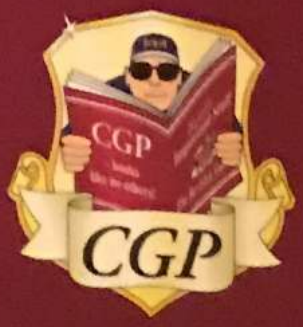

11+

Maths: Word Problems

Ages

10-11

The 10-Minute Tests

Book 2

CGP

Maths: Word Problems

For the CEM (Durham University) test

Practise • Prepare • Pass

Everything your child needs for 11+ success

CGP

Maths:
Word Problems

The 11+
10-Minute Tests

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Book 2

Ages
10-11

Practise • Prepare • Pass

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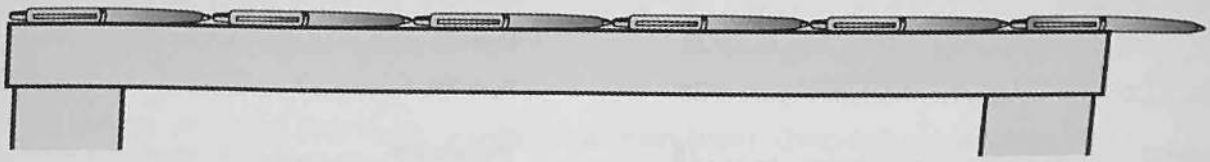
Test 1

You have **10 minutes** to do this test. Work as quickly and accurately as you can.

1. A football stadium has 75 542 seats. 4201 seats were left empty during a match. How many seats were filled?

2. Bethany wants to know how long her desk is but she has lost her measuring tape. She lines some pens up across the length of the desk.



She knows that each pen is 10 cm long.
Which of these is the length of Bethany's desk? Circle the correct option.

A 70 cm **C** 55 cm **E** 45 cm
B 60 cm **D** 65 cm

Zola's baby brother has a circular paddling pool.

3. Zola measures the diameter of the paddling pool. The diameter is 101 cm. What is the radius of the paddling pool?

. cm

4. The paddling pool holds 108 litres of water. Zola's dad fills up the paddling pool using a bucket. The bucket can hold 13 litres of water. What is the minimum number of times that Zola's dad will need to fill the bucket so that he can completely fill the pool? Circle the correct option.

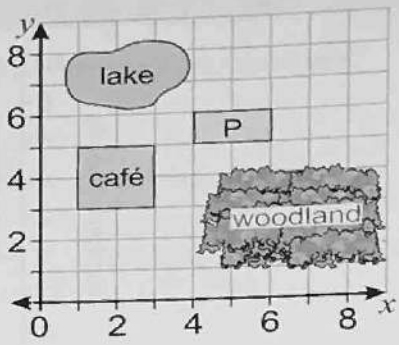
A 6 **C** 9 **E** 12
B 8 **D** 11

5. A plan of an area of land owned by Appleton council is shown below.

Appleton council want to move the play area, P, so that they can build a fountain in its place. The play area cannot be moved to the areas occupied by the lake, café or woodland.

Which of the following translations shows a possible new position of the play area?

Circle the correct option.



A 3 squares left and 2 squares up.

B 2 squares right and 4 squares down.

C 2 squares left and 1 square down.

D 3 squares left and 5 squares down.

E 1 square left and 2 squares up.

A balloon salesman has two different colours of string for tying to his balloons.
He has 121 m of blue string, which he cuts into 11 equal lengths.
He has 96 m of silver string, which he cuts into 8 equal lengths.

6. How much longer is each piece of silver string than each piece of blue string? Give your answer in cm.

☐☐☐ cm

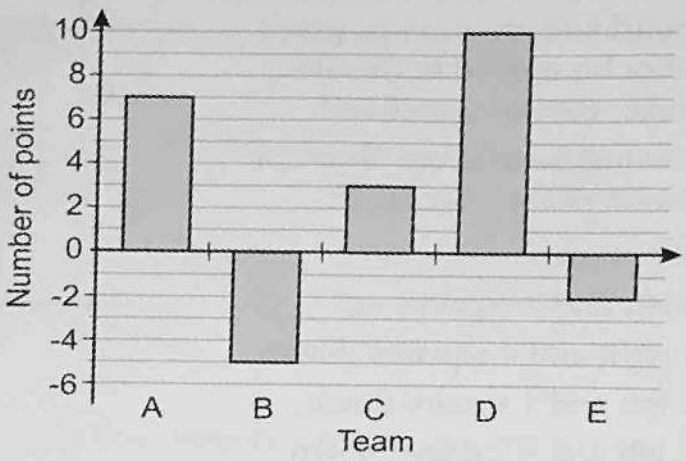
7. The salesman sells balloons with blue string for £2.00 each and balloons with silver string for £3.00 each. He sells twice as many blue-string balloons as silver-string balloons. He sells 30 balloons in total. How much money did the salesman make?

£☐☐.☐☐

8. There are 4550 people in a shopping centre.
$\frac{1}{5}$ of the people are at least 50 years old.
How many people in the shopping centre are younger than 50 years old?
Circle the correct option.

A 910 **B** 4095 **C** 2730 **D** 3640 **E** 3590

Five teams take part in a football tournament.
The points each team has at the end of the tournament are shown in the bar chart below.



9. What is the difference between the numbers of points won by the teams in first and last places?

10. The scoring system for the tournament is shown on the right.
Which of the following shows the results of Team E's matches?
Circle the correct option.

Points per game	
win:	+3 points
draw:	+1 point
lose:	–2 points

A won: 1, drew: 2, lost: 1

B won: 2, drew: 2, lost: 0

C won: 0, drew: 2, lost: 2

D won: 0, drew: 3, lost: 1

E won: 2, drew: 1, lost: 1

Sabah gets £1.25 pocket money every week.
She then gets an extra 70 pence for every chore that she does.

11. Sabah does 6 chores. How much pocket money will she get?

£ .

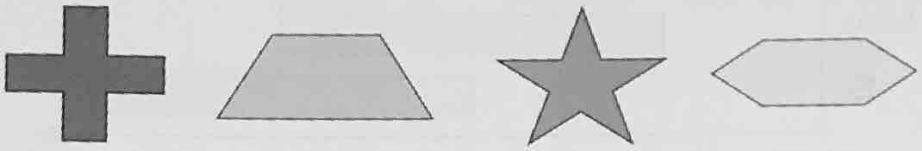
12. The next week, Sabah gets £9.65.
How many chores did Sabah do during that week?

/ 12

Test 2

You have **10 minutes** to do this test. Work as quickly and accurately as you can.

1. Niall uses the shapes below to help him remember his 4-digit passcode.



Each digit is equal to the number of lines of symmetry in each shape.
What is Niall's passcode?

2. Jansen records the number of birds that he sees each day for 5 days.
He saw 92 birds in total over the 5 days

	Day 1	Day 2	Day 3	Day 4	Day 5
Frequency	13	22	11		29

How many birds did Jansen see on Day 4?

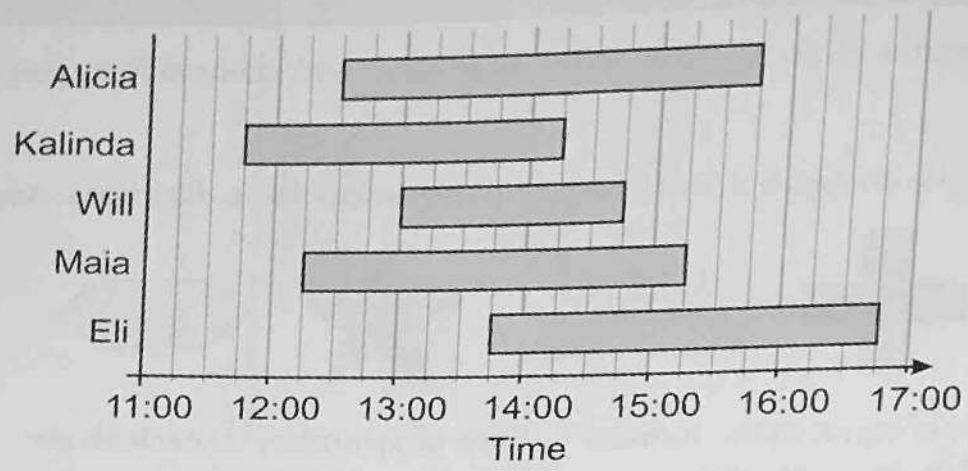
3. Jacob has made 110 cookies to sell at a bake sale.
He has made 30 toffee cookies. The rest are chocolate chip.
What fraction of the cookies are chocolate chip? Circle the correct option.

A $^{3}/_{11}$ **C** $^{7}/_{11}$ **E** $^{30}/_{110}$
B $^{3}/_{8}$ **D** $^{8}/_{11}$

4. Sierra was 1.2 m tall. Since then, her height has increased by 10%.
How many centimetres tall is Sierra now?

cm

The chart below shows the times that five different children were at the beach.



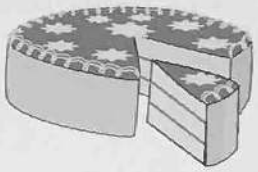
5. How much longer was Alicia at the beach than Will?

☐ hour(s) and ☐☐ mins

6. Which child left the beach 90 minutes before Eli? Circle the correct option.

A Alicia **B** Kalinda **C** Will **D** Maia **E** Impossible to tell

Michael is making cakes for a village fete.
Each cake is made from 3 sponge layers.
Each cake will be cut into 8 slices.



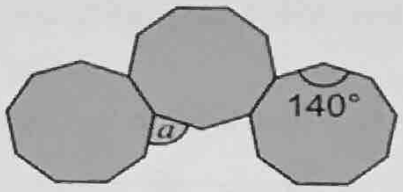
7. How many sponge layers does Michael need to bake so that there are 152 slices of cake? Circle the correct option.

A 18 **B** 45 **C** 51 **D** 57 **E** 60

8. Michael sells each slice for £1.15. He sells 130 slices in total. How much money does he make?

£☐☐☐.☐☐

Ali is designing a new nature area for her school.
Her design is made up of three regular-nonagon-shaped gardens.



not drawn accurately

9. What is the size of angle a?

□□□°

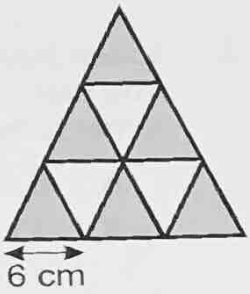
10. The perimeter of the nature area will be 4140 cm.
What is the length of each side of the gardens? Circle the correct option

A 90 cm **C** 180 cm **E** 220 cm
B 100 cm **D** 200 cm

Ross makes a tower by stacking identical blue triangles.

11. The base of each triangle is 6 cm. The area of each triangle is 21 cm^2.
What is the height of the tower? Circle the correct option.

A 12 cm
B 18 cm
C 21 cm
D 24 cm
E 28 cm



12. Ross adds rows to the tower so there are now 7 blue triangles at the tower's base.
The total number of blue triangles in a tower can be found using the formula:

$$n(n + 1) \div 2$$

where n is the number of blue triangles at the base of the tower.
How many blue triangles has Ross used for the new tower?

□□

/ 12

Test 3

You have **10 minutes** to do this test. Work as quickly and accurately as you can.

1. The spots on opposite faces of a dice add up to 7. Jed lines up the 5 dice below.

What is the total of the spots on the opposite faces of the dice?

☐☐

Karen is buying some fabric.

2. One type of fabric costs £4.80 per metre.
How much would 5 m of this fabric cost?

£☐☐.☐☐

3. Karen buys a different piece of fabric.
The piece of fabric is a rectangle 1.76 m wide and 9 m long.
What is the area of this piece of fabric? Circle the correct option.

A 0.1584 m^2 **C** 1.584 m^2 **E** 1584 m^2
B 15.84 m^2 **D** 158.4 m^2

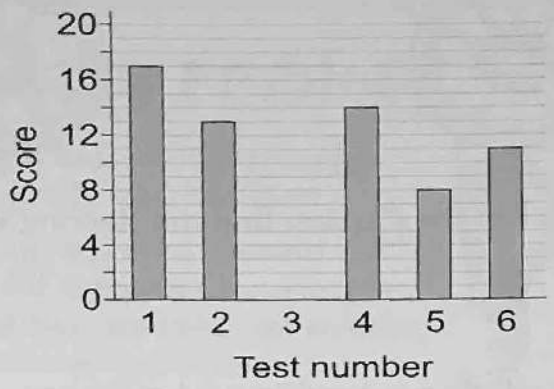
4. Mac sells one raffle ticket each to 200 people.
16% of these won a prize in the raffle.
How many of these people didn't win a prize? Circle the correct option.

A 32 **B** 68 **C** 84 **D** 168 **E** 184

5. Selina is thinking of a number. She squares the number and adds 3, to get 52. What number was Selina thinking of?
Circle the correct option.

A 3.5 **B** 7 **C** 8 **D** 14 **E** 16

Rhiannon does a 20-question arithmetic test each week for six weeks.
She gets 1 point for each correct answer.
The bar chart shows the number of points that she scores in the test each week.



6. How many more points in total did Rhiannon score in the first two tests than in the last two tests?

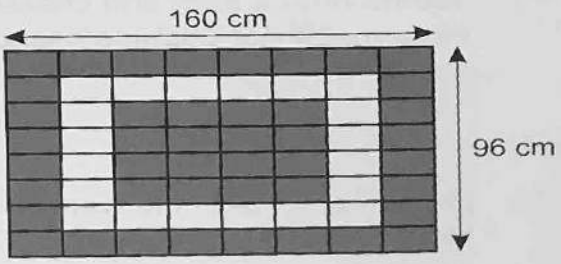
☐☐

7. Rhiannon has lost her score for Test 3.
Her teacher says that Rhiannon's mean score for the 6 tests is 12.
What score did Rhiannon get in Test 3? Circle the correct option.

A 6 **C** 7 **E** 9
B 8 **D** 11

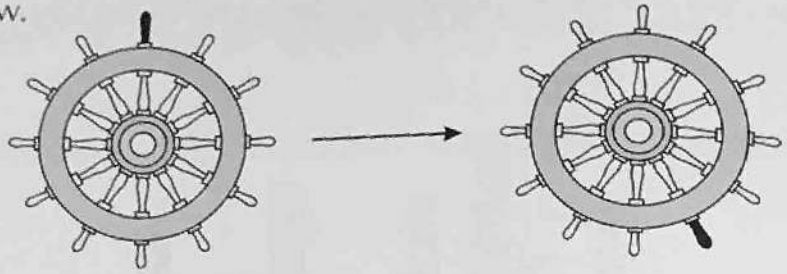
8. The blanket on the right has been made from equally-sized blue and white patches.

What is the total area of the 20 white patches?



☐☐☐☐ cm^2

9. A captain turns the steering wheel of her boat less than a full turn clockwise. The position of the steering wheel before and after the turn is shown in the diagram below.



By how many degrees did the Captain turn the steering wheel?

[ ][ ][ ]°

10. On Monday, Phillipa's dad gave her 60p pocket money. Each day that week, her dad gave her double the amount of pocket money that she got the day before. How much pocket money did Phillipa get in total from Monday to Friday?

£[ ][ ].[ ][ ]

At Sally's Sandwiches, the price of each sandwich is calculated using the formula:

Price (£) = $1.25 + 0.5x + 0.3y + 0.2z$

Where, x is the number of different main fillings,
y is number of salad fillings,
z is the number of sauces.

Main Fillings			
Ham	Chicken	Cheese	Tofu
Salad Fillings			
Lettuce	Tomato	Cucumber	Avocado
Sauces			
BBQ	Mustard	Mayonnaise	

11. Sabina buys a ham and cheese sandwich with tomato, cucumber and mayonnaise. How much does Sabina's sandwich cost?

£[ ].[ ][ ]

12. David has £3.50. He wants a sandwich with chicken, cheese and BBQ sauce. How many salad fillings can David afford to add to his sandwich? Circle the correct option.

A 1 **B** 3 **C** 4 **D** 6 **E** 7

/ 12

Puzzles 1

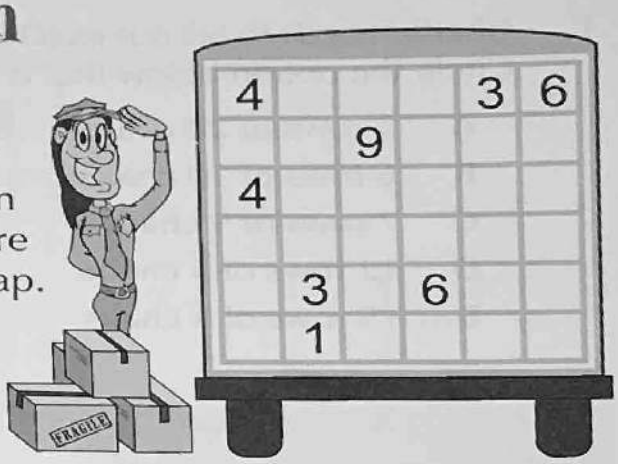
Now for a break from 10-minute tests. Try out your skills on these puzzles.

Penny's Packing Problem

Oh no! Somebody has erased Penny's plan for fitting all of her parcels into her post van.

Help Penny by drawing a parcel around each number in the grid. All the parcels are square or rectangular and no two parcels can overlap. There are no gaps between parcels.

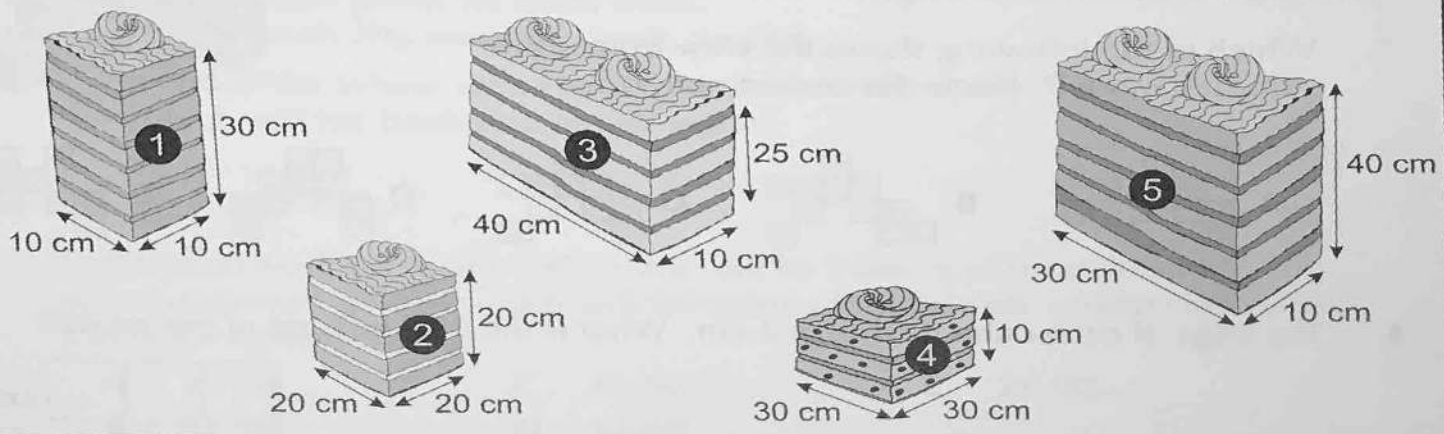
The numbers tell you how many squares each parcel covers. For example, a parcel around the number 4 could be a square or rectangle, e.g.:



Nanny Carol's Cakes

Nanny Carol made a cake for each of her grandsons but she can't remember which cake is for which grandson. Use these clues to help her work it out.

The top of Bill's cake and the top of Clive's cake have the same area.
Dave's cake's volume is the same as the volumes of two other cakes added together.
Adam's cake is 50% taller than Clive's cake. Ed's cake is the one that's left.



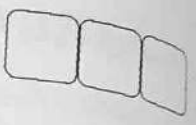
Test 4

You have **10 minutes** to do this test. Work as quickly and accurately as you can.

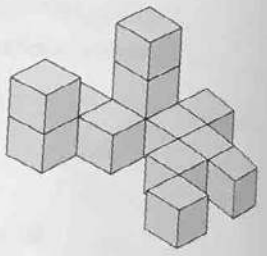
1. Charlie needs to set out exactly 60 chairs for a show.
Circle the option below that is not a way that he could do this.

A 3 rows of 20 chairs
B 6 rows of 10 chairs
C 7 rows of 9 chairs
D 12 rows of 5 chairs
E 15 rows of 4 chairs

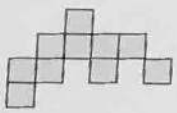
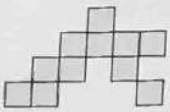
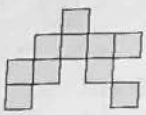
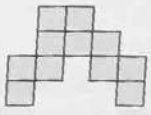
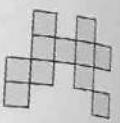
2. There are 54 people working at a shop. The manager hires more people, which increases the number of staff members by $\frac{1}{3}$.
How many people now work at the shop?



Acacia makes a model from 13 cubes.
Her model is shown on the right.



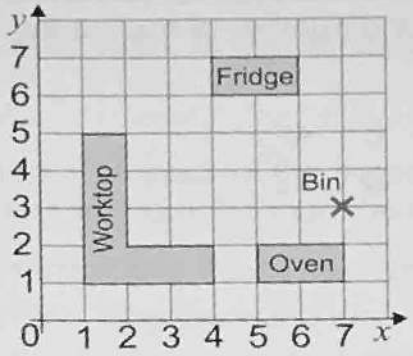
3. Which of the following shows the view from above Acacia's model? Circle the correct option.

A 
B 
C 
D 
E 

4. The edge of each cube measures 2 cm. What is the total volume of the model?

 cm^3

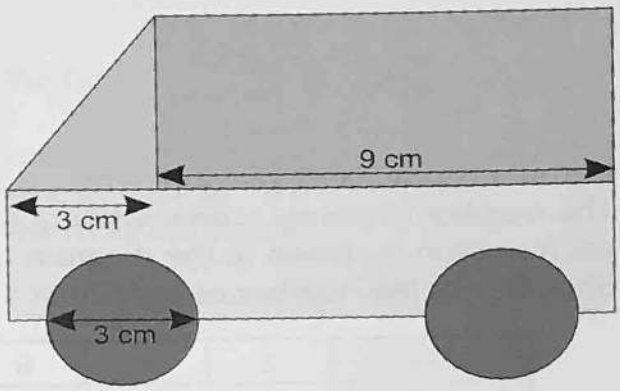
5. Elaine draws a plan of her kitchen on the coordinate grid below. Elaine wants the bin to be closer to the worktop, so she moves it 5 squares left and 3 squares up.



What are the new coordinates of the bin?

(☐ , ☐)

6. Aurelia draws a van using two identical circles, a triangle and two rectangles. The widths of some of the shapes are shown in the diagram.
Each rectangle has an area of 36 cm^2.



What is the height of the van?
Circle the correct option.

A 7.5 cm **D** 9.5 cm
B 8 cm **E** 10 cm
C 8.5 cm

In class 5E, pupils earn points for good work.
Every 5 points is worth 20p towards a book voucher.

7. At the end of the school year, Felicity has earned 235 points.
How much will her book voucher be worth?

£ ☐☐.☐☐

8. Tom's good work earns him 240 points, but he loses $\frac{1}{8}$ of his points for poor behaviour. By how much will the value of Tom's book voucher decrease?
Circle the correct option.

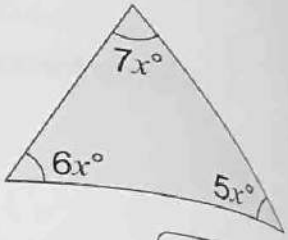
A £0.90 **C** £1.50 **E** £6.00
B £1.20 **D** £3.60

9. At a wedding, there is a total of 101 men and women.
There are 7 more women than men.

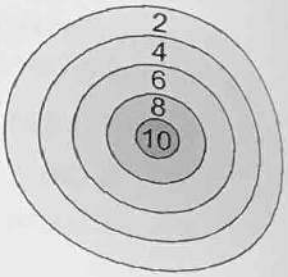
Which of the following is the number of men at the wedding?
Circle the correct option.

A 44 **B** 46 **C** 47 **D** 52 **E** 54

10. Peter draws a scalene triangle.
The size of the angles in the triangle are shown on the right.
What is the value of x?



Camilla is practising playing darts.
The number of points scored when a dart lands in each section is shown in the diagram on the right.
She records the number of times that a dart lands in each section.



Section	2	4	6	8	10
Frequency	31	19	15	12	7

11. In which section did Camilla score the most points in total?
Circle the correct option.

A 2 **B** 4 **C** 6 **D** 8 **E** 10

12. What is the mean number of times that a dart landed in each section?

/ 12

Test 5

You have **10 minutes** to do this test. Work as quickly and accurately as you can.

1. Jasper is buying a new house. The price of the house is £349 950.
What is the price of the house in words? Circle the correct option.

   A Three hundred and ninety-four thousand, nine hundred and fifty pounds
   B Three hundred and forty-nine thousand and ninety-five pounds
   C Three million, four hundred and ninety thousand, nine hundred and fifty pounds
   D Three hundred and forty-nine thousand, nine hundred and fifty pounds
   E Thirty-four thousand, nine hundred and ninety-five pounds

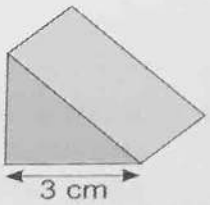
2. Miriam has 11 bags of rubbish to take out to the bin.
She can carry a maximum of 3 bags at a time.
The distance between her house and the bin is 6.5 m.
What is the minimum distance that she will have to walk to take all of the bags of rubbish to the bin and return to her house?

   ☐☐.☐ m

3. Mason's playlist has 550 songs on it.
40% of the songs are rock songs, 50% are pop songs and the rest are hip hop songs.
How many songs on Mason's playlist are hip hop songs? Circle the correct option.

   A 55 **B** 65 **C** 105 **D** 155 **E** 165

4. Holly has a cube of cheese.
She cuts the cube of cheese diagonally into two equal pieces.
A diagram of one of the pieces of cheese is shown on the right.
What is the volume of one piece of cheese?

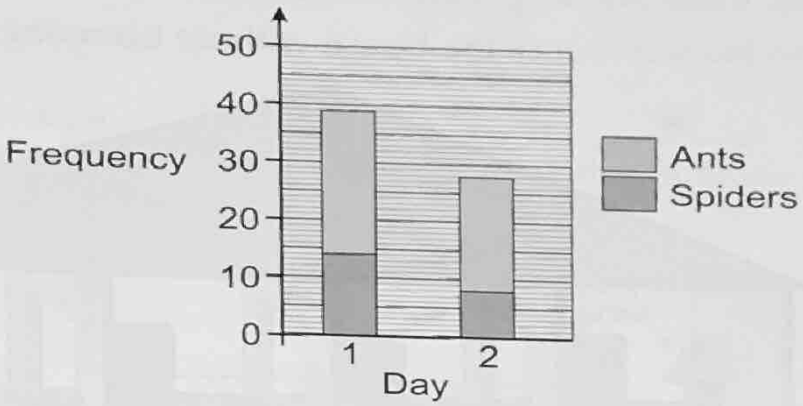


   ☐☐.☐ cm^3

10. Marcel wins £480 in a competition.
He gives 35% of his winnings to 3 of his friends, who each get the same amount.
How much money does Marcel give to each of his friends?
Circle the correct option.

A £48 **B** £56 **C** £66 **D** £96 **E** £168

Daniel collects some ants and spiders from his garden on two different days.
He records the number of ants and spiders collected each day in the chart below.



11. What fraction of the ants collected over the 2 days were collected on day 1?
Circle the correct option.

A $^4/_9$ **B** $^4/_5$ **C** $^1/_2$ **D** $^5/_9$ **E** $^3/_5$

12. To work out the total number of legs (l) of the ants and spiders collected on one day, Daniel uses the formula $l = 6a + 8s$, where a is the number of ants collected and s is the number of spiders collected.
What was the total number of ant and spider legs on day 1?

/ 12

Puzzles 2

Now for a break from 10-minute tests. Try out your skills on this puzzle.

Haunted House

Arthur is in a haunted house and there are ghosts hiding in some of the rooms. He has a list of maths problems to help him find out which rooms are safe. Each room contains a number. If this number is the answer to one of the maths problems, there are no ghosts hiding in that room.

Help Arthur find his way out of the house without bumping into any ghosts.

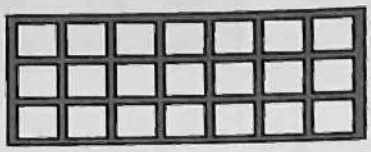
Safe Rooms

$194 \div 2$
$-12 + 27$
$119 \div 7$
$11.86 + 11.14$
$3^2 + 4^2$
$12 + 56 - 34$
$39 \div 3$
11×12
$253 - 137$
$108 \div 9$
$32 \div 2^3$
$100 - 17$

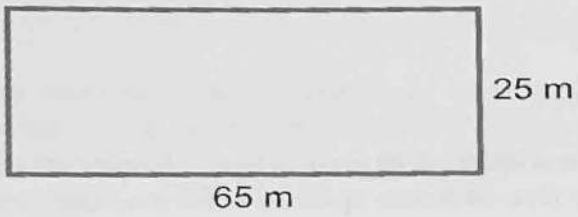
Test 6

You have **10 minutes** to do this test. Work as quickly and accurately as you can.

1. Lina has a tray of ice cubes, as shown.
She drops one ice cube and splits the rest equally between five glasses of lemonade.
How many ice cubes does she put in each glass?



Mo is learning to ice-skate.
He skates around the perimeter of the rectangular rink shown below.



2. What distance will Mo have skated in one lap of the rink?

m

3. What is the minimum number of laps that Mo will need to do to skate at least 2 km?

4. Mo starts skating at 12:56 and stops at 13:11, after skating 10 laps. How many minutes does it take for Mo to skate each lap? Circle the correct answer.

A 0.5 **B** 1 **C** 1.5 **D** 2 **E** 2.5

Five friends are preparing for an exam. They each take two practice tests one month apart, to see how much they have improved. Their scores are shown in the table below. Both tests are out of the same number of marks.

	Ana	Baz	Cat	Dil	Eve
Test 1	76	42	78	68	89
Test 2	84	63	81	91	65

5. One person had a higher mean score over the two tests than any of the other friends. What was this person's mean score?

6. Baz had the biggest increase in score between the two tests as a percentage of his score in test 1. What was this percentage?

%

A packet of crisps usually contains 150 g of crisps. A special offer packet has '40% extra free'. Cal buys five of these special offer packets, which cost £1.99 each.

7. How much change will Cal get if she pays with a £10 note?

£ .

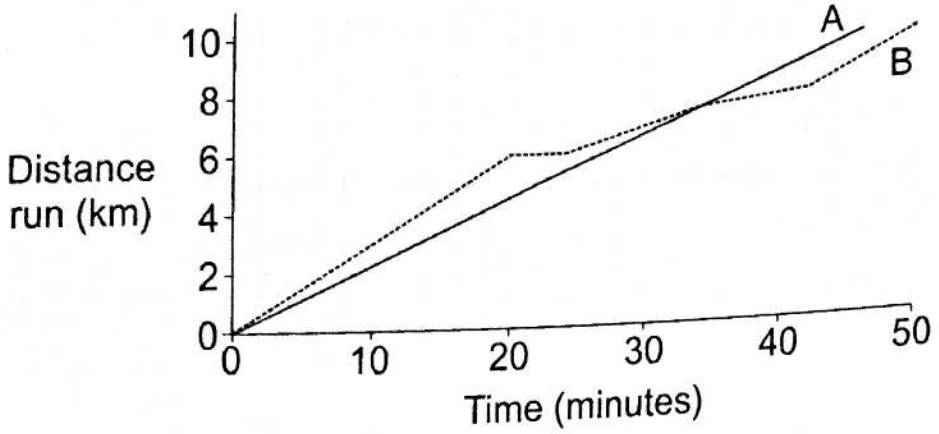
8. What is the total mass, in kg, of crisps that Cal buys?

 . kg

9. Cal wants to share the crisps equally between 25 people at a party. What mass of crisps will each person get? Circle the correct answer.

A 24 g **B** 32 g **C** 35 g **D** 40 g **E** 42 g

Dev, Tina and Scott take part in a 10 km race.
The graphs below show the progress made by two of the three runners during the race.



10. The race began at 10:32. Circle the time that runner A overtook runner B.

A 10:52 **B** 10:56 **C** 11:06 **D** 11:14 **E** 11:22

11. Dev ran 0.2 km every minute without stopping. Tina took 22 minutes to reach the halfway point. Scott took 4 minutes to run the final kilometre. Circle the option that correctly matches the graphs to the runners.

A A is Dev, B is Tina
B A is Tina, B is Scott
C A is Dev, B is Scott
D A is Tina, B is Dev
E A is Scott, B is Tina

12. Molly is reducing the price of everything in her shop by 10%.
Which of the following formulas should she use to calculate the reduced prices, R, from the full prices, F? Circle the correct option.

A $R = F - 10$
B $R = F - 0.1$
C $R = F \div 10$
D $R = F - 10F$
E $R = F - (F \div 10)$

/ 12

Test 7

10

You have **10 minutes** to do this test. Work as quickly and accurately as you can.

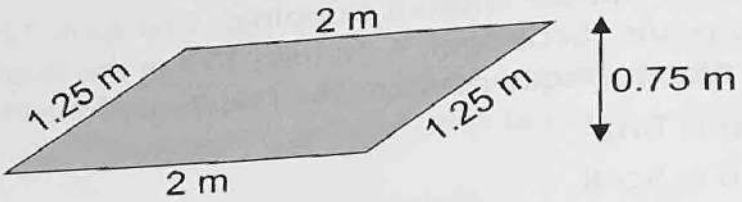
1. Ulrich gets a cheque for 'three hundred and sixteen thousand and eight pounds'. Write this amount in digits.

£ ☐☐☐☐☐☐

2. It is 17:00 on Wednesday, and Lucy's flight leaves at 11:00 on Friday. How many hours are there until her flight?

☐☐ hours

Daisy has a parallelogram-shaped flower bed, as shown below.



3. Fencing is sold in 1 m rolls. How many rolls must Daisy buy to go around the edge of the flower bed?

☐☐

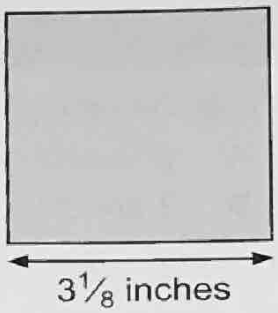
4. What is the area of the flower bed? Give your answer in m^2.

☐.☐☐ m^2

5. Daisy plants 40 seeds in the flower bed. 32 of these grow into plants. What fraction grow into plants? Circle the correct answer.

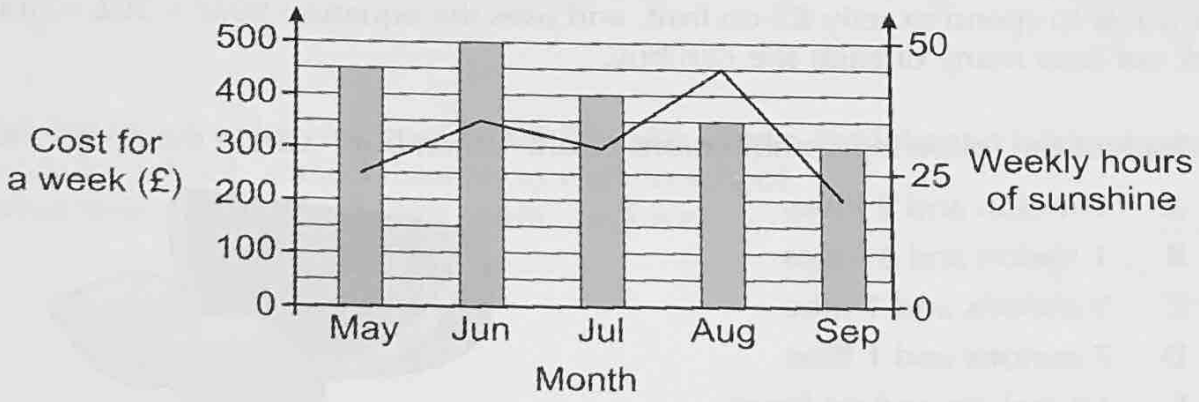
A $\frac{3}{4}$ **B** $\frac{4}{5}$ **C** $\frac{5}{6}$ **D** $\frac{6}{7}$ **E** $\frac{7}{8}$

6. Lisa wants to buy some antique tiles.
She is told they are $3\frac{1}{8}$ inches wide.
What is the total width of a row of 16 of these tiles?
Circle the correct answer.



A 48 inches
B $48\frac{1}{8}$ inches
C $48\frac{1}{2}$ inches
D 49 inches
E 50 inches

The cost of a week's stay in a holiday cottage in Sunny Hamlet varies throughout the year. This is shown on the line graph below. The average weekly hours of sunshine each month is shown as a bar chart.



7. What is the difference in price between a week in the cottage in the sunniest month, and a week in the cottage in the least sunny month?

£ [ ][ ][ ]

8. Steph wants to spend no more than £300 for a week in the cottage, and wants as much sunshine as possible.
Circle the best month for Steph to book a stay in the cottage.

A May
B June
C July
D August
E September

Prime numbers are used to make and crack codes.
Alan is looking for two prime numbers to multiply together to make a code.

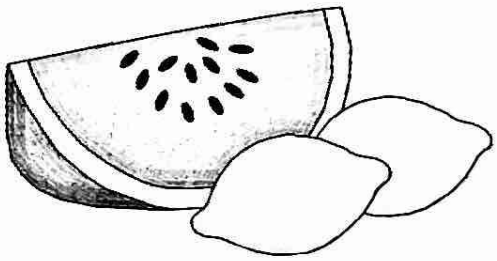
9. Circle the option below which shows two prime numbers.

A 2 and 37 **C** 4 and 29 **E** 7 and 92
B 3 and 27 **D** 5 and 85

10. Alan has picked 53 as one prime number, and wants to multiply it by the largest prime below 53. What answer will he get?

Althea needs to buy a number of melons, M, and a number of limes, L.
Melons cost 90p each, and limes cost 30p each.
Althea wants to spend exactly £3 on fruit, and uses the equation $90M + 30L = 30$
to work out how many of each she can buy.

11. Which of the following combinations could Althea buy? Circle the correct



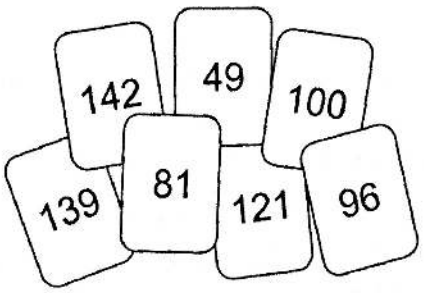
A 1 melon and 9 limes
B 1 melon and 3 limes
C 3 melons and 1 lime
D 7 melons and 1 lime
E 10 melons and no limes

12. Althea actually buys twice as many limes as melons.
How many pieces of fruit does she buy in total?

Test 8

You have **10 minutes** to do this test. Work as quickly and accurately as you can.

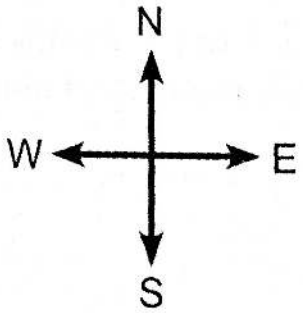
1. Damien has the set of seven cards shown below.
From this set, he picks the one which has the highest square number written on it.
What number is written on Damien's card?



2. Debbie needs to be at school by 08:50. She knows she takes an hour to get ready for school, and 25 minutes to walk to school.
What time should she set her alarm clock for?

:

3. Robbie is practising turns on a skateboard.
He starts facing East (E) and does two 360° turns clockwise, followed by one 90° turn anticlockwise.
Which direction is he now facing (N, E, W or S)?



4. Olive has a 1 litre bottle of plant food. She feeds her plant using 25 ml of the plant food each week. How many weeks will one bottle of plant food last for?

5. Piotr has rubbed the paint off one of his calculator number buttons.
He presses the following buttons:

9	×	2		−		=

He gets the answer 220. What is the missing number? Circle the correct option.

A 1 **B** 3 **C** 4 **D** 5 **E** 8

6. Jen and Ben are writing sequences.
Jen's sequence starts at 1 and increases by 7 each term.
Ben's sequence starts at 100 and decreases by 7 each term.
On which term number will Jen's sequence be larger than Ben's?

7. Entrants in a maths contest have to take an entrance test. They are then put into teams of four, so that the team has a mean test score of 7. Five friends enter the contest, and get the following test scores:

Rachid: 10 Jaden: 9 Ash: 7 Elisha: 5 Sonja: 4

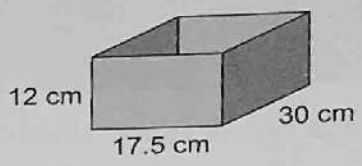
Which of the friends should not be included to make a team of four?
Circle the correct answer.

A Rachid **B** Jaden **C** Ash **D** Elisha **E** Sonja

8. The temperature in a room is –3 °C.
Holly switches on a heater, which heats the room by 2 °C every minute.
How many minutes will it take for the room to heat up to 17 °C?

minutes

9. Nancy is tidying away her toy blocks into a cuboid-shaped box, as shown here. The blocks are cubes, with a width of 5 cm. How many cubes can she fit in the box?



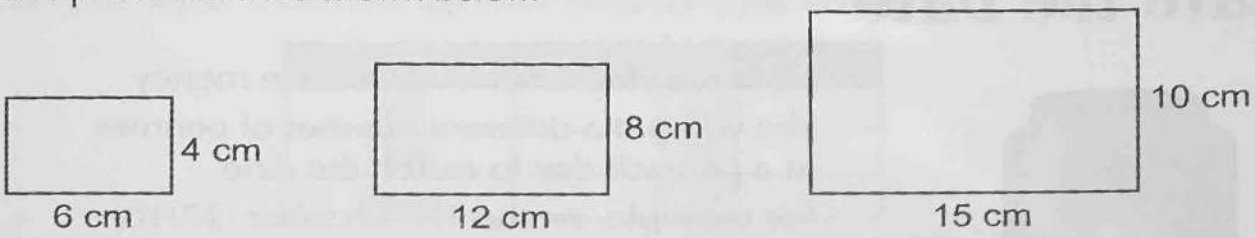
Jean's grandson Johnny was born on Jean's 50th birthday. Jean and Johnny now have a total age of 80.

10. How old is Johnny now?

11. In ten years' time, what fraction of Jean's age will Johnny's age be? Circle the correct answer.

A $^1/_5$ **B** $^1/_4$ **C** $^1/_3$ **D** $^1/_2$ **E** $^3/_4$

12. A photographer prints photos in a variety of sizes. The ratio of the width to the height of a photo is always the same. Three photo sizes are shown below.



Circle the expression below which gives the width of a photo with height x.

A $x + 2$
B $2x$
C $3x$
D $1.5x$
E $^2/_3x$

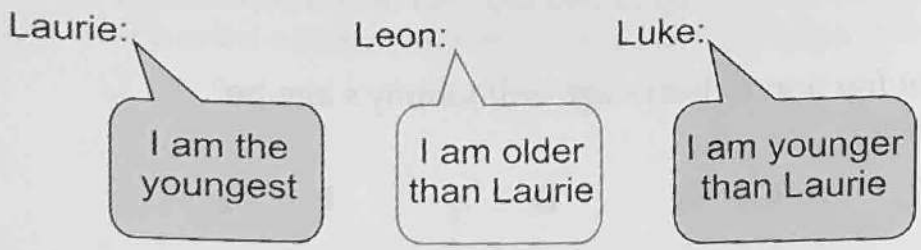
/ 12

Puzzles 3

Now for a break from 10-minute tests. Try out your skills on these puzzles.

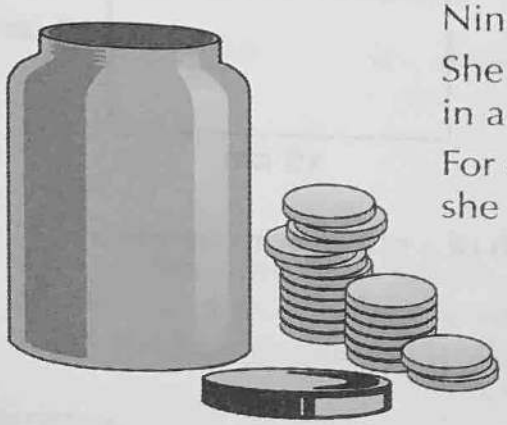
An Age-Old Problem

George has three nephews, Laurie, Leon and Luke.
He is trying to work out how old Laurie is.
Two of the nephews always tell lies. The other always tells the truth.
Here's what they have to say about their ages...



George knows that the boys have a mean age of 8, that their ages are evenly spread, and that the youngest boy was born 6 years after the oldest.
Can you help George work out Laurie's age?

Save the Date



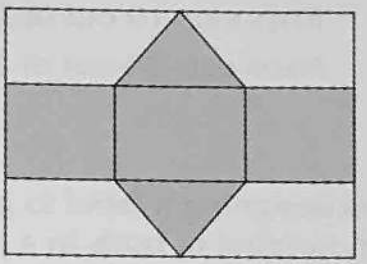
Nina is trying a new way to save money.
She will put a different number of pennies in a jar each day to match the date.
For example, on the 17th October (17/10) she would save $17 \times 10 = 170$p.

She starts this new saving scheme on the 30th May.
On what date will she have more than £5 in her money jar?

Test 9

You have **10 minutes** to do this test. Work as quickly and accurately as you can.

1. Liam draws a net on a piece of card, as shown below.
Circle the shape that Liam's net will make.



A Cube
B Cuboid
C Cylinder
D Pyramid
E Triangular prism

2. A dance class has more than 20 but fewer than 30 members.
The class members can dance in pairs or in threes with no one left out.
How many members does the class have?

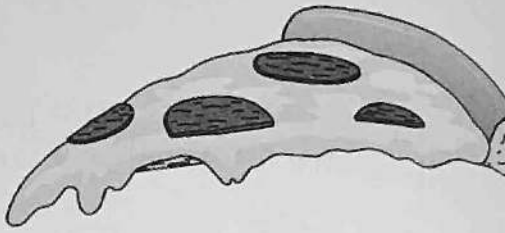
3. In a vegetable growing contest, gardeners compete to grow the heaviest carrot.
The table below shows the top three entrants in the contest.

Gardener	Mass of carrot (kg)
Bill	7.099
Bob	7.901
Betty	7.191

Who should win 1st, 2nd and 3rd prize? Circle the correct answer.

A 1st: Bill, 2nd: Bob, 3rd: Betty
B 1st: Bill, 2nd: Betty, 3rd: Bob
C 1st: Bob, 2nd: Bill, 3rd: Betty
D 1st: Bob, 2nd: Betty, 3rd: Bill
E 1st: Betty, 2nd: Bob, 3rd: Bill

4. Five friends have an identical pizza each. Each friend cuts their pizza into a different number of equally-sized slices. Circle the friend below who eats a different amount of pizza to the other friends.



A Paul eats 2 out of 3 slices of his pizza.

B Zac eats 6 out of 9 slices of his pizza.

C Nate eats 4 out of 6 slices of his pizza.

D Rhys eats 10 out of 12 slices of his pizza.

E Nico eats 20 out of 30 slices of his pizza.

5. Saif is designing a label to go on packs of cotton buds. He needs to include the mean number of buds in a pack. He counts the number in five of the packs:

160 159 155 165 161

What number should Saif put on the label for the mean number of buds in a pack?

6. Max sees the following written on an old building:

FIRST BUILT MDCCCLXXXVI
RESTORED MCMLXXX

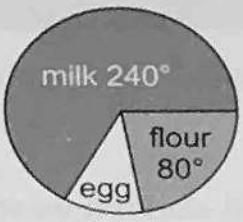
How many years after it was built was the building restored?

7. Mia wants to draw a regular pentagon. She knows the angles inside must add up to 540°. How big should she draw the first angle?

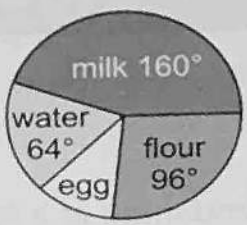
°

8. Layne wants to paint a rectangular wall, which is 2.5 m high and 10 m wide. Each tin of paint will cover an area of 7.5 m^2. How many tins will she need to buy?

The pie charts below show the ingredients in two different recipes for pancakes.



Recipe 1
450 g total



Recipe 2
450 g total

9. Circle the statement which is not true.

A Recipe 2 contains more flour than recipe 1.

B Flour makes up less than $^1/_4$ of recipe 1.

C Both recipes use the same amount of egg.

D Egg makes up more than 10% of recipe 1.

E Milk makes up $^1/_3$ of recipe 2.

10. How much milk is used in recipe 1? Give your answer in grams.

☐☐☐ g

Tia has a job delivering leaflets to houses. She estimates that the job will take her 25 minutes to walk to the first house, 1 minute for every leaflet she delivers, then another 20 minutes to walk home after delivering the final leaflet.

11. Circle an expression below that Tia could use to calculate the total time for the job, in minutes, if she delivers n leaflets.

A $45n$ **B** $25n + 20$ **C** $25 + 20n$ **D** $45 + n$ **E** $45 - n$

12. Tia gets paid 10p for every leaflet delivered.
How much would she get paid if the job took her a total time of 2 hours?

£☐☐.☐☐

/ 12

Test 10

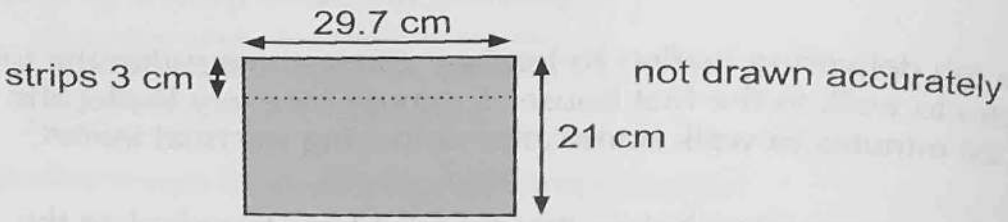
You have **10 minutes** to do this test. Work as quickly and accurately as you can.

Over three matches, the attendances at a football stadium were:
27 664, 23 500 and 26 739.

1. What is the smallest attendance, rounded to the nearest 1000?

2. What is the difference between the largest and second largest attendance?

Jessie cuts strips of coloured paper from sheets of paper like the one below.
She cuts all the strips parallel to the long edge, as shown. Each strip is 3 cm wide.



3. Jessie has 100 sheets of coloured paper.
How many strips can she cut in total?

4. Jessie wants to draw circles on some of the strips.
How big should the radius of each circle be to fit the width of the strip exactly? Circle the correct answer.

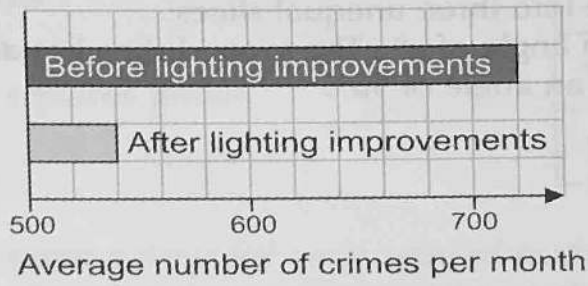
A 6 cm **B** 3 cm **C** 2 cm **D** 1.5 cm **E** 1 cm

5. Ben takes two teaspoons of sugar in his tea. Each teaspoon of sugar weighs 4 g. How many cups of tea will he make before his 1 kg bag of sugar is used up?

6. One pint is approximately 568 ml.
Zara has 11 pints of orange juice and wants to pour the juice into litre bottles.
How many bottles will she need? Circle the correct answer.

A 5 **B** 6 **C** 7 **D** 12 **E** 20

People in Dimton receive a leaflet to inform them of the drop in crime in the town since street lighting was improved. The letter includes the following bar chart.



7. Why might the people in Dimton find the bar chart misleading?
Circle the correct option.

A The bars should be vertical not horizontal.
B There should be at least 3 bars.
C The scale on the horizontal axis is not evenly spaced.
D The scale on the horizontal axis does not start at zero.
E The scale on the horizontal axis should go up in 10s.

8. By what percentage has the number of crimes each month fallen?

A 10% **B** 20% **C** 25% **D** 50% **E** 90%

Puzzles 4

Now for a break from 10-minute tests. Try out your skills on this puzzle.

Red and Yellow and Pink and Green...

Rosie wants to colour in the numbers on a grid to help her learn the square, cube and prime numbers. She has four different coloured pens: red, yellow, pink and green.

She colours the square, cube and prime numbers each in a different colour, and uses the other colour for any remaining numbers.

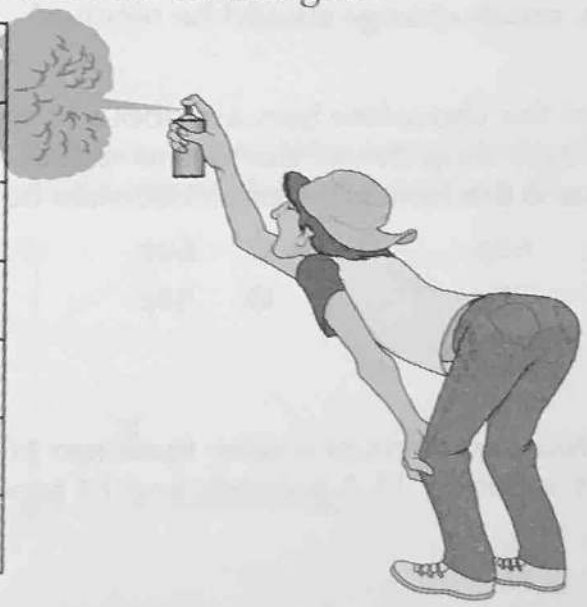
For the grid on the right, Rosie colours:

- 7 squares red
- 3 squares yellow
- 5 squares pink
- the rest of the squares green

2	3	4	5
6	7	8	9
10	11	12	13
14	15	16	17

Rosie then uses the same colour for each type of number on the grid below. How many squares of each colour will there be on this grid?

2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	32	33	34	35	36
37	38	39	40	41	42	43
44	45	46	47	48	49	50



Test 11

You have **10 minutes** to do this test. Work as quickly and accurately as you can.

1. In 2016, the population of a country was 65 111 143.
What is the value of the 5 in this figure? Circle the correct option.

A 500 **C** 5 000 000 **E** 500 000

B 5000 **D** 50 000

2. A full water tank starts to leak at a rate of four litres every hour.
After 14 hours, the tank is empty. What is the capacity of the water tank?

☐☐☐ litres

A school tuck shop's price list is shown below.

Chocolate bar	79p
Crisps	65p
Fizzy pop	80p

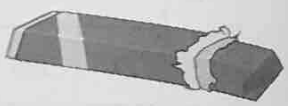
3. Chris buys one of each item and pays with a £5 note.
How much change should he receive?

£☐.☐☐

4. All of the chocolate bars are about to go out of date.
The tuck shop owner decides to reduce their price by 20%.
What is the new price of a chocolate bar? Circle the correct option.

A 62p **C** 60p **E** 50p

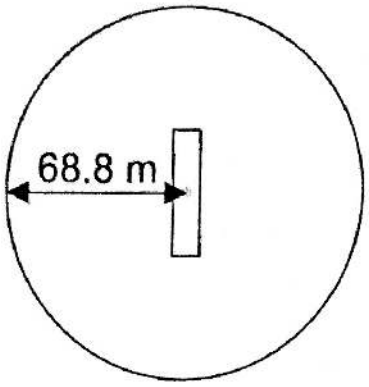
B 56p **D** 58p



5. All four members of a relay team run 100 m each. Their times are 10.2 seconds, 12.3 seconds, 11.5 seconds and 14 seconds. What is the mean of these four times?

☐☐ seconds

The diagram below shows a circular cricket ground.



6. The radius of the cricket ground is 68.8 m. What is its diameter?

□□□.□ m

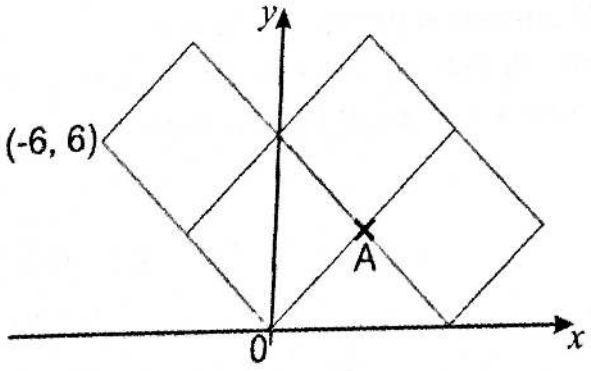
7. The radius of the ground is increased by 25%.
What is the new radius of the ground?

□□□ m

8. Darragh thinks of a sequence. The first number in his sequence is 34, the second is 43, the third is 53 and the fourth is 64.
What is the sixth number in the sequence? Circle the correct option.

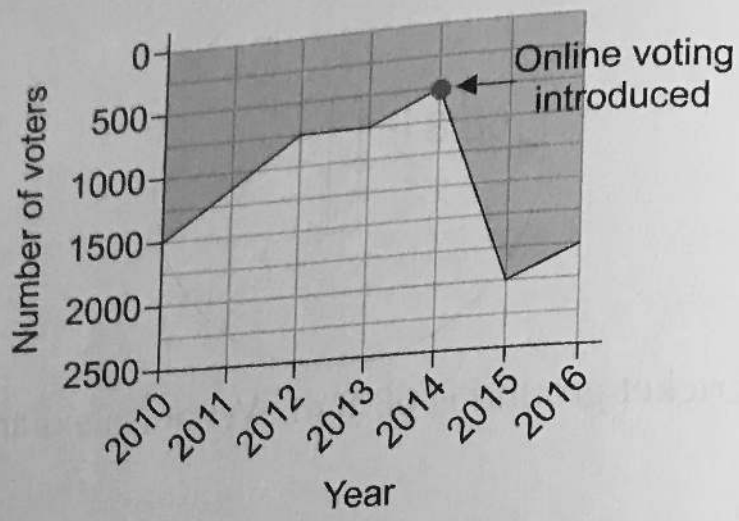
A 103 **B** 89 **C** 76 **D** 86 **E** 93

9. Safron draws four identical squares on the axes below. The coordinates of one corner are shown. What are the coordinates of the point marked A?



(□, □)

10. The graph below shows the number of people who voted for the contestants on a TV talent show.



Which of the following statements about the graph is not true? Circle the correct option.

A There were the same number of voters in 2012 and 2013.

B There were 250 more voters in 2016 than in 2010.

C The number of voters fell by 1500 after online voting was introduced.

D The lowest number of voters was 500.

E The number of voters fell by 250 between 2015 and 2016.

11. A window cleaner needs 300 millilitres of soap to clean 6 m^2 of window. If the soap is sold in 200 millilitre bottles, what area of window could he clean with 16 bottles of soap? Circle the correct option.

A 60 m^2 **C** 72 m^2 **E** 58 m^2

B 54 m^2 **D** 64 m^2

12. Lauren has used 30 units of water in her home this month. Her water bill in pounds for n units is given by the expression $1.2n + 19.99$. How much will Lauren's water bill be this month?

£ ☐☐.☐☐

Test 12

You have **10 minutes** to do this test. Work as quickly and accurately as you can.

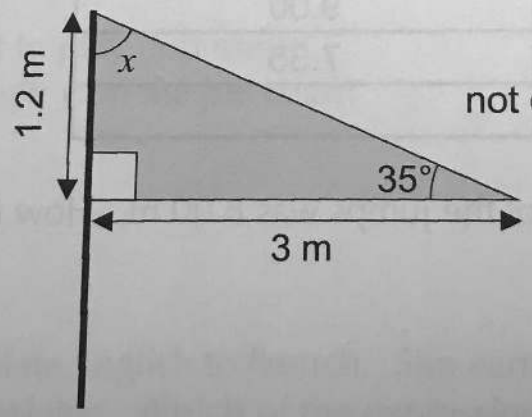
1. The train journey from Cambridge to London takes 53 minutes.
A train leaves Cambridge at 11:25. What time does the train arrive in London?

☐☐:☐☐

2. Aaron is buying supplies for his garden. He buys 0.65 kg of bird seed, 500 g of daffodil bulbs, 1300 g of compost, 0.9 kg of fertiliser and a spade weighing 1.6 kg. What is the second heaviest item that Aaron buys? Circle the correct option.

A Compost **C** Bird seed **E** Daffodil bulbs
B Spade **D** Fertiliser

The diagram below shows a flag.



3. What is the area of the flag?

☐.☐ m^2

4. What is the size of angle x? Circle the correct answer.

A 55° **C** 125° **E** 100°
B 180° **D** 145°

Chloe completes a 100-word typing exercise on a computer in 86.687 seconds.

5. Circle the best estimate for the number of seconds it would take Chloe to type 500 words.

A 360 seconds
B 490 seconds
C 400 seconds
D 510 seconds
E 435 seconds

6. Siobhan takes 4 tenths of a second longer than Chloe to complete the 100-word speed typing exercise. How long does it take Siobhan to complete the exercise?

□□.□□□ s

7. The results of a long jump competition are shown in the table below.

Athlete	Length of jump (m)
Anne	8.65
Ben	6.90
Clint	9.00
Daisy	7.35
Edward	

The mean length of all of the jumps was 8.00 m. How far did Edward jump?

□.□□ m

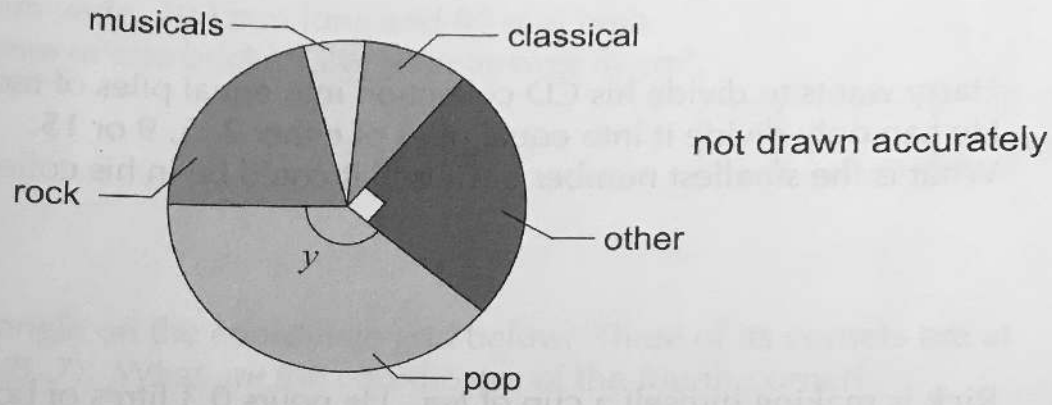
8. Branislav receives a monthly salary of £2130. He spends $\frac{1}{2}$ of his salary on rent and bills, and another $\frac{1}{3}$ on his car. How much money does he have left over each month? Circle the correct option.

A £475 **B** £255 **C** £325 **D** £355 **E** £450

9. David writes out the first four terms of a sequence. These are 1, 5, 13 and 29. Each term is found by multiplying the previous term by 2 and adding 3. Which of these numbers would not appear if he continued writing his sequence? Circle the correct option.

A 61 **B** 125 **C** 256 **D** 509 **E** 1021

A conductor asks a band of 80 musicians what kind of music they want to play. He puts their responses into the pie chart below.



10. 60% of the musicians who said 'other' want to play jazz music. How many of the musicians want to play jazz?

11. Thirty musicians want to play pop music. What is the size of angle y on the pie chart?

°

12. Abigail's job is to translate English to French. She earns £30 a day, as well as 5p for every word she translates. Which of the expressions below shows the number of pounds that Abigail earns on a day when she translates w words? Circle the correct option.

A $0.05w + 30$ **B** $30w + 5$ **C** $5w + 30$ **D** $w(0.05 + 30)$ **E** $30w + 0.05$

/ 12

Test 13

10

You have **10 minutes** to do this test. Work as quickly and accurately as you can.

1. A gardener records the average temperature in his greenhouse on five different days. The temperatures are 33.28 °C, 28.95 °C, 26.29 °C, 41.74 °C and 36.43 °C. When these temperatures are written in order from lowest to highest, which value is in the middle?

□□.□□ °C

2. Harry wants to divide his CD collection into equal piles of more than one CD. He can only divide it into equal piles of either 3, 5, 9 or 15. What is the smallest number of CDs that could be in his collection?

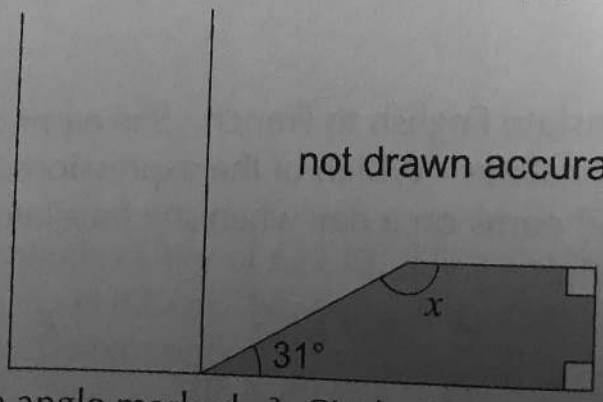
□□□

3. Rick is making himself a cup of tea. He pours 0.3 litres of boiling water into a mug and adds 25 ml of milk. What is the total volume of Rick's cup of tea? Circle the correct option.

A 0.325 litres **C** 0.525 litres **E** 0.55 litres

B 55 ml **D** 0.355 litres

4. The diagram below shows the side view of a doorstop placed at the foot of a door.



What is the size of the angle marked x? Circle the correct answer below.

A 131° **C** 59° **E** 159°

B 149° **D** 180°

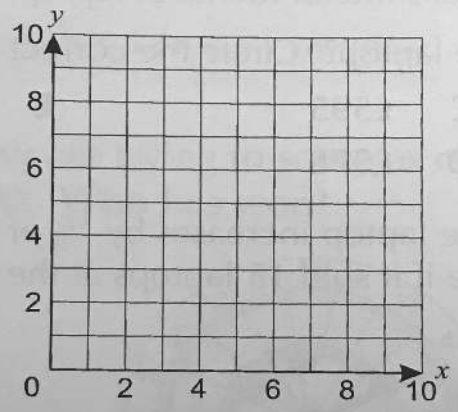
5. The credits at the end of a film say that it was made in the year MMVII.
A sequel to this film is made seven years later.
What year does it say in the credits of the sequel? Circle the correct option.

A MCXIV **B** MVIII **C** MMXIV **D** MMC **E** MMXXI

6. A brick is 100 mm wide, 200 mm long and 60 mm high.
What is the volume of one brick? Give your answer in cm^3.

☐☐☐☐ cm^3

7. Ella draws a rectangle on the coordinate grid below. Three of its corners are at (2, 3), (2, 7) and (8, 7). What are the coordinates of the fourth corner?

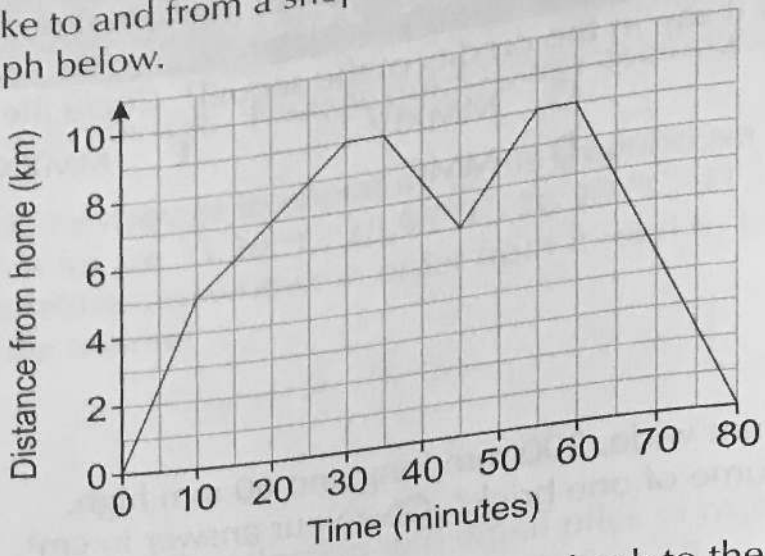


(☐, ☐)

8. Ruby practises playing the piano once a week. She wants to double the amount of time she spends practising each week until she is playing for over 2 hours each week. In Week 1, Ruby practises for 12 minutes.
In which week will Ruby play for over 2 hours for the first time?

☐☐

9. Roger rode his bike to and from a shop. He recorded his whole journey on the distance-time graph below.



On the way home, Roger realised he needed to go back to the shop. How far had Roger cycled in total before turning back to the shop?

☐☐ km

During a sale, a computer shop sells fifteen identical laptops for a total of £8670.

10. What is the sale price of one laptop? Circle the correct answer.

A £619 **B** £541 **C** £595 **D** £578 **E** £482

11. After the sale, the price of the laptop increases by $\frac{1}{5}$ of the sale price. How much money would the shop make if it sold 15 laptops at the new price?

£☐☐☐☐☐

12. During the day, a taxi driver charges a basic fare of £2.50, plus 50p per kilometre travelled. At night, the driver increases the basic fare by £1.50 and raises the price per kilometre by 25p. Which of the following expressions gives the cost in pounds of a k kilometre journey at night? Circle the correct option.

A $4k + 0.75$ **B** $4 + 0.75k$ **C** $75k + 4$ **D** $k(4 + 0.75)$ **E** $2.50 + 1.75k$

/ 12

Puzzles 5

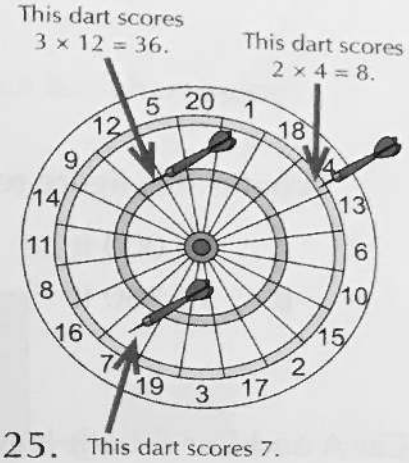
Now for a break from 10-minute tests. Try out your skills on this puzzle.

Board Games

Darts that land in each segment of a dartboard score a different number of points.

Darts in white segments score the number on the outside. Darts in the shaded outer ring score double this value, and darts in the shaded inner ring score three times the value.

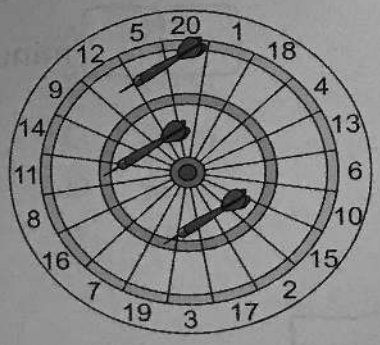
Darts in the small circle in the centre of the board score 50, and those in the shaded ring around it score 25.



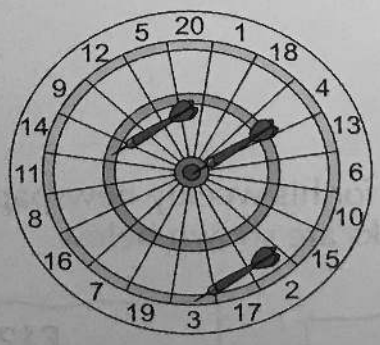
So the three darts in the example shown would score...

$$7 + (2 \times 4) + (3 \times 12) = 51 \text{ points}$$

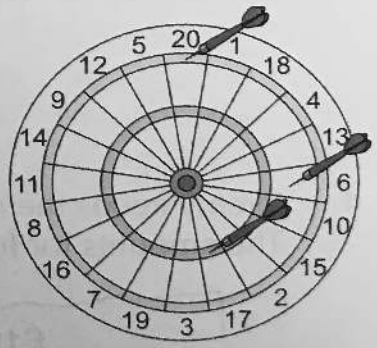
The three players below are trying to score as close to 100 points as possible, without going over 100. Who has won?



Dart Garfunkel



Helena Bonham Darter



Dartin Clunes

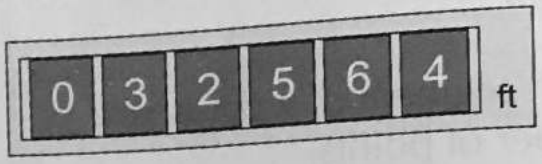
Too easy for you? Try these darts brain teasers...

- What is the highest score that can be achieved with 3 darts?
- What is the lowest score that **CANNOT** be achieved with a single dart?

Test 14

You have **10 minutes** to do this test. Work as quickly and accurately as you can.

1. A pilot checks a meter in the cockpit to see how high his plane is flying.



What is this figure rounded to the nearest hundred feet? Circle the correct option.

A 33 000 ft **C** 30 000 ft **E** 32 600 ft

B 32 560 ft **D** 32 500 ft

Car A and Car B both leave the start line of a circular race track at the same time.

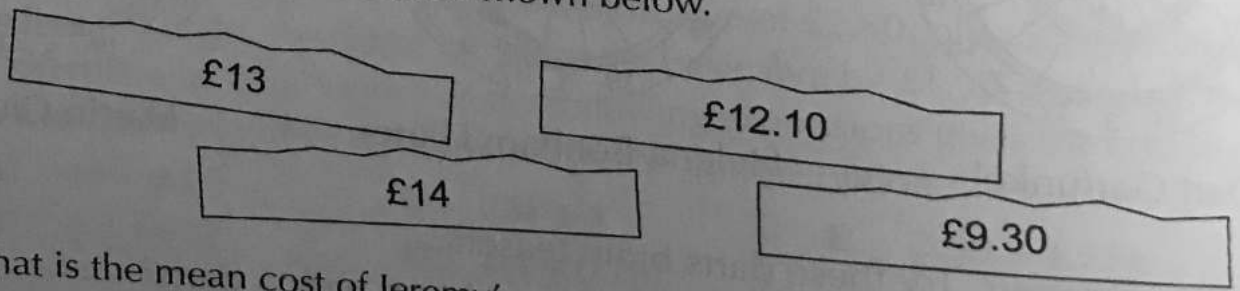
2. The track is 5.5 km long. How far will each car have travelled after completing four laps of the track?

□□.□ km

3. Car A takes 6 minutes to complete one lap of the track and Car B takes 7 minutes. After how many minutes will both cars cross the start line at the same time again?

□□ minutes

4. Jeremy keeps the receipts for his weekly newspaper bill. The amounts for four weeks are shown below.



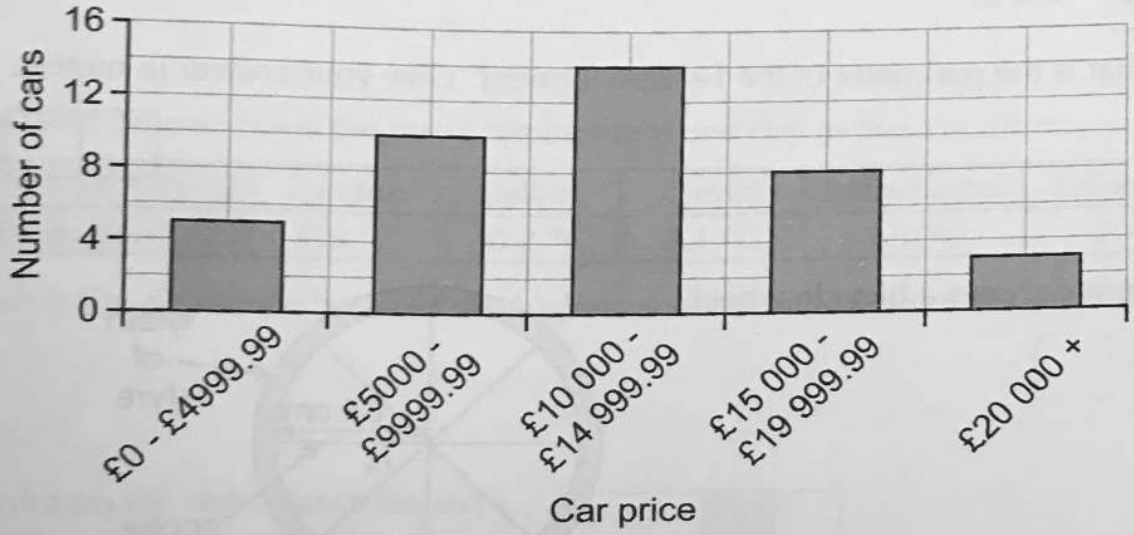
What is the mean cost of Jeremy's newspaper bill for these four weeks?

£□□.□□

5. A hockey team plays 55 matches in a season. It wins $^{6}/_{11}$ of these matches.
How many matches does the hockey team not win? Circle the correct option.

A 5
B 7
C 25
D 30
E 35

6. The prices of cars on sale in a car showroom are shown in a bar chart below.



Sandy wants to buy a car from the showroom for less than £20 000.
She doesn't want to buy a car for less than £5000.
What percentage of the cars on sale can Sandy buy? Circle the correct option.

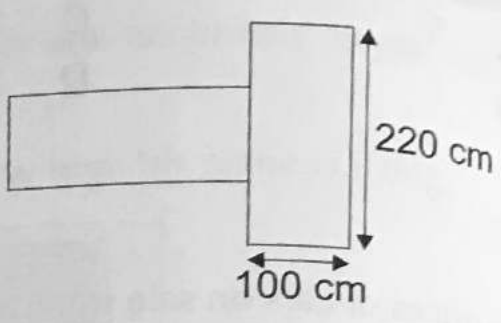
A 75%
B 70%
C 80%
D 60%
E 85%

7. When Isabel arrives at work in the morning, the big hand on the clock is pointing at XI and the little hand is pointing just before IX.
How long is it until Isabel's lunch break at 13:30?

☐☐ hours ☐☐ minutes

At a party, two identical rectangular tables are put together to form a T-shape, as shown.

8. What is the total area of the two tables?
Circle the correct option.



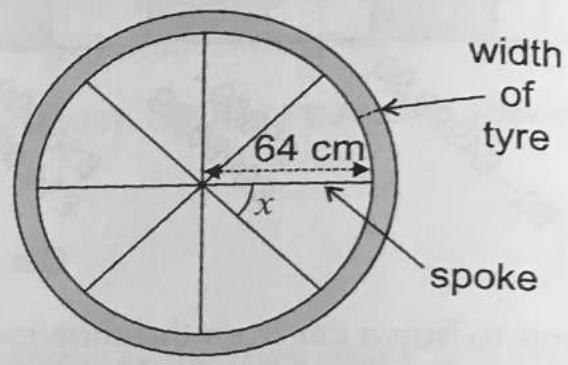
A 0.44 m^2
B 4400 cm^2
C 2200 cm^2
D 44 m^2
E 4.4 m^2

9. What is the perimeter of the T-shape formed? Give your answer in metres.

.

m

The diagram shows a bicycle wheel.



10. What is the size of the angle marked x?

°

11. The length of one spoke on the wheel is 64 cm.
The width of the bicycle tyre is $^1/_{16}$ of the length of one spoke.
What is the total diameter of the wheel?

cm

12. Luke writes out a sequence. The first six numbers in his sequence are 1, 1, 2, 3, 5, 8.
Each number in the sequence is the sum of the previous two numbers.
Which term in the sequence will be the first to be greater than 100?
Circle the correct option.

A 12th term
B 10th term
C 15th term
D 9th term
E 13th term

/ 12

Test 15

You have **10 minutes** to do this test. Work as quickly and accurately as you can.

1. A farmer uses 4 bales of hay each day to feed 12 horses.
How many bales of hay would he need each day if he owned 30 horses?

☐☐

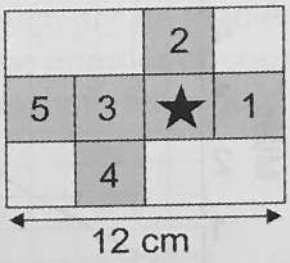
2. The table below shows the mean temperature one day in five UK cities.

City	London	Belfast	Cardiff	Manchester	Edinburgh
Temperature (°C)	4.6 °C	–0.2 °C	2.1 °C	1.3 °C	–2.4 °C

What is the difference between the highest and lowest temperatures shown?

☐.☐ °C

The diagram on the right shows the net of a cube drawn on a piece of card.



3. When the net is folded into a cube, which face will be opposite the face marked with a star? Circle the correct option.

A 1 **B** 2 **C** 3 **D** 4 **E** 5

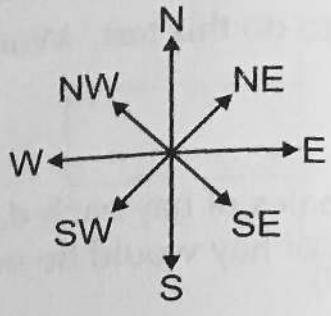
4. What is the volume of the cube?

☐☐ cm^3

5. A recipe for 25 cookies requires 225 g of butter. Simon has exactly the right amount of butter to make 20 cookies. How much butter does Simon have?

☐☐☐ g

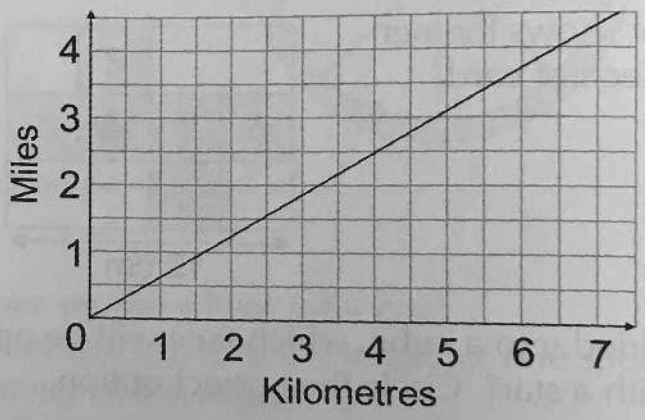
6. Tracey is facing south west. She turns clockwise until she is facing east. How many degrees clockwise does she turn through? Circle the correct option.



A 225°
B 180°
C 245°
D 135°
E 310°

7. A teacher gives her class twenty-five days to read a book with 850 pages. Alice starts reading the book on Day 1. She reads 50 pages each day until she finishes the book. How many days does Alice have to spare before the 25 days are up?

Tony uses the graph below to convert the number of kilometres he drives to and from work each day into miles.



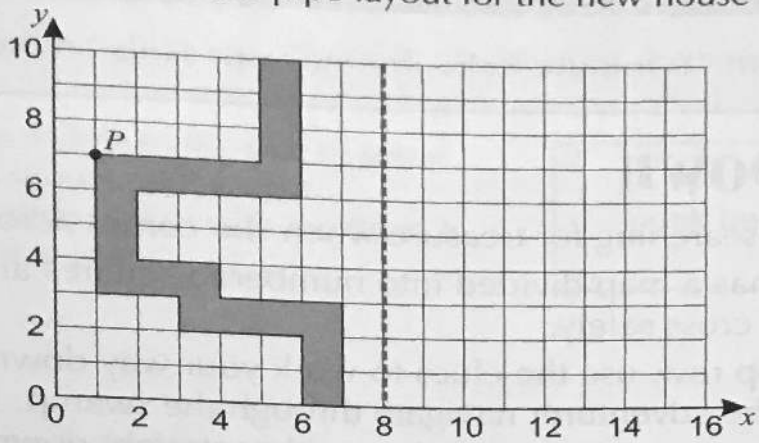
8. Tony drives 36 kilometres in total each day. Using estimation, convert this distance into miles. Circle the correct option.

A 15.2 miles
B 22.4 miles
C 29.8 miles
D 18.9 miles
E 27.1 miles

9. Tony's car uses 9 litres of petrol for every 100 km travelled. How much petrol does Tony's car use in five days of travelling to and from work?

A 4 litres
B 13.5 litres
C 16.2 litres
D 18 litres
E 17.1 litres

10. The coordinate grid below shows the pipe layout under a house.
A plumber needs to reflect the pipe layout for the new house next door.



The dashed line shows the wall between the two houses. This is the mirror line.
What are the coordinates of the reflection of point P?

(☐☐ , ☐☐)

11. A board game contains 56 counters, which are divided equally among the players. Each player receives a prime number of counters.
What is the minimum number of players that there could be?

☐☐

12. A waiter is paid £6.95 an hour. He is also given 50% of any tips given each evening. Which of the expressions below can be used to calculate the waiter's pay in pounds, on an evening when he worked for h hours and there were t pounds given as tips? Circle the correct option.

A $(6.95 + 50)t$
B $6.95h + 50t$
C $6.95h + (t \div 2)$
D $(0.5 + 6.95)h$
E $0.5h + 6.95t$

/ 12

Puzzles 6

Now for a break from 10-minute tests. Try out your skills on these puzzles.

Bogged Down

An adventurer is searching for treasure when she comes across a swamp. Fortunately, she has a map divided into numbered squares and a series of clues to help her cross safely.

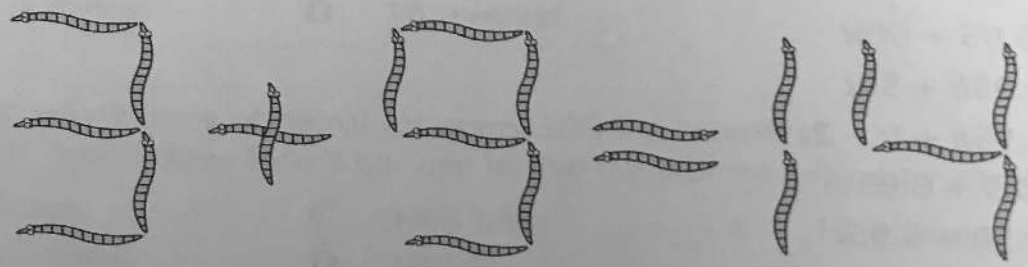
Starting on the top row, use the clues to work your way down to the bottom of the grid to help the adventurer navigate through the swamp. You can only move one square at a time, either straight down or diagonally.

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56
57	58	59	60	61	62	63	64

- The smallest prime number.
- 13 more than −3.
- The number that is written XIX in Roman numerals.
- 14% of 200.
- 6 squared.
- The next number in this sequence: 73, 64, 56, 49, ...
- The number that is $^{13}/_{16}$ of the highest number on the grid.
- The highest prime number on the grid.

Muddy Maths

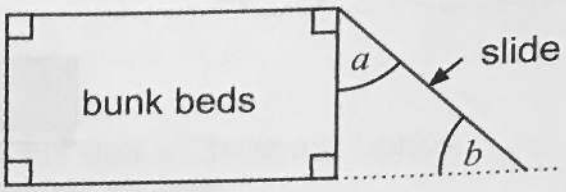
Bertie is using the worms in his back garden to practise his sums, but one of them seems to have wriggled out of position. Make the sum below correct again by moving only one worm.



Test 16

You have **10 minutes** to do this test. Work as quickly and accurately as you can.

1. David attaches a slide to the side of some bunk beds, as shown on the right.
The angle the slide makes with the floor, b, is 53°. What size is angle a?



□□□°

2. One chocolate bar weighs 50 g. A box containing 1500 g of chocolate bars arrives at the supermarket. How many chocolate bars are in the box?
Circle the correct option.

A 35 **C** 15 **E** 50
B 30 **D** 10

Michelle has recorded a podcast show which is 105 minutes long.
She needs to add four adverts into it to break up the show into five equal parts.

3. How long will the show last in total, including the adverts, if each advert is $3\frac{1}{2}$ minutes long?

□□□ minutes

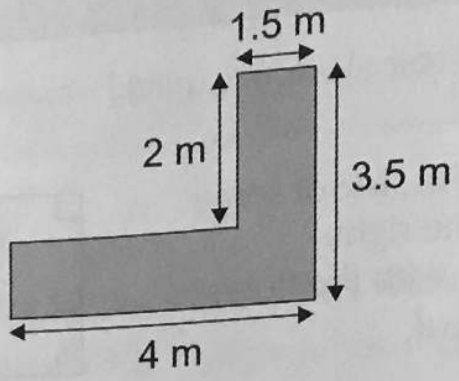
4. How far into the show should Michelle put the first advert?
Circle the correct answer.

A 15 minutes **C** 21 minutes **E** 31 minutes
B 17 minutes **D** 25 minutes

5. A new toy has just come into stock in three different stores.
The first store has 225 in stock.
The second store has $\frac{4}{5}$ of the amount in the first store.
The third store has a quarter of the amount in the second store.
How many of the new toys does the third store have in stock?

□□□

Jason has an L-shaped sofa. The view from above the sofa is shown here.



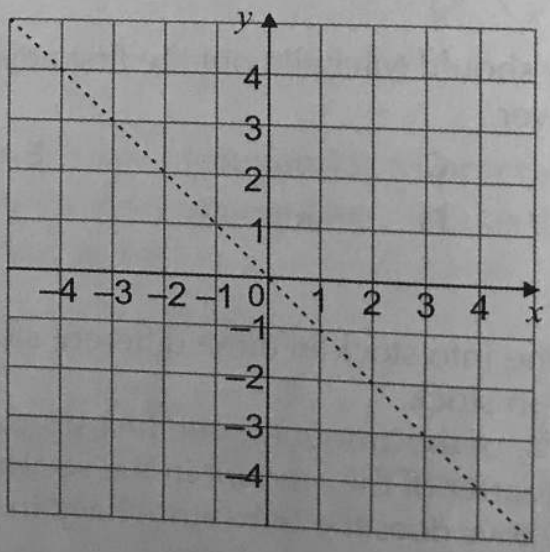
6. What is the perimeter of Jason's sofa?

m

7. What area of the floor is taken up by Jason's sofa?

m²

8. The grid below shows the area of a park.
There are trees planted at each of the four corners of a kite shape on the grid.
Three of the corners have the coordinates (–3, 3), (–3, 0) and (2, –2).
The dashed line shows the line of symmetry of the kite shape.
What are the coordinates of the fourth corner?



(,)

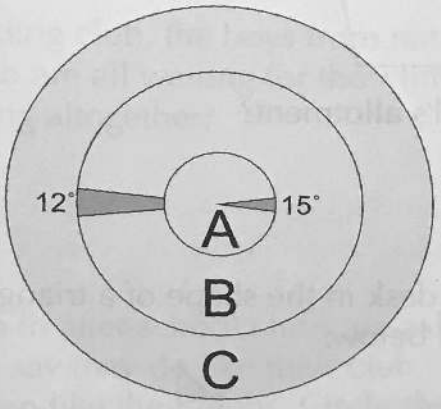
9. A book was on sale in a shop for £19. Its price was reduced by 20%.
Amy bought the book and used a voucher at the till which gave her 5% off the sale price.
How much did Amy pay for the book?

£ ☐☐.☐☐

10. The boss of a small company wants to give all of his staff a Christmas bonus.
He has a total of £9823 to share out equally between 19 staff.
How much will each member of staff receive as a Christmas bonus?

£ ☐☐☐.☐☐

11. Harriet is cutting up a wedding cake with three circular layers, A, B and C.
She cuts the wedding cake into a total of 118 slices.
Slices from layer A measure 15° each. Slices from layer B measure 12° each.



Top view of wedding cake

How many slices of wedding cake are from layer C?

☐☐☐

12. George is y cm tall. Louise is 3 cm shorter than George.
Duncan is twice as tall as Louise. How tall is Duncan in terms of y?
Circle the correct option.

A $y - 3 \times 2$ **C** $3y - 2$ **E** $3y + 2$

B $2y - 3$ **D** $2(y - 3)$

/ 12

Test 17

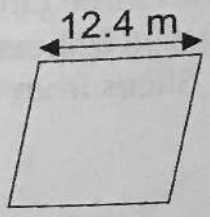
You have **10 minutes** to do this test. Work as quickly and accurately as you can.

1. Chocolate bars costs 55p, but if you buy three chocolate bars you get one free. Mohammad has £2. How many chocolate bars can he get? Circle the correct option.

A 2 **C** 4 **E** 6

B 3 **D** 5

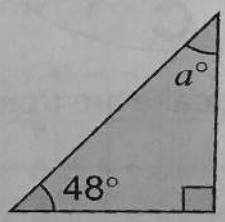
2. Rashid's allotment is the shape of a rhombus, as shown.



What is the perimeter of Rashid's allotment?

□□.□ m

3. Sharon has a footrest under her desk in the shape of a triangular prism. The end of the footrest is shown below.



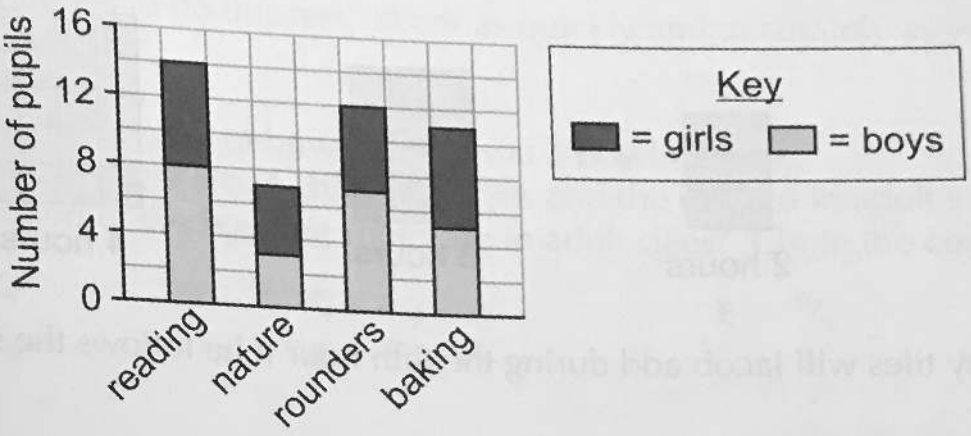
What is the size of angle a?

□□°

4. A bucket has 600 ml of water in it. Leo adds 21% more water to the bucket. How much water does the bucket now contain?

□□□□ ml

The Rose School has four different after-school clubs. The number of pupils in each club is shown in the graph below. Each pupil can only belong to one club.



5. How many more girls are in rounders club than in nature club?

6. The girls from reading club, the boys from nature club and half of the children from rounders club are all waiting for their lifts home together. How many children are waiting altogether?

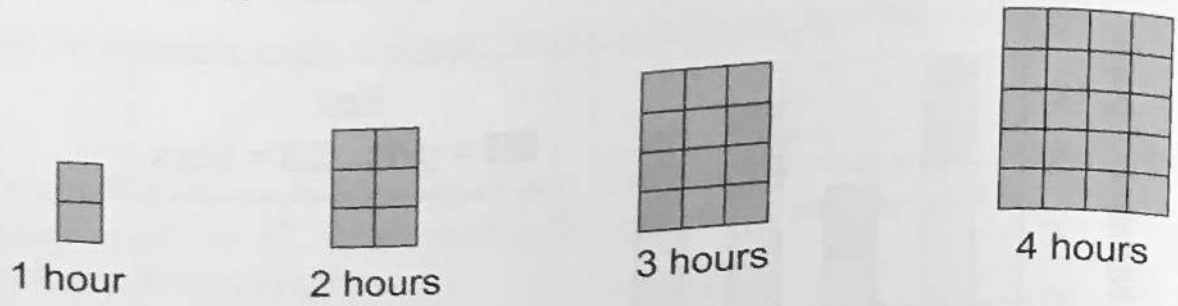
7. All of the children in after-school clubs are asked if they like their club or not. $^3/_4$ of the children say they do like their club.
How many children like their club? Circle the correct option.

A 30 **C** 40 **E** 44
B 33 **D** 41

8. Dana is dyeing fabric. She uses 56.8 g of dye to colour a 50 g piece of fabric. Her next piece of fabric weighs 450 g. How much dye should she use to make it the same shade? Circle the correct option.

A 550.1 g **C** 560 g **E** 511.2 g
B 500 g **D** 568.2 g

Jacob is tiling one of his bathroom walls. He adds tiles each hour and leaves them to dry. The diagrams below show the wall after the first four hours.



9. How many tiles will Jacob add during the fifth hour if he follows the same pattern?

10. How many tiles will he have put on the wall in total after seven hours? Circle the correct option.

A 56 **B** 42 **C** 72 **D** 55 **E** 54

11. Sarah and Robin are having a craft afternoon. Sarah has eight blue buttons and five black buttons. Robin has seven green buttons and four purple buttons. Sarah gives 60% of her black buttons to Robin. Robin gives 75% of his purple buttons to Sarah. How many buttons does Sarah now have?

12. Ramone's garden is a quadrilateral shape. The first corner has an angle of 61°. The second corner has an angle that's a prime number between 90 and 100. The third and fourth corners have the same angle.
What is the size of the third and fourth angles? Circle the correct option.

A 158° **B** 97° **C** 202° **D** 300° **E** 101°

/ 12

Test 18

You have **10 minutes** to do this test. Work as quickly and accurately as you can.

1. There are ninety pairs of bowling shoes at a bowling alley.
Seventy of the pairs are in children's sizes and the rest are in adult sizes.
What fraction of the bowling shoes are in adult sizes? Circle the correct option.

A $^1/_9$ **C** $^6/_9$ **E** $^8/_9$

B $^2/_9$ **D** $^7/_9$

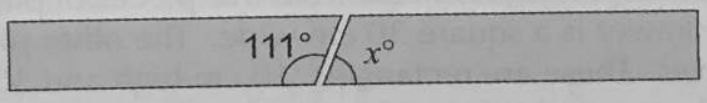
2. Marvin shares out three packs of playing cards equally between himself and three friends. Each pack contains 52 cards. How many cards does each person get?

3. Kevin plans out a running route that is 5.5 km long.
When he does the run he has to make a detour.
The detour adds 150 m onto his route. How far did he run in total?
Circle the correct option.

A 5500 m **C** 5600 m **E** 5560 m

B 5650 m **D** 6000 m

4. Shannon cuts a block of wood in two, as shown.



What is the size of angle x?

°

Matt recorded how many times he did activities that used water one Saturday.

Activity	Amount of water used each time	Matt's Activity Tally
Washing up	7 litres	II
Shower	7 litres per minute	
Flushing the toilet	9 litres	𝍸
Bath	75 litres	I
Food & drink	6 litres	II
Washing face	4 litres	I

5. What percentage of Matt's water use on Saturday was used for a bath? Circle the correct option.

A 40% **C** 60% **E** 80%

B 50% **D** 70%

6. On Sunday, Matt had a shower for six minutes instead of a bath. How much water did he save by having a shower rather than a bath?

☐☐ litres

7. Jeremy was watching a film at the cinema that was meant to last 128 minutes. There was a problem with the film and it stopped running $^{3}/_{8}$ of the way through. How many minutes of the film did Jeremy watch? Circle the correct option.

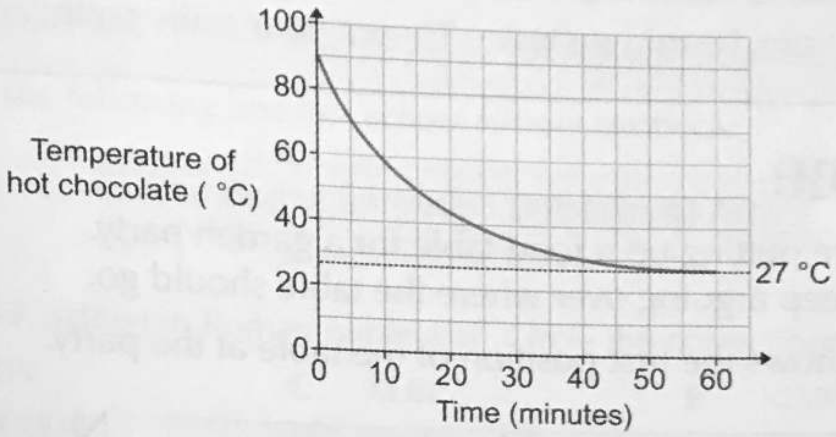
A 30.5 **C** 47.5 **E** 56.0

B 31.0 **D** 48.0

8. A drawer for a plastic cabinet is made from five pieces of plastic. The base of the drawer is a square 30 cm wide. The other pieces are the sides of the drawer. These are rectangles, 10 cm high and 30 cm long. What is the total area of plastic used in the drawer?

☐☐☐☐ cm^2

Jamaal makes a mug of hot chocolate and leaves it to cool.
The graph below shows how the hot chocolate cools down over time.



9. During which of the following periods of time after the hot chocolate was made does its temperature decrease most? Circle the correct option.

A 0-10 minutes **C** 20-30 minutes **E** 40-50 minutes
B 10-20 minutes **D** 30-40 minutes

10. If the hot chocolate was 90 °C to start with, what percentage of its original temperature was it after 60 minutes?

☐☐ %

Sasha and her friend, Tom, go to an ice cream parlour. The cost for s scoops of ice cream with marshmallows is given by $C = 65s + 15$, where C is in pence.

11. Sasha has three scoops of ice cream with marshmallows. How much does she pay?

£☐☐.☐☐

12. Tom gets 10p off each scoop of ice cream. He also has sauce for an extra 25p, as well as marshmallows. How much does Tom pay in pence if he has s scoops? Circle the correct option.

A $55s$ **C** $65s + 15$ **E** $55s + 25$
B $65s + 25$ **D** $55s + 40$

/ 12

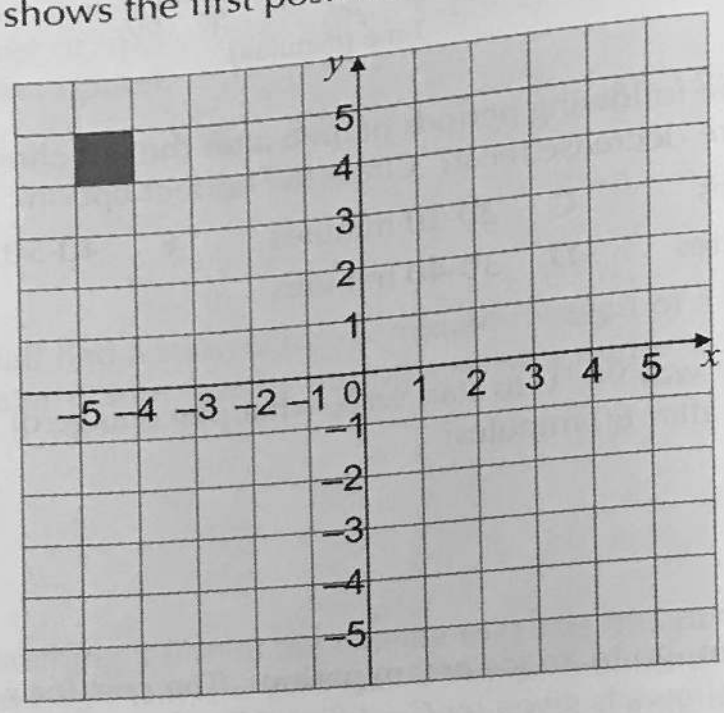
Puzzles 7

Now for a break from 10-minute tests. Try out your skills on this puzzle.

Party Time

Alan and John are putting up a food table for a garden party. However, they keep arguing over where the table should go.

The grid below shows the first position of the table at the party.



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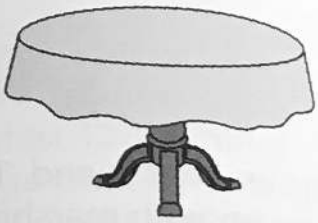


John and Alan were facing south at the table's first position. They jotted down notes on how they had moved the table to different positions:

1. We walked forwards 2 squares, then turned 90° anticlockwise and walked forwards another 6 squares and set the table down.
2. We then moved the table so it was reflected in the x-axis.
3. We then translated the table 2 squares up and 6 squares left.

The four different positions of the table form four corners of a shape. What shape is it?

Test 19

You have **10 minutes** to do this test. Work as quickly and accurately as you can.

1. Jeb reads the following line in a school history textbook:

> The Romans invaded Britain in 43 AD.

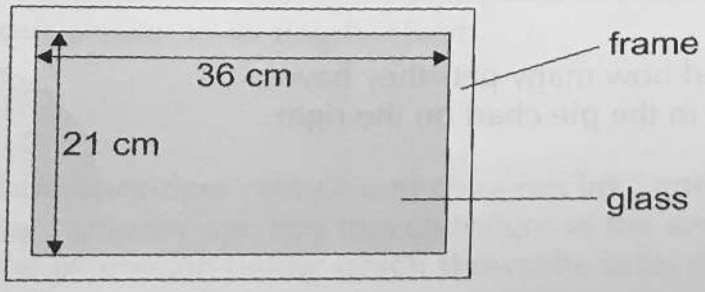
What is 43 written in Roman numerals? Circle the correct option.

A LXIV **B** XXXXIII **C** XLIII **D** CXIII **E** XLVIII

2. Zoe measures the heart rate in beats per minute (bpm) of five athletes after a race. She takes measurements of 93 bpm, 89 bpm, 101 bpm, 112 bpm and 98 bpm. What is the difference between the highest and lowest measurements taken?

☐☐ bpm

The diagram below shows a picture frame hanging on a wall.



3. The frame is 2 cm wide all the way around the glass. What is the perimeter of the outside of the frame?

☐☐☐ cm

4. What is the area of the glass? Circle the correct option.

A 75.6 cm^2 **B** 396 cm^2 **C** 702 cm^2 **D** 756 cm^2 **E** 7560 cm^2

This table shows the maximum distance that four different types of vehicle could travel in one hour.

Vehicle	Car	Bicycle	Lorry	Van
Max. distance (miles)	91	18	75	84

5. What is the mean of these four maximum distances?

□□ miles

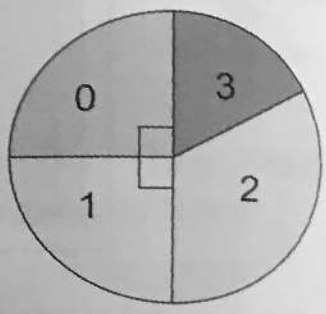
6. The van has a speed limiter installed, which reduces the maximum distance it can travel in one hour by 12 miles. What fraction of its original maximum distance is the van now able to travel in one hour? Circle the correct option.

A $^3/_4$ **B** $^2/_3$ **C** $^{11}/_{12}$ **D** $^1/_7$ **E** $^6/_7$

7. 5 miles is approximately 8 kilometres. Use this approximation to find the maximum distance in kilometres that a lorry can travel in one hour.

□□□ km

168 people were asked how many pets they have. The results are shown in the pie chart on the right.



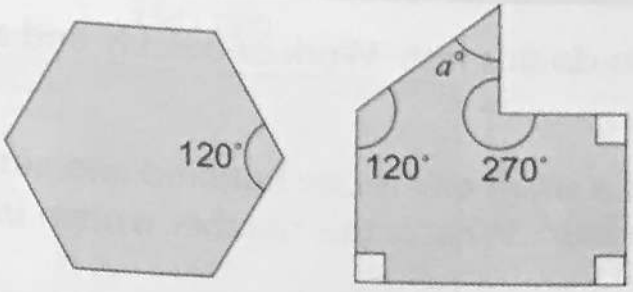
8. Fourteen more people have two pets than have one pet. How many people have two pets?

□□□

9. What fraction of the people asked have three pets? Give your answer in its simplest form.

□
□

10. A factory makes two types of hexagonal tiles, one regular and one irregular.



The angles in any hexagon add up to the same amount. Find angle a inside the irregular tile. Circle the correct option.

A 75°
B 50°
C 85°
D 60°
E 45°

A printing company uses 70 ink cartridges each month.
42 are black ink and the rest are coloured ink.

11. What is the ratio of black ink cartridges to coloured ink cartridges used each month? Give your answer in its simplest form.

☐ : ☐

12. Normally, black ink cartridges cost £b and coloured ink cartridges cost £c. During a sale, the company can buy two cartridges of the same type for the price of one. Circle the expression below which shows the sales price, in pounds, of a months supply of cartridges.

A $21b + 14c$
B $42b + 28c$
C $42b - 28c$
D $21b + 14c$
E $70(b + c)$

/ 12

Test 20

You have **10 minutes** to do this test. Work as quickly and accurately as you can.

1. The population of a small city is one hundred and ninety-nine thousand eight hundred and fifty-four. What is this number written in figures?

2. A biology teacher asks the pupils in his class how many glasses of water they drink each day. He records their answers in a table.

Glasses of water	1	2	3	4	5	6
Frequency	2	4	3	5	4	1

What was the most common response by his pupils?

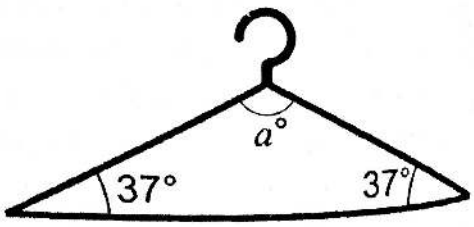
3. Steph goes to the dentist on 19th October. The dentist tells her to come back in 2 weeks for a check-up. On what date does Steph return to the dentist? Circle the correct option.

A 26th October **C** 21st October **E** 9th November

B 3rd November **D** 2nd November

The diagram on the right shows a triangular coat hanger.

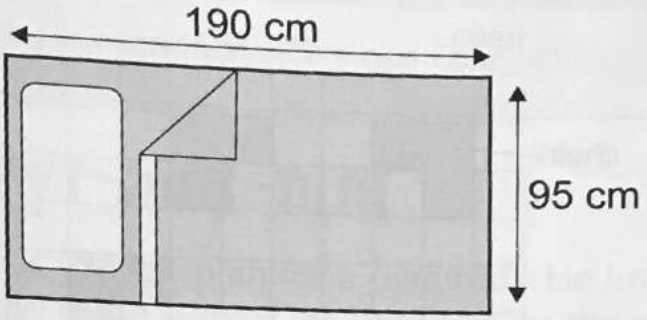
4. What is the size of angle a inside the coat hanger?



°

5. A clothes shop has 456 coat hangers to divide equally between 12 rails. How many hangers should there be on each rail?

A furniture shop sells rectangular single mattresses that are 95 cm wide and 190 cm long.



6. What fraction of the length of a single mattress is its width?
Circle the correct option.

A $^2/_5$ **C** $^1/_2$ **E** $^6/_{10}$

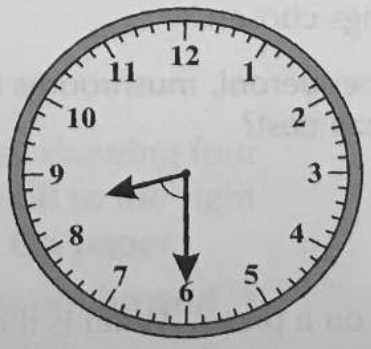
B $^2/_3$ **D** $^3/_4$

7. The shop also sells double mattresses that are 133 cm wide. By what percentage is the width of a double mattress greater than the width of a single mattress?
Circle the correct option.

A 10% **C** 30% **E** 50%

B 20% **D** 40%

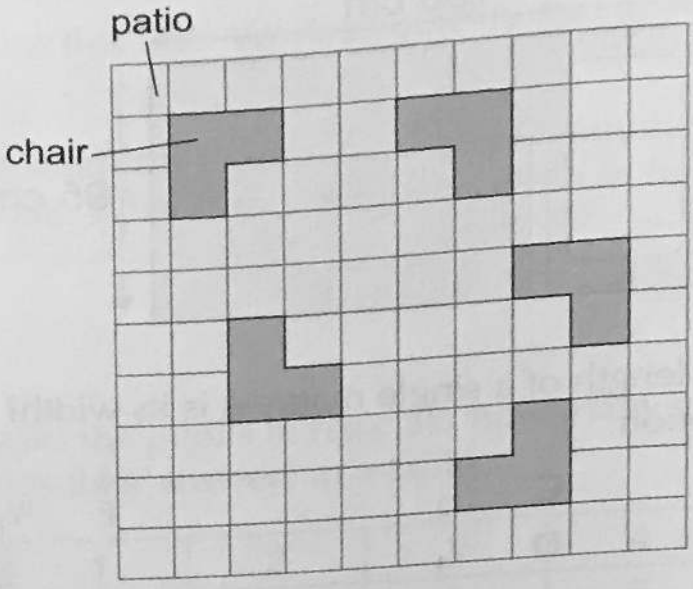
8. Peter's clock shows that the time is exactly half past 8 one evening.



What is the size of the angle between the hour hand and the minute hand?

□□□°

Samira positions her garden chairs on a square patio.
The view from above is shown in the diagram.



9. What fraction of the patio's total area is taken up by the chairs?
Circle the correct option.

A $^1/_{20}$ **B** $^3/_{20}$ **C** $^1/_{10}$ **D** $^1/_5$ **E** $^{17}/_{20}$

10. The patio's total area is 16 m^2. What is the perimeter of one chair?

☐.☐ m

The expression for the price in pounds of a pizza from a takeaway is $1.25t + 8$, where t is the number of toppings chosen.

11. Isaac orders a pizza with pepperoni, mushrooms and onions.
How much will Isaac's pizza cost?

£☐☐.☐☐

12. Polly has £17.50 to spend on a pizza. What is the maximum number of toppings she can have? Circle the correct option.

A 5 **B** 9 **C** 7 **D** 8 **E** 6

/ 12

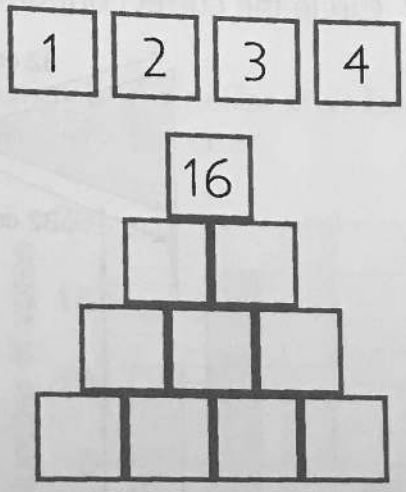
Puzzles 8

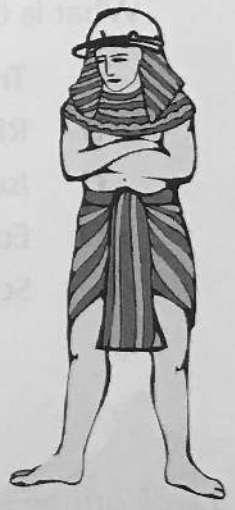
Now for a break from 10-minute tests. Try out your skills on these puzzles.

The Great Pyr-add-mid

A pyramid-builder has lost the plan for a pyramid. He knows that the number on each stone is the sum of the numbers on the two stones below. He also knows that the top stone has the number 16 on it.

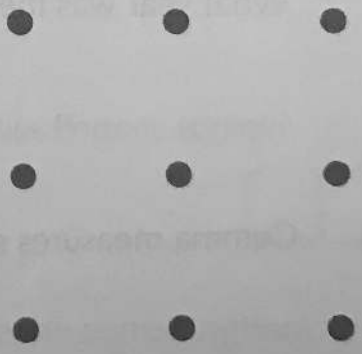
Help him work out what order to put these stones on the bottom row. There may be more than one answer.





If he rearranges the stones on the bottom row, what is the highest possible number that could be on the top stone?

Logo No Go



A company's logo is made by drawing four straight lines on the dotted grid to the right without your pencil leaving the paper.

The logo covers all nine dots on the grid and doesn't trace any line twice.

Draw what you think the company's logo must look like on the grid.

(Hint: you may need to think outside the box to solve this one...)

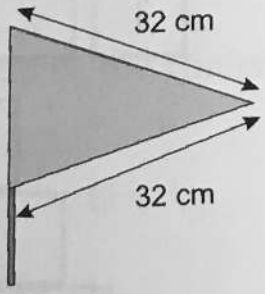
Test 21

You have **10 minutes** to do this test. Work as quickly and accurately as you can.

1. Dan needs to bake 125 cupcakes for the bake sale tomorrow.
He has baked 44 so far. How many more cakes does he need to bake?

2. Ashley measures a flag and finds that two of its sides are of equal length.
What is the name of this shape? Circle the correct option.

A Trapezium
B Right-angled triangle
C Isosceles triangle
D Equilateral triangle
E Scalene triangle



3. Corinne sees this sign in a museum.

This statue was made in MDLXV

What year was the statue made?

4. Gemma measures some garden gnomes and records their heights.

43 cm, 27 cm, 51 cm, 19 cm

What is the mean height of the four gnomes?

cm

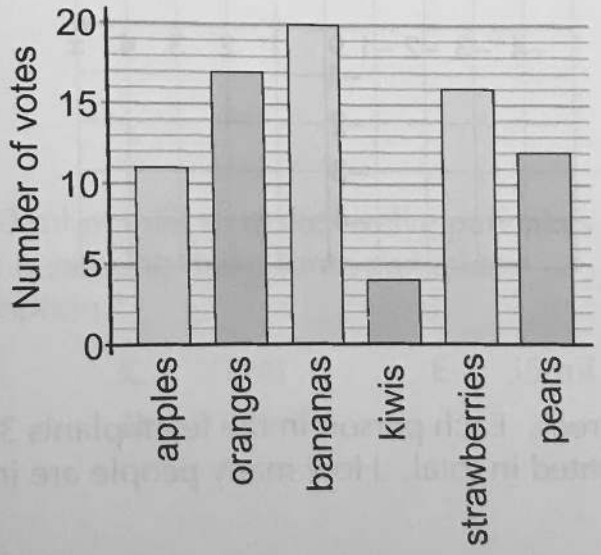
5. A sunflower was 75 cm tall. It is now 30% taller.
How tall is the sunflower now?

□□□.□ cm

6. There are 185 boiled and chewy sweets in a box. The ratio of boiled sweets to chewy sweets is 2 : 3. How many chewy sweets are there in the box?

□□□

Miss Porter asked Year 6 pupils to vote for their favourite fruit.
She recorded their answers in a bar chart.



7. Each pupil got one vote. How many pupils took part in Miss Porter's survey?

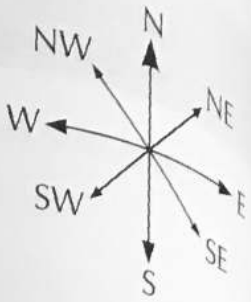
□□

8. What fraction of the votes did strawberries receive? Circle the correct option.

A $^1/_{10}$ **C** $^1/_5$ **E** $^4/_9$

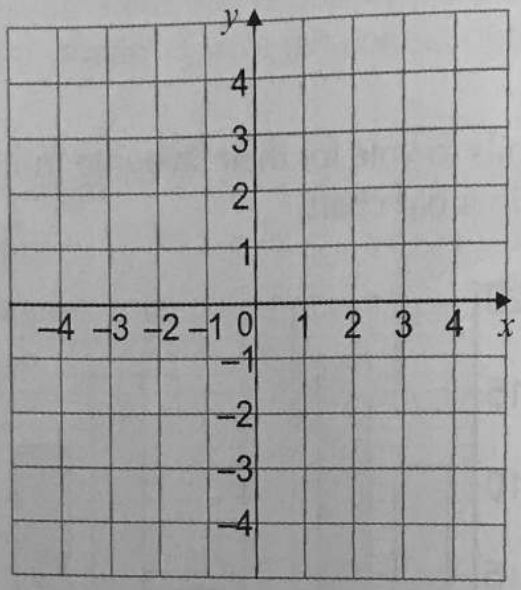
B $^2/_5$ **D** $^1/_6$

9. Saul is facing south east. He turns 180° anticlockwise, then 45° clockwise, then 135° anticlockwise. Which direction is he now facing? Circle the correct option.



A east
B north east
C south west
D north
E north west

10. Callie draws a square on the grid below.
Three corners of the square have the coordinates (–1, 4), (2, 1) and (–1, –2).
What are the coordinates of the fourth corner of the square?



(,)

11. A team are planting trees. Each person in the team plants 36 trees so that 900 trees are planted in total. How many people are in the team?

12. At a restaurant, each table's bill includes a 10% tip. The bill is calculated using the formula $n + (n \div 10)$, where n is the total cost of food and drink. How much will the bill be if a table spends £137.50 on food and drink?

A £150.70 **B** £151.25 **C** £151.20 **D** £152.00 **E** £152.50

/ 12

Test 22

You have **10 minutes** to do this test. Work as quickly and accurately as you can.

1. Gethin has driven his car 23 781 miles in total.
How many miles, to the nearest thousand, has Gethin driven his car?

☐☐☐☐☐ miles

2. In a survey, 84 out of 200 pupils said they could play a musical instrument.
What percentage of pupils can play an instrument?

☐☐ %

3. A recipe needs 300 ml of milk to make twelve pancakes.
How much milk is needed to make three pancakes?
Circle the correct option.

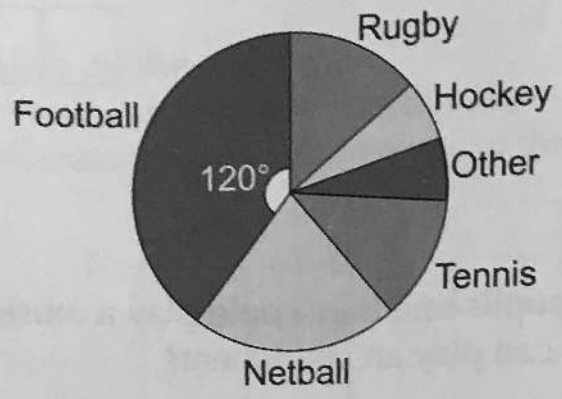
A 120 ml **C** 35 ml **E** 55 ml
B 75 ml **D** 175 ml

4. Martha has a strand of wool that is 4.2 m long. She cuts it into six equal strands.
How long is each new strand of wool? Circle the correct option.

A 0.6 m **C** 0.7 m **E** 7 cm
B 90 cm **D** 0.45 m

5. The ratio of black sheep to white sheep in a field is 2 : 9.
There are 66 sheep in total. How many black sheep are in the field?

6. The pie chart below shows the favourite sports of 33 pupils.



How many pupils chose football as their favourite sport?

7. Anisa gets the bus five times in one week. The mean length of time she spends waiting at the bus stop is 13 minutes. How long does she spend waiting for the bus during the week in total? Circle the correct option.

A 1 hour 5 minutes
B 48 minutes
C 1 hour 16 minutes
D 52 minutes
E 40 minutes

8. Sean is painting a rectangular wall. The wall is 3.8 m tall and 25 m long.
So far, he has painted half of the wall.
What area of the wall has been painted?

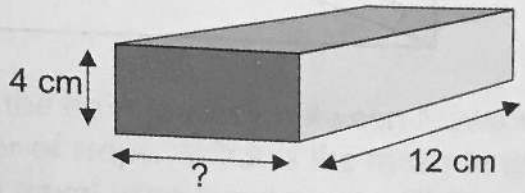
m^2

9. Laura made 200 fruit pies. 112 had an apple filling, 64 had a cherry filling and the rest had a blueberry filling. What fraction of the pies had a blueberry filling? Circle the correct option.

A $^{2}/_{9}$ **C** $^{1}/_{15}$ **E** $^{1}/_{24}$

B $^{3}/_{25}$ **D** $^{3}/_{10}$

10. Sasha made a box in a woodwork class. The box has a volume of 288 cm^3. What is the width of the box?



not drawn accurately

☐☐ cm

11. Kelsey wants to reduce the amount of time she spends watching TV. She decides that each week she will spend 25% less time watching TV than she spent the week before. She spends 16 hours watching TV in Week 1. How much time will she spend watching TV in Week 4?

☐ hours ☐☐ minutes

12. Max has 15 shirts in his wardrobe. He donates two shirts to charity for every new shirt that he buys. Max buys x new shirts. Which expression shows the number of shirts now in Max's wardrobe? Circle the correct option.

A $15x - 2$ **C** $15 + 2 + x$ **E** $15 - x$

B $2x - x$ **D** $15x - 2x$

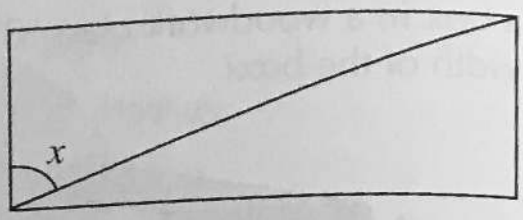
/ 12

Test 23

You have **10 minutes** to do this test. Work as quickly and accurately as you can.

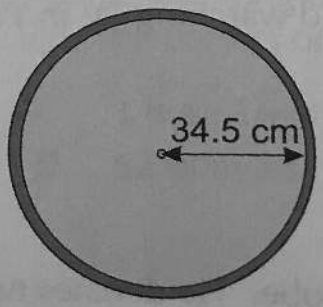
1. Mallika cuts a rectangle of card in half diagonally, as shown below.
Estimate the size of angle x. Circle the best option.

A 95°
B 170°
C 70°
D 105°
E 38°



2. There are 55 houses on a street. $^1/_5$ of the houses on the street have a blue door.
How many houses do not have a blue door?

3. Freya is on a cruise ship. The porthole in her cabin has a radius of 34.5 cm.
What is the diameter of the porthole?



cm

4. Dennis runs 6 miles every week.
He converts miles to kilometres using the approximation 1 mile = 1.6 km.
How many kilometres does Dennis run each week?

km

A train timetable is shown below.

Newtown	08:20	08:45	09:05
Fartown	08:40	-	09:25
Northtown	08:56	-	-
Oldtown	09:15	09:30	09:55

5. How long does it take the train leaving Newtown at 8:20 to get to Oldtown?

☐☐☐ minutes

6. The length of the train journey between Newtown and Oldtown depends on the number of stops. What is the mean length of time it takes these three trains to travel from Newtown to Oldtown?

☐☐☐ minutes

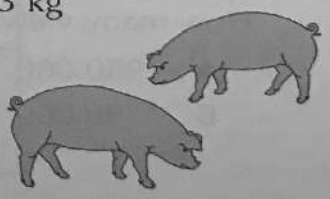
There are 500 piglets on Libby's farm.
160 of the piglets are fed in the morning and the rest are fed in the afternoon.

7. What percentage of the piglets are fed in the afternoon? Circle the correct option.

A 32% **C** 34% **E** 74%
B 25% **D** 68%

8. Each piglet eats 0.49 kg of food per day. Estimate the total amount of food that Libby needs to feed the piglets in the afternoon. Circle the correct option.

A 79.4 kg **C** 166.6 kg **E** 438.3 kg
B 816.5 kg **D** 686.2 kg



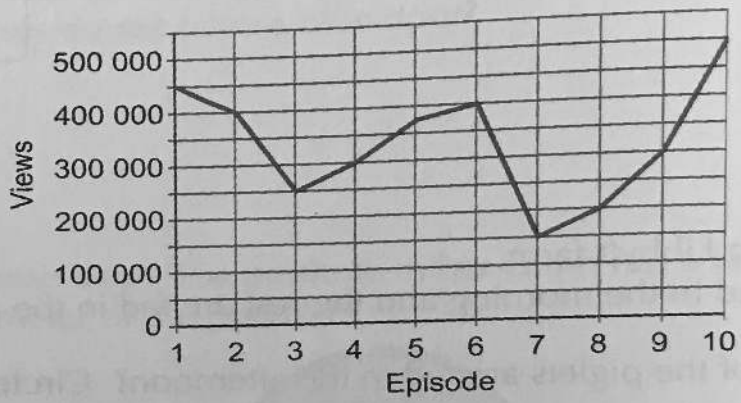
9. Tarek splits 91 playing cards into equal piles.
The number of cards in each pile is a prime number.
What is the smallest number of cards that could be in each pile?

10. A cafe sells hot chocolate for £3 and cups of tea for £1.
If they sell x hot chocolates and y cups of tea, which expression shows how much money they have made in pence? Circle the correct option.

A $300x + y$ **C** $300(x + y)$ **E** $3x + y$

B $3y - x$ **D** $300x + 100y$

The viewing figures for the first 10 episodes of a TV drama are shown in the line graph.



11. To the nearest 50 000, what is the difference in the number of views between the most watched episode and the least watched episode?

12. Episode 11 had 250 000 more views than Episode 4.
Episode 12 had $^{6}/_{10}$ of the views of Episode 6.
How many views were there in total for Episodes 11 and 12?

A 950 000 **C** 574 000 **E** 750 000

B 790 000 **D** 2 950 000

/ 12

Puzzles 9

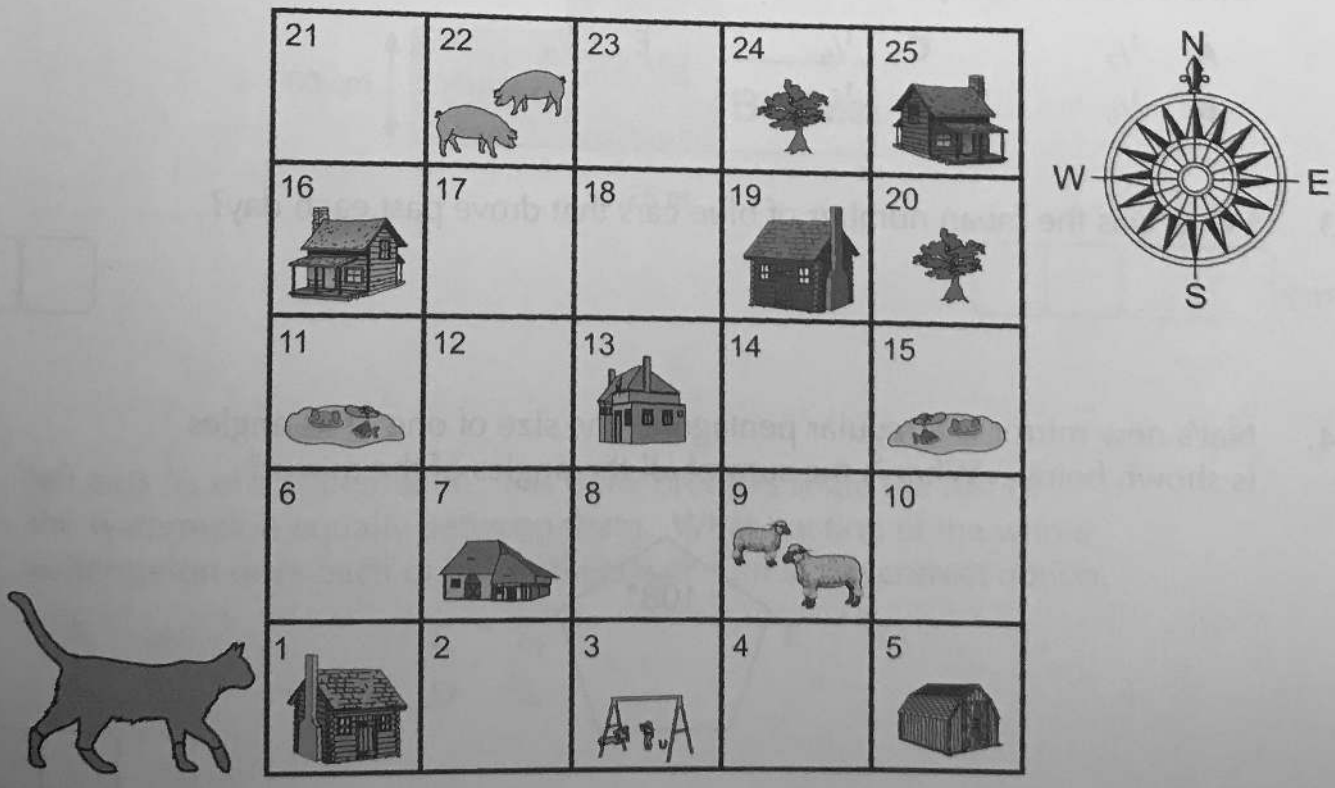
Now for a break from 10-minute tests. Try out your skills on this puzzle.

Difficult Directions

Socks the cat is going to Rover the dog's new house.
Rover has given Socks a map and a list of clues.
Follow the clues to help Socks work out which square on the map contains Rover's house.

Clues to my new house

1. My house is an equal distance from the two trees.
2. My house is not halfway between two ponds.
3. My house is closer to the sheep field than the pig field.
4. My house is further north than the swings.
5. There are no houses directly west of my house.



Test 24

You have **10 minutes** to do this test. Work as quickly and accurately as you can.

1. Maya reads 20 pages of her book each night. Her book has 220 pages. How many nights will it take her to read the whole book?

Sally counts the colours of cars she sees driving past her house over four days. She records the numbers in a table.

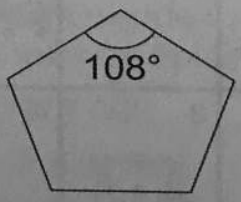
Day	Blue	Black	Red
1	6	4	2
2	3	5	1
3	3	0	4
4	4	3	0

2. Sally counted 35 cars in total. What fraction of the total cars were red? Circle the correct option.

A $1/7$ **C** $1/6$ **E** $1/4$
B $1/5$ **D** $1/9$

3. What was the mean number of blue cars that drove past each day?

4. Nat's new mirror is a regular pentagon. The size of one of its angles is shown below. What is the sum of all the angles of the mirror?



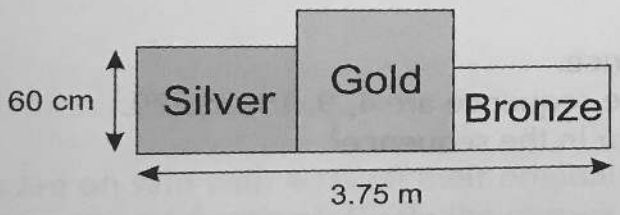
5. Kai sells some DVDs for £25 in total. He saves 70% of this money and spends the rest. How much money does he spend?

£ ☐.☐☐

6. A rocket launched into space travels at 8.2 km per second. Estimate how far the rocket will have travelled in 9 minutes. Circle the correct option.

A 3210 km
B 948 km
C 4428 km
D 6112 km
E 2996 km

7. At a competition, the gold, silver and bronze medal winners each stand on a platform. The front faces of the three platforms are shown below. Each platform has an equal width.
What is the area of the front face of the silver medal winner's platform?



☐☐☐☐ cm^2

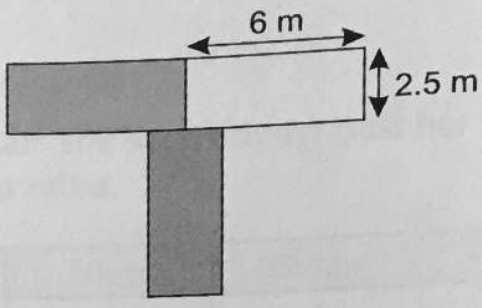
8. Jeff eats $^1/_3$ of a watermelon. His three brothers share the rest of the watermelon equally between them. What fraction of the whole watermelon does each of his brothers eat? Circle the correct option.

A $^1/_9$ **C** $^1/_5$ **E** $^3/_{10}$
B $^1/_6$ **D** $^2/_9$

9. A bookshelf is 84.5 cm wide. The shelf fits exactly 13 books of equal size. What is the width of each book? Circle the correct option.

A 5 cm **B** 6 cm **C** 9.5 cm **D** 8 cm **E** 6.5 cm

10. In a hotel garden, three identical flower beds are planted as shown.



What is the perimeter of the shape made by the three flower beds?

m

11. Zahra thinks of a sequence.
The first five terms in the sequence are 4, 9, 19, 39, 79.
What is the seventh term in the sequence?

12. Jordan earns £6.75 per hour working in a cafe. He works h hours per week. One week he drops some plates and has £8 taken out of his pay. Circle the expression below which shows how much Jordan is paid that week in pounds?

A $6.75 + h - 8$ **B** $6.75 + 8h$ **C** $6.75 + h - 8$ **D** $6.75h - 8$ **E** $h(6.75 - 8)$

/ 12

Test 25

You have **10 minutes** to do this test. Work as quickly and accurately as you can.

1. Mo weighs out five different masses of sugar: 250 g, 1.75 kg, 300 g, 0.5 kg, 2000 g. Which mass of sugar is the second heaviest? Circle the correct option.

   A 250 g
   B 1.75 kg
   C 300 g
   D 0.5 kg
   E 2000 g

2. Seth buys a newspaper for £1.50, an apple for 30p and a croissant for 60p. He pays with a £5 note. How much change does he get?

   £☐.☐☐

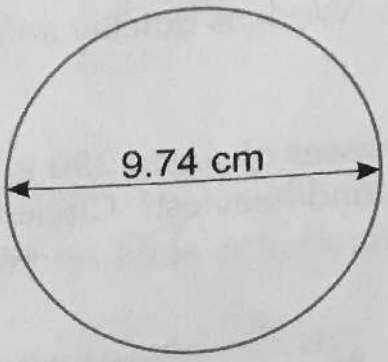
3. A pair of shoes are on sale with 40% off their original price. What is this discount as a fraction? Circle the correct option.

   A $^2/_5$ **C** $^1/_4$ **E** $^3/_8$
   B $^4/_5$ **D** $^1/_3$

4. It takes Cara 336.25 minutes to run a marathon. What is this time rounded to the nearest hour?

   ☐☐ hours

5. The wheel of a toy car has a diameter of 9.74 cm.
What is the radius of the wheel?



□.□□ cm

6. Aisling has a pack of pencils.
She divides the pack of pencils into eighteen groups of eight pencils.
How many pencils will be in each group if she divides the pack into six groups?

□□

Rohan measures the angles in four quadrilaterals and puts the results into a table.

Angle	Shape 1	Shape 2	Shape 3	Shape 4
1	90°	70°	110°	105°
2	90°	70°	120°	105°
3	55°	110°	70°	90°
4	125°	110°	60°	60°

7. What is the most common acute angle across the four shapes?

□□□°

8. What type of quadrilateral is Shape 3? Circle the correct option.

A Trapezium **B** Rhombus **C** Parallelogram **D** Square **E** Rectangle

9. A train travels 426.75 km in 3 hours at a constant speed.
How far did the train travel in one hour?

□□□.□□ km

10. Rebekah thinks of a sequence. The first five numbers are 101, 82, 65, 50, 37.
What is the next number in the sequence?

□□

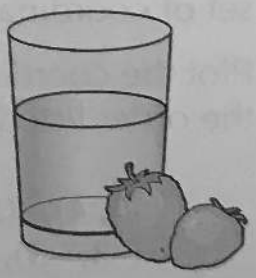
11. Helen makes chairs and sells them.
It costs her £12 to make one chair and she sells each chair for £20.
Which expression shows how much profit (P) Helen makes if she sells n chairs?

A $P = n(12 + 20)$ **C** $P = 20 + 12n$ **E** $P = 20 - 8n$

B $P = 8n$ **D** $P = 20n - 8$

12. Archie is following a smoothie recipe. The recipe uses 144 g of strawberries.
Archie only has enough strawberries to make $^2/_3$ of the amount of smoothie made in the recipe.
Archie wants each serving of smoothie to contain 16 g of strawberries.
How many servings of smoothie does he make? Circle the correct option.

A 12
B 16
C 8
D 9
E 6



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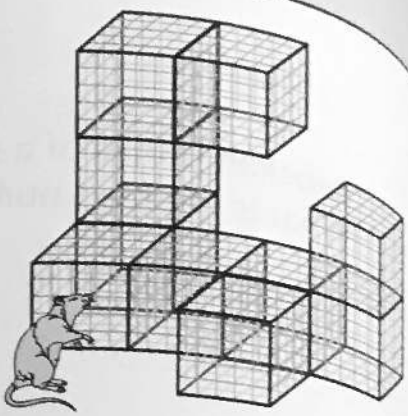
Puzzles 10

Now for a break from 10-minute tests. Try out your skills on these puzzles.

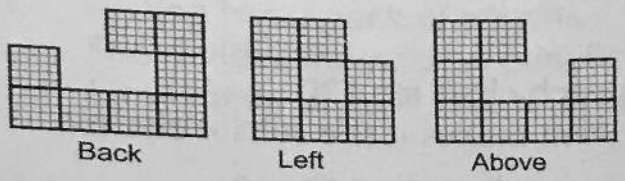
Colin's Cube Cages



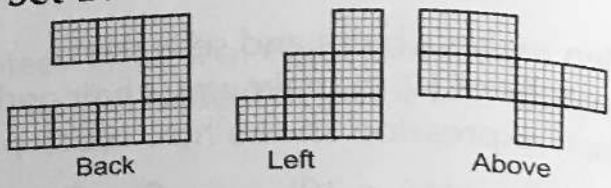
Colin is making a big rat cage by attaching smaller cube-shaped cages together. He first arranges the cube-shaped cages in the shape he wants.

Which of the following sets shows the views from the back, the left and above the cage?

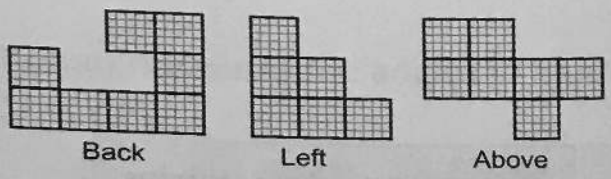
Set A:



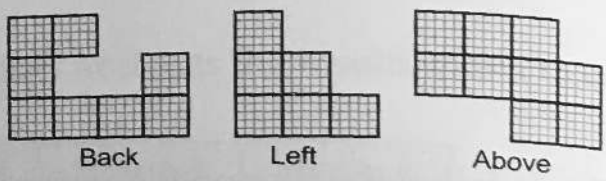
Set B:



Set C:



Set D:

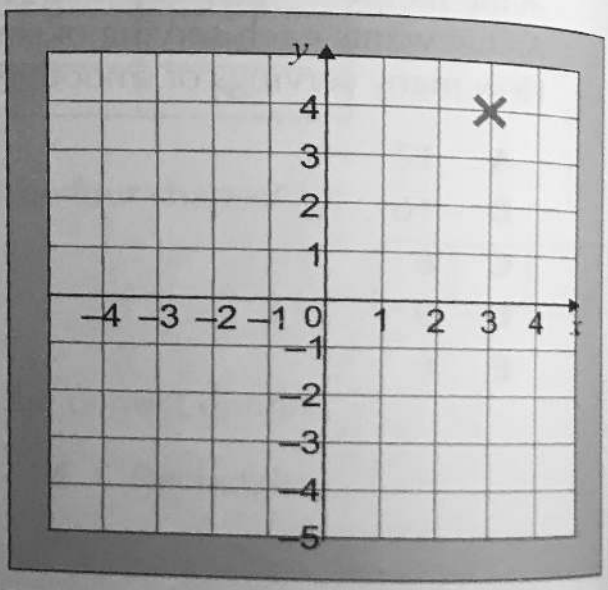


Top Secret

Pip is a secret agent and has been assigned a one-letter code name. She has been given a set of coordinates to work out what it is.

Plot the coordinates below and join them in the order listed to find out Pip's code name.

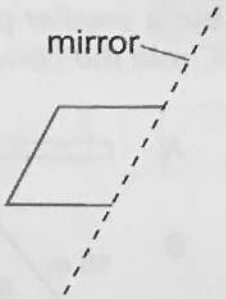
(3, 4), (3, 1), (3, –3), (0, 1), (–3, –3), (–3, 1), (–3, 4)



Test 26

You have **10 minutes** to do this test. Work as quickly and accurately as you can.

1. Sammi is using a mirror to draw symmetrical shapes. She completes the shape on the right by drawing its reflection on the other side of the dotted mirror line. Circle the name of the symmetrical shape she will draw.

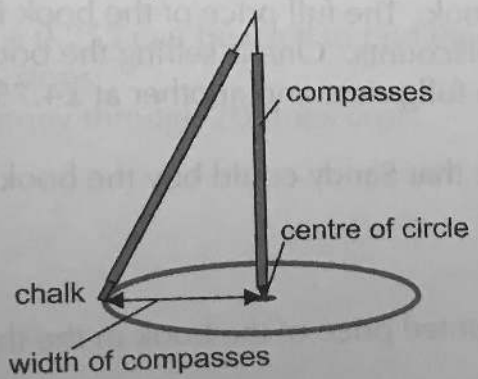


A Parallelogram
B Trapezium
C Rhombus
D Octagon
E Hexagon

2. The time is 16:14. Ciara has missed her train by 20 minutes. What time did her train leave? Circle the correct option.

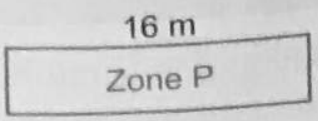
A 16:34
B 16:04
C 15:54
D 16:00
E 15:30

3. Jack is using a large pair of compasses to draw chalk circles on the playground. How wide should he set the pair of compasses so that he can draw a chalk circle with a diameter of 1.3 m? Give your answer in centimetres.



☐☐☐ cm

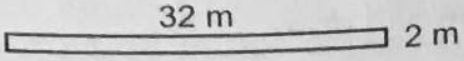
4. Maisie wants to re-use some plastic fencing that was used for Zone P at a festival.



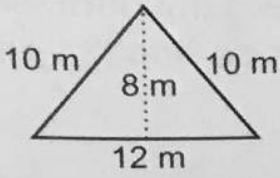
Area of Zone P = 64 m²
Perimeter of Zone P = 40 m

She wants to use the fencing for for Zone Q, which has the same area as Zone P but a smaller perimeter. Which of the following could be Zone Q?
Circle the correct option.

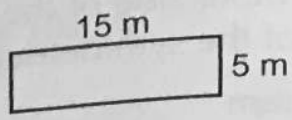
A



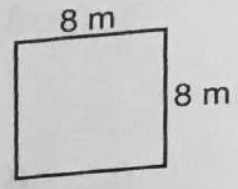
B



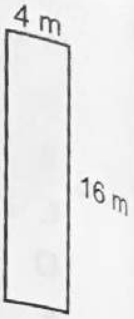
C



D



E



Kelly and Jonah want to see how using brackets changes the answer to a calculation. Kelly finds the answer to $5 + 6 \times 8 - 7$. Jonah finds the answer to $(5 + 6) \times 8 - 7$.

5. What is the difference between the answers to Kelly's and Jonah's calculations?

6. Circle the calculation that will not give the same answer as Kelly's calculation.

A $(5 + 6 \times 8) - 7$

B $5 + (6 \times 8) - 7$

C $5 + (6 \times 8 - 7)$

D $5 + 6 \times (8 - 7)$

E $5 + 8 \times 6 - 7$

Sandy wants to buy a new book. The full price of the book is £15, but three shops are offering different discounts. One is selling the book at $^2/_3$ of the full price, another at 30% off the full price, and another at £4.75 off the full price.

7. What is the lowest price that Sandy could buy the book for?

£ .

8. What is the mean discounted price of the book in the three different shops?

£ .

Cassie has a large packet containing 1605 sultanas. She measures out $^1/_5$ of the packet, and splits these sultanas equally between three bowls.

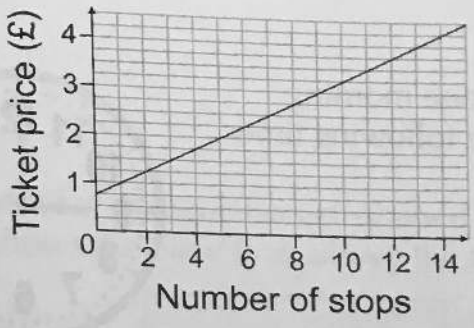
9. What fraction of the large packet is in each bowl? Circle the correct option.

A $^1/_2$ **B** $^1/_3$ **C** $^1/_5$ **D** $^1/_8$ **E** $^1/_{15}$

10. How many sultanas are in each bowl?

☐☐☐

The cost of a bus ticket depends on the number of stops you are travelling through. This is shown on the graph below.



11. Liz pays £2.50 for her ticket. Jane is travelling three more stops than Liz. How much should Jane pay?

£☐☐.☐☐

12. The formula $C = 0.75 + 0.25S$ can be used to find the cost in pounds, C, of a journey through S stops.
How much does a journey through 20 stops cost?

£☐☐.☐☐

/ 12

Test 27

You have **10 minutes** to do this test. Work as quickly and accurately as you can.

Kim saves 20p coins. She wants to use some of her coins to pay her bill in a cafe, which comes to £4.73.

1. What is £4.73 rounded to the nearest 20p?

£ ☐.☐☐

2. How many 20p coins will she need to pay the bill?

☐☐

3. When Benita starts work one morning, her office clock shows the following time:

By how many degrees clockwise will the hour hand have moved by the time she finishes work at 18:00?

☐☐☐°

4. Pete's shopping receipt is shown below.
Use estimation to work out the total cost of Pete's shopping.
Circle the correct total from the options below.

Bananas	£0.96
2 Loaves of bread	£1.18 × 2
3 Tins of beans	£0.81 × 3
Magazine	£3.99

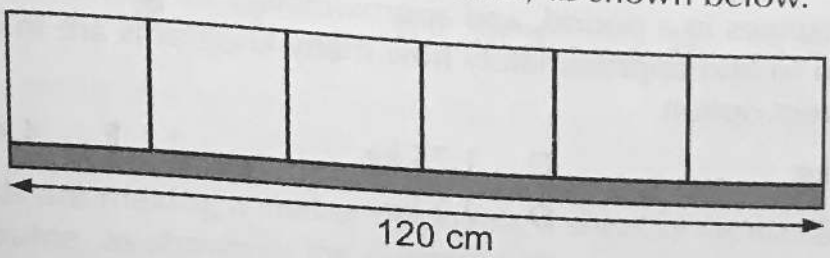
A £5.62
B £6.94
C £9.74
D £11.05
E £13.98

James works in a shop selling board games. He is stacking boxes of games.

5. James makes a tower of 15 identical boxes. The tower is 1.8 m high.
What is the height of each box? Circle the correct answer.

A 12 cm **B** 14 cm **C** 16 cm **D** 18 cm **E** 20 cm

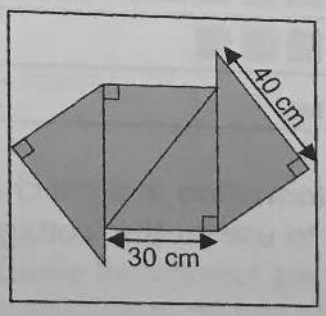
6. Another one of the games is in a cube-shaped box.
He arranges some of the boxes across a shelf, as shown below.



What is the volume of one box?

☐☐☐☐ cm^3

7. Fred arranges four identical triangular-prism-shaped boxes on a table.
The diagram below shows the view from above the table.



What area of the table is covered by the boxes?

☐☐☐☐ cm^2

8. Eva and Frankie are twins. Their sister Geri is three years older than them.
The three sisters have a mean age of 11. How old are the twins?

☐☐

9. The house numbers on Jake's side of the street go up in twos, and are all odd. Jake's house has the smallest number, as it is at one end of the street. If Jake lives at number n, what is the number of the house 10 doors down? Circle the correct option.

A $n + 10$ **C** $2n + 1$ **E** $n + 20$

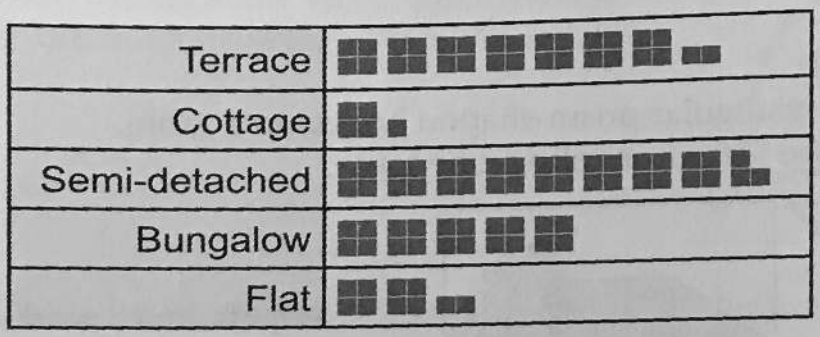
B $10n$ **D** $n + 2$

10. There are 16 ounces in a pound, and approximately 28 g in an ounce. Use estimation to find approximately how many kilograms are in one pound. Circle the correct option.

A 0.448 kg **C** 1.75 kg **E** 4.48 kg

B 1.48 kg **D** 2.2 kg

The pictogram below shows the number of each type of home in a village. There are 500 homes in total.



Key: ■ = 20 homes

11. Bert wants to display the information in a pie chart. What angle would he need to use for the 'cottage' sector?

□□□°

12. The council wants to increase the number of flats so that they make up 25% of the total number of homes. If no other types of homes are built, how many more flats will need to be built in the village to meet this target? Circle the correct answer.

A 25 **B** 50 **C** 75 **D** 100 **E** 150

/ 12

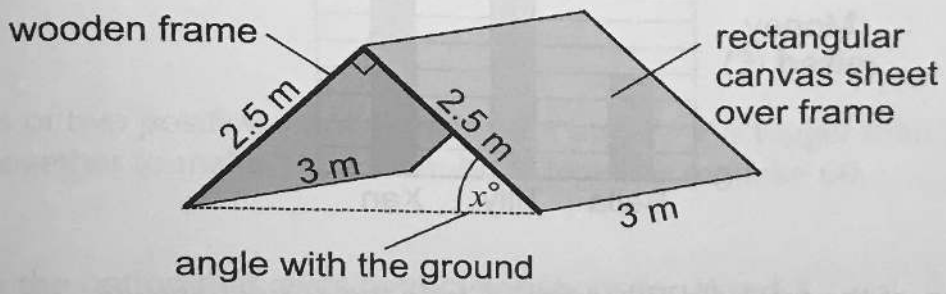
Test 28

You have **10 minutes** to do this test. Work as quickly and accurately as you can.

1. One day in winter, the lowest temperature recorded across the country was –13 °C, and the highest was 5 °C. What is the difference between these two temperatures? Circle the correct option.

A –8 °C **B** 8 °C **C** 18 °C **D** 13 °C **E** 5 °C

A group of friends are making a shelter by putting a sheet of canvas over a wooden frame, as shown in the diagram below.



2. What is the area of the canvas sheet?

☐☐☐ m²

3. What is the size of angle x? Circle the correct answer.

A 30° **B** 45° **C** 60° **D** 90° **E** Can't say

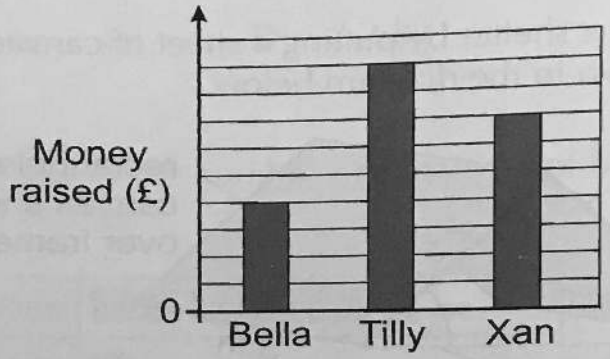
4. Jemma has a full two-litre bottle of lemonade. She pours six 200 ml glasses of lemonade. How much lemonade is left in the bottle? Circle the correct option.

A 0.08 litres **B** 1200 ml **C** 1.2 litres **D** 800 ml **E** 1.8 litres

5. A bunch of 6 identical bananas has a mass of 0.48 kg.
Sally eats one of the bananas. What is the mass of the remaining bunch?

□.□□ kg

Bella, Tilly and Xan raised £100 in total for a charity. They drew the bar chart below to show how much each of them raised, but they forgot to put numbers on the scale.



6. What fraction of the total did Tilly raise? Circle the correct answer.

A $^{9}/_{100}$ **B** $^{1}/_{9}$ **C** $^{1}/_{3}$ **D** $^{9}/_{20}$ **E** $^{1}/_{2}$

7. What percentage of the total did Bella raise?

□□ %

8. How much money did Xan raise?

£□□

A Year 6 class are making a book of short stories they have written.
There are 350 words on each page of the book.

9. The book will have 270 pages for the stories.
How many words will there be on these pages in total?

10. Lauren has written the longest story in the book. It has 8050 words.
How many pages long is Lauren's story?

Dale thinks of two positive whole numbers, X and Y. Y is bigger than X.
They add together to make 17, and multiply together to make 60.

11. Circle the option that gives correct equations for X and Y.

A $X + Y = 17$ and $X = 60Y$
B $X = Y - 17$ and $XY = 60$
C $X = 17 - Y$ and $YX = 60$
D $Y = 17 - X$ and $X = 60Y$
E $X + 17 = Y$ and $XY = 60$

12. What is the value of $Y - X$?

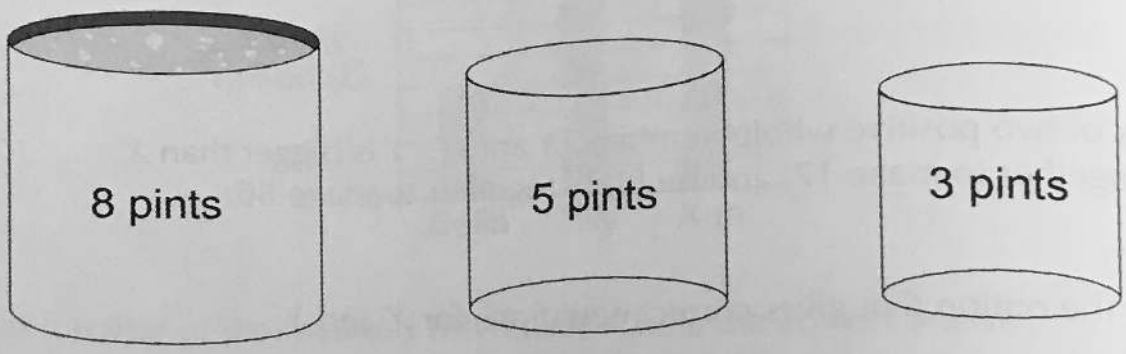
/ 12

Now for a break from 10-minute tests. Try out your skills on these puzzles.

Pint Sized Problem

Mimi has a container with exactly a gallon (8 pints) of lemonade. She needs to measure out 1 pint of the lemonade but she only has another two, empty containers with no scales, and no measuring equipment.

One of the containers holds exactly 3 pints, and the other holds exactly 5 pints:



How could Mimi measure out 1 pint of lemonade using only these containers?

For example, to measure out 2 pints of lemonade, Mimi could:

- *Fill the 5 pint container from the 8 pint container.*
- *From the 5 pint container, fill the 3 pint container.*

This leaves Mimi with 2 pints of lemonade in the 5 pint container.

Then try this one:

How could Mimi split the gallon of lemonade exactly in two using only these containers?

Test 29

You have **10 minutes** to do this test. Work as quickly and accurately as you can.

A book about space contains the following sentence.

> The diameter of the Earth is 12 756.32 kilometres.

1. In the number 12 756.32, what does the number 1 represent?
Circle the correct option.

A ten million
B one million
C one thousand
D ten thousand
E one hundred thousand

2. What is the Earth's diameter rounded to the nearest hundred kilometres?

☐☐☐☐☐ km

3. Jo is building a shelf to store her six boxes of breakfast cereal on.
Each box of cereal takes up 30 cm of the shelf's length.
What is the minimum length that the shelf can be, in metres?

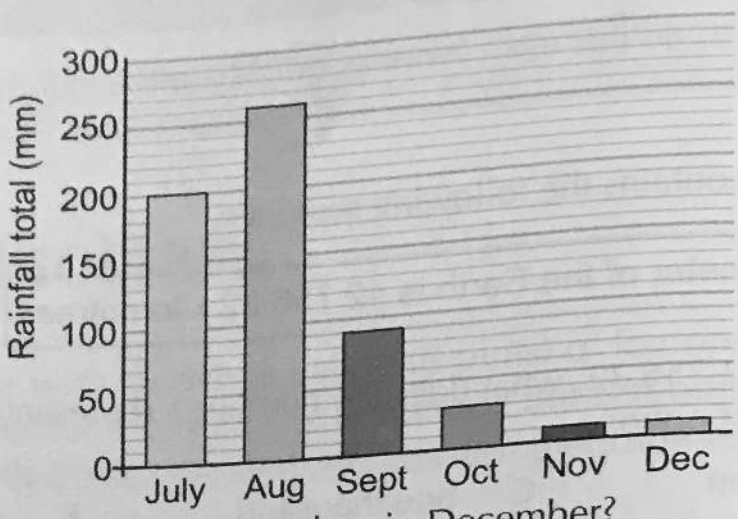
☐.☐☐ m

4. Robin is decorating socks to sell at the school fair. He buys 100 pairs of socks for £80. He needs a piece of ribbon and a bow for each separate sock.
Each piece of ribbon costs 7p. Bows cost 5p each.

How much does Robin spend on each pair of socks?

£☐☐.☐☐

The chart below shows the monthly rainfall total (in mm) between July and December for a city in India.



5. How much more rain fell in August than in December?
Give your answer in centimetres.

□□□.□ cm

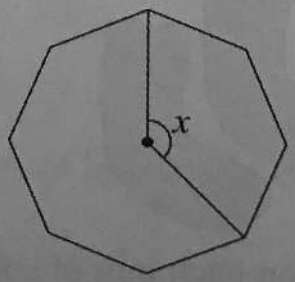
6. What fraction of the total rainfall for the six months fell in July?
Circle the correct option below.

A $^1/_4$ **B** $^1/_6$ **C** $^1/_8$ **D** $^1/_3$ **E** $^2/_5$

7. An animal shelter houses cats and dogs in the ratio 4 : 7.
The shelter currently has 12 cats. How many dogs are in the shelter?

□□

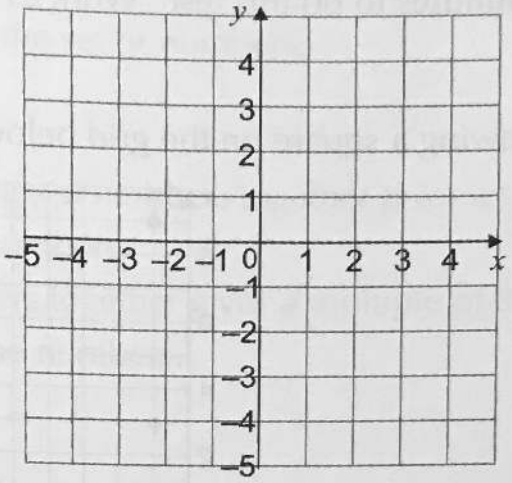
8. The floor tile below is a regular octagon. What is the size of angle x?



□□□°

9. Kem thinks of a shape and plots it onto the coordinate grid below.
The coordinates of the shape's corners are (2, 4), (4, 2), (–1, –3) and (–3, –1).
What is Kem's shape? Circle the correct option.

A Rhombus
B Square
C Rectangle
D Parallelogram
E Trapezium



10. At an auction, Asanti buys fifteen chairs for 30% of their original price.
Each chair originally cost £48. How much did Asanti pay in total for the chairs?

£ [ ][ ][ ][ ]

11. Joseph's coin collection can be divided into groups of 3, 6, 7 or 14 coins without any coins being left over. Which of the options below could be the number of coins in Joseph's collection? Circle the correct option.

A 260 **B** 266 **C** 280 **D** 294 **E** 300

12. All of the pupils in Year 6 get the bus, walk or cycle to school.
Three times as many pupils walk to school as get the bus.
25 pupils cycle to school. The number of pupils that take the bus is given by x.
Circle the expression below which gives the total number of pupils in Year 6.

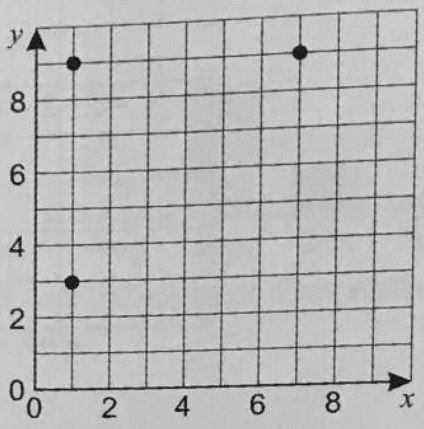
A $4x + 25$ **B** $3(x + x) + 25$ **C** $4x + 25x$ **D** $3 + x + 25$ **E** $3x + 25$

/ 12

Test 30

You have **10 minutes** to do this test. Work as quickly and accurately as you can.

1. Lily is drawing a square on the grid below.



Lily has already plotted three of the square's corners.
What are the coordinates of the square's fourth corner?

(,)

2. Anika has saved up 1400 one pence coins in a jar. She exchanges them at the bank and uses the money to buy a sandwich for £3.50 and a coffee for £2. How much of the money does she have left?

£ .

3. 89 cards are dealt out so that each player has the same number. There are five cards left over. Circle the option below that shows a possible number of players.

A 5 **B** 7 **C** 8 **D** 9 **E** 10

4. Reuben buys a 3 litre container of milk. He uses half of it to make a rice pudding. He then pours 250 ml on his cereal. How much milk is left in the container in millilitres?

 ml

5. Six numbers are selected by a lottery machine.

(17) (8) (56) (37) (15) (31)

Some friends make statements about the set of numbers.
Circle the incorrect statement.

A $^2/_3$ of the numbers are odd.

B Adding the smallest and the biggest numbers together gives a square number.

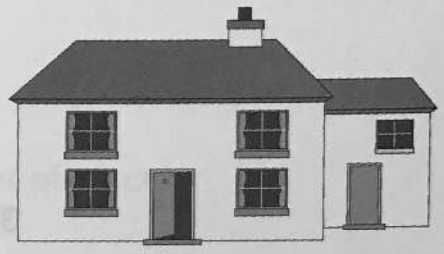
C Four is a factor of two of the numbers.

D Adding the biggest two numbers together gives a multiple of 33.

E Three of the numbers are prime numbers.

Tina is writing about house prices for a newspaper report.
The prices of the five houses for sale in a village are:

£100 000, £125 000, £150 000, £75 000, £200 000



6. What is the mean price of the five houses?

£ ☐☐☐☐☐☐

7. A new house is put up for sale. Its price is 87% of the price of the most expensive house for sale. What is its price?

£ ☐☐☐☐☐☐

8. Henry has been doing a sponsored silence for 510 minutes.
How many seconds has he been silent for? Circle the correct option.

A 45 000 **B** 28 560 **C** 30 600 **D** 34 120 **E** 25 510

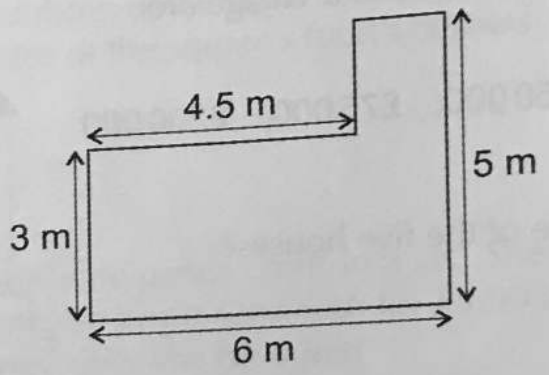
9. Gavin has twenty minutes to do the washing up before his mum gets home from work. He spends $^1/_6$ of the time washing the cutlery and $^1/_4$ of the time washing the plates. What fraction of the time does he have left to do the rest of the washing up? Circle the correct option.

A $^4/_5$ **C** $^5/_6$ **E** $^7/_{12}$

B $^9/_{10}$ **D** $^5/_{12}$

10. Shona and Eric have 252 stamps between them. Eric has 6 times as many stamps as Shona. How many stamps does Shona have?

Huw is buying carpet for his L-shaped living room, shown below.



Not drawn accurately

11. He chooses carpet costing £15 per 1 m^2. What is the total cost of Huw's carpet? Circle the correct option.

A £105 **C** £315 **E** £345

B £275 **D** £210

12. Circle the option below which shows the cost of buying carpet priced at £9.99 per 1 m^2 for a room with an area of A m^2.

A $10A - 0.1A$ **C** $10A - A$ **E** $10A - 0.01$

B $10A - 0.01A$ **D** $9A + 0.01A$

/ 12

Test 31

You have **10 minutes** to do this test. Work as quickly and accurately as you can.

1. The area of a classroom floor is 72 m^2. The teacher splits the classroom into six equal zones. What is the area of each zone?

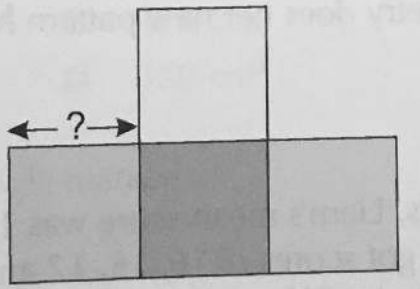
$\square\square$ m^2

2. The bank balance of a millionaire is £44 670 980. In this figure, what does the number 6 represent? Circle the correct option.

A 6000 **C** 60 000 **E** 600 000

B 600 **D** 6 000 000

3. Nimishi has an ornament made from coloured cubes.
The face of the ornament shown below has a perimeter of 45 cm.
What is the length of the side marked on the diagram?



$\square.\square$ cm

4. Out of 120 girls in a school, 24 have the same first name as one other girl.
What fraction of girls in the school have the same first name as another girl?
Circle the correct option.

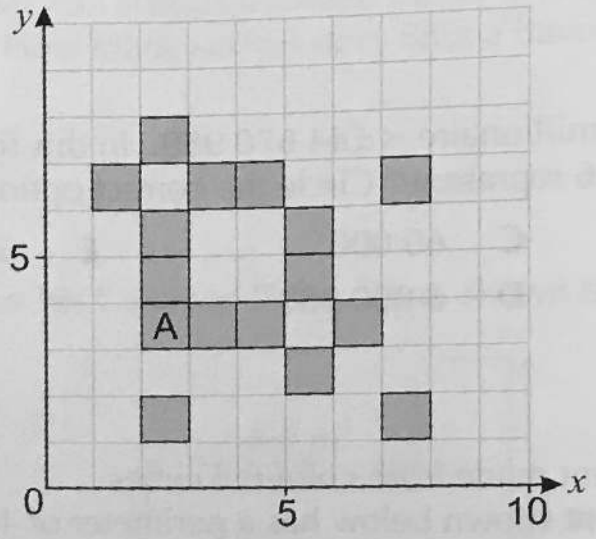
A $^1/_{12}$ **C** $^2/_5$ **E** $^1/_6$

B $^1/_5$ **D** $^3/_8$

5. Claudia gets £4.35 in pocket money for helping her dad with the housework. Her sister Flora helps for four times as long and gets four times as much pocket money. How much pocket money do the girls get in total?

£ □□.□□

6. Kim is planning a tiling pattern for her kitchen wall on a coordinate grid, as shown.



She translates tile A two squares left and five squares up.
How many lines of symmetry does her new pattern have?

□

7. In his last five spelling tests, Liam's mean score was 16.
In the first four tests, Liam got scores of 16, 15, 17 and 19.
What score did Liam get in the fifth spelling test? Circle the correct option.

A 13 **B** 12 **C** 16 **D** 15 **E** 17

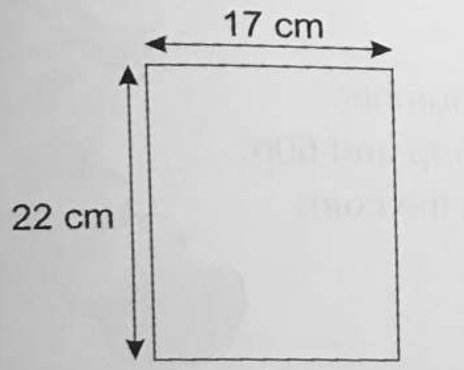
8. There are 28 boxes of exercise books in a stock cupboard. Each box contains 15 books. Jess takes two boxes, Aoife takes five boxes and Gary takes eight. How many books are left in the cupboard?

□□□

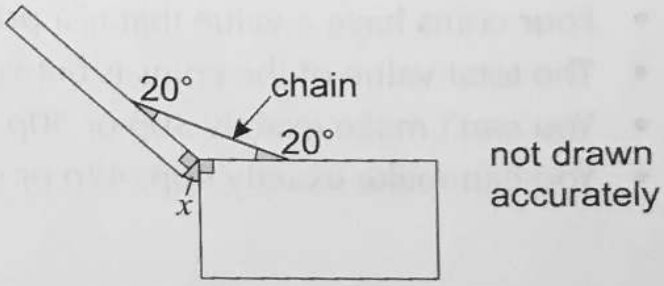
9. Lea thinks of a sequence. The first five numbers are 1.45, 1.9, 2.35, 2.8 and 3.25.
What is the seventh number in the sequence?

[ ][ ].[ ][ ]

The lid on Jade's jewellery box is attached to the box on one side.
To stop the lid from opening too far, the lid and the box are joined by a chain.
Top and side views of the jewellery box are shown below.



Top view of closed box



Side view of open box

10. What is the area of the top face of the closed jewellery box?
Circle the correct option.

A 247 cm^2 **C** 374 cm^2 **E** 304 cm^2

B 274 cm^2 **D** 350 cm^2

11. What is the size of the angle marked x?

[ ][ ][ ]°

12. Neville has x sweets. He gives Sandy four of his sweets.
Sandy now has twice as many sweets as Neville.
Circle the expression which shows the number of sweets Sandy has.

A $2x + 4$ **C** $2x$ **E** $2x - 4x$

B $2x - 4$ **D** $2(x - 4)$

/ 12

Puzzles 12

Now for a break from 10-minute tests. Try out your skills on these puzzles.

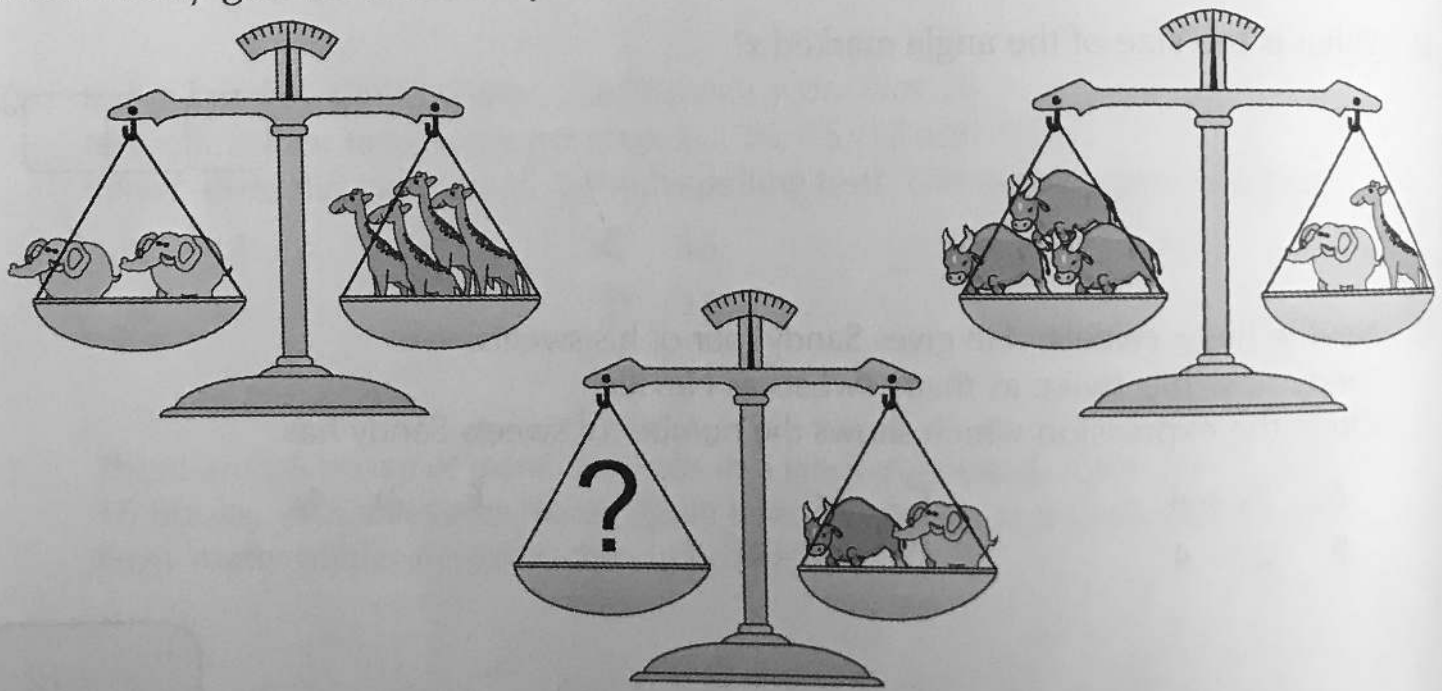
Coin Conundrum

Sam has six coins and a chocolate bar in his sock.
Use these clues to work out the value of each coin.

- There are three different values of coin.
- Four coins have a value that is a prime number.
- The total value of the coins is between 50p and 60p.
- You can't make exactly 30p or 50p with the coins.
- You can make exactly 40p, 42p or 47p.

Wild Animal Weighing

Lucas has some plastic animals.
He finds some sets of animals that weigh exactly the same.
How many giraffes should replace the question mark to make the scales balance?



Test 1 — pages 2-4

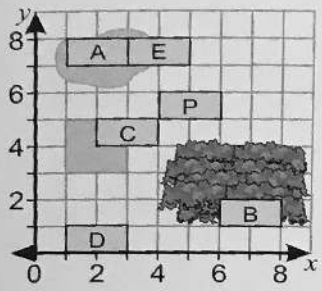
1. 71 341
The football stadium had 75 542 − 4201 = 71 341 seats that were filled during the match (use column subtraction).

2. C
The desk is the same length as 5.5 pens, so the desk is 5.5 × 10 cm = 55 cm long.

3. 50.5 cm
The radius is half of the diameter. The diameter of the paddling pool is 101 ÷ 2 = 50.5 cm (use partitioning).

4. C
A is incorrect because 6 × 13 = 78 litres of water, which is not enough. 10 buckets of water contains 10 × 13 = 130 litres, which is too much water, so options D and E will also be too much. 9 buckets of water contains 130 − 13 = 117 litres. 8 buckets contains 117 − 13 = 104 litres, which is not enough to fill the paddling pool. So Zola's dad needs fill the bucket with water a minimum of 9 times.

5. D
Find the position of the play area following each translation.
Option D is the only option which does not overlap with the lake, café or woodland.



6. 100 cm
Each length of blue string is 121 ÷ 11 = 11 m long.
Each length of silver string is 96 ÷ 8 = 12 m long.
So each silver string is 12 − 11 = 1 m longer than each length of blue string. 1 m = 100 cm.

7. £70.00
If the number of silver-string balloons is s, then the number of blue-string balloons is $2s$. So $30 = s + 2s = 3s$. So $s = 10$. He sells 10 silver-string balloons for 10 × £3 = £30. He sells 2 × 10 = 20 blue-string balloons for 20 × £2 = £40. So he made £30 + £40 = £70.

8. D
$^5/_5 - {}^1/_5 = {}^4/_5$ of the people in the shopping centre are younger than 50 years old. $^1/_{10}$ of 4550 is 4550 ÷ 10 = 455, so $^1/_5$ of 4550 is 455 × 2 = 910. 910 × 4 people are younger than 50. Use partitioning, 910 = 900 + 10. 4 × 900 = 3600. 4 × 10 = 40. So 3600 + 40 = 3640 people in the shopping centre are younger than 50.

9. 15
The team in first place was Team D with 10 points. The team in last place was Team B with −5 points. −5 to 0 is 5 points. 0 to 10 is 10 points. So the difference between the number of points of the two teams is 5 + 10 = 15 points.

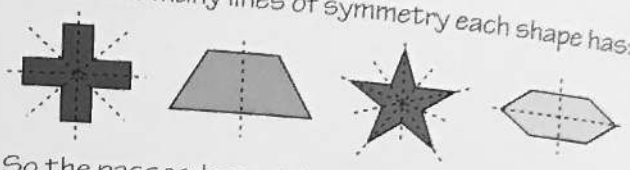
10. C
Option A gives (1 × 3) + (2 × 1) + (1 × −2) = 3 + 2 −2 = 3 points. Option B gives (2 × 3) + (2 × 1) = 6 + 2 = 8 points. Option C gives (2 × 1) + (2 × −2) = 2 − 4 = −2 points. Option D gives (3 × 1) + (1 × −2) = 3 − 2 = 1 point. Option E gives (2 × 3) + (1 × 1) + (1 × −2) = 6 + 1 − 2 = 5 points. From the graph, Team E scored a total of −2 points, so their results must be option C.

11. £5.45
100p = £1, so 70p = £0.70.
Sabah gets 1.25 + (6 × 0.7) = 1.25 + 4.2 = £5.45 pocket money.

12. 12
The pocket money that Sabah gets from doing chores is £9.65 − £1.25 = £8.40. To find the number of chores that she did, divide the amount she gets in tot for doing chores by the amount she gets for doing eac chore: 8.40 ÷ 0.70, which is the same as 84 ÷ 7 = 12 chores.

Test 2 — pages 5-7

1. 4152
Count how many lines of symmetry each shape has:



So the passcode must be 4 1 5 2.

2. 17
On Days 1, 2, 3 and 5, Jansen saw 13 + 22 + 11 + 29 = 75 birds in total. So on Day 4, he saw 92 − 75 = 17 birds.

3. D
Jacob has made 110 − 30 = 80 chocolate chip cookies. So $^{80}/_{110}$ of the cookies are chocolate chip. Simplify the fraction by dividing the numerator and the denominator by 10: $^8/_{11}$.

4. 132 cm
1 m = 100 cm, so 1.2 m = 120 cm. 10% of 120 is 120 ÷ 10 = 12. So Sierra's height has increased by 12 cm. So Sierra is now 120 + 12 = 132 cm tall.

5. 1 hour 30 mins
Each interval on the chart is worth a quarter of an hour = 15 mins. From the chart, Alicia was at the beach from 12:30 until 15:45, which is 3 hours and 15 mins. Will was at the beach from 13:00 until 14:45, which is 1 hour and 45 mins. Find the difference between the two lengths of time:
1 hour 45 mins + 1 hour = 2 hours 45 mins.
2 hours 45 mins + 15 mins = 3 hours.
3 hours + 15 mins = 3 hours 15 mins.
1 hour + 15 mins + 15 mins = 1 hour 30 mins.

6. D
Eli left the beach at 16:45. 60 mins = 1 hour, so 90 mins = 1 hour and 30 mins. 1 hour before 16:45 is 15:45. 30 mins before 15:45 is 15:15.
From the chart, Maia left the beach at 15:15.

7. D
Option A will make 18 ÷ 3 = 6 cakes, which will give 6 × 8 = 48 slices. Option B will make 45 ÷ 3 = 15 cakes, which will give 15 × 8 = 120 slices. Option C will make 51 ÷ 3 = 17 cakes, which will give 17 × 8 = 136 slices. Option D will make 57 ÷ 3 = 19 cakes, which will give 19 × 8 = 152 slices. Option E will make 60 ÷ 3 = 20 cakes, which will give 20 × 8 = 160 slices. So Michael needs to bake 57 sponges.

8. £149.50
Use partitioning, £1.15 = £1 + £0.15. 130 × £1 = £130. £0.15 = 15p = 10p + 5p. 130 × 10p = 1300p. 130 × 5p = 650p. So 130 × 15p = 1300p + 650p = 1950p = £19.50.
So Michael makes £130 + £19.50 = £149.50 in total.

9. 80°
All angles in a regular nonagon are equal, so each angle in each garden is 140°. Angles around a point add to 360°, so angle a must be 360 − (2 × 140) = 360 − 280 = 80°.

10. C
The garden has 23 sides, so 23 × length = 4140 cm. 23 × 100 = 2300 cm, which is too small, so options A and B are incorrect.
23 × 200 = 2300 × 2 = 4600, which is too big, so options D and E are incorrect. So option C must be correct.

11. C
Work out the height of one triangle.
Area = $^1/_2$ × base × height.
21 = $^1/_2$ × 6 × height = 3 × height. So height = 7 cm.
The tower is 3 triangles tall, so it is 3 × 7 = 21 cm tall.

12. 28
Substitute 7 for n in the expression to find the number of triangles in the tower: 7 × (7 + 1) ÷ 2 = (7 × 8) ÷ 2 = 56 ÷ 2 = 28 triangles.

Test 3 — pages 8-10

1. 23
The number of spots on the opposite faces will be:
7 − 2 = 5, 7 − 3 = 4, 7 − 4 = 3, 7 − 1 = 6, 7 − 2 = 5.
So the total number of spots is 5 + 4 + 3 + 6 + 5 = 23.

2. £24
Use partitioning, £4.80 = £4 + 80p. 5 × 4 = £20.
5 × 80 = 5 × 8 × 10 = 40 × 10 = 400p = £4. So 5 m of fabric costs £20 + £4 = £24

3. B
The area is length × width = 1.76 m × 9 m.
1 m × 9 m = 9 m². 2 × 9 = 18 m². So 1.76 m × 9 m is between 9 m and 18 m. 15.84 m² (option B) is the only value which falls in this range.

4. D
100% − 16% = 84% of the people didn't win a prize.
1% of 200 people is 200 ÷ 100 = 2 people.
So 84 × 2 = 168 people didn't win a prize.

5. D
Work backwards to find the number that Selina is thinking of: 52 − 3 = 49. 49 = 7².
So Selina was thinking of the number 7.

6. 11
In the first two tests, Rhiannon scored 17 + 13 = 30 points. In the last two tests, she scored 8 + 11 = 19 points. So she scored 30 − 19 = 11 more points in the first two tests than in the last two tests.

7. E
The total number of points for all 6 tests is 12 × 6 = 72.
The total number of points for all of the known tests is 17 + 13 + 14 + 8 + 11 = 63. So in Test 3, Rhiannon scored 72 − 63 = 9 points.

8. 4800 cm²
The blanket is 8 patches long and 8 patches wide. The length of one patch is 160 cm ÷ 8 = 20 cm. The width of one patch is 96 cm ÷ 8 = 12 cm. The area of one patch is 20 × 12 = 2 × 120 = 240 cm².
There are 20 white patches, so the total area of the white patches is 20 × 240 = 2 × 2400 = 4800 cm².

9. 150°
There are 12 handles on the steering wheel, so the angle between neighbouring handles is 360° ÷ 12: 36° ÷ 12 = 3°, so 360° ÷ 12 = 30°. The black handle at the top has been turned clockwise to the position of the fifth handle. So the captain turned the steering wheel 5 × 30° = 150°.

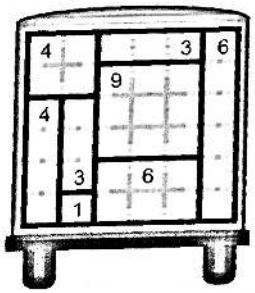
10. £18.60
Work out how much money Phillipa was given each day:
Monday = 60p = £0.60, Tuesday = £0.60 × 2 = £1.20, Wednesday = £1.20 × 2 = £2.40, Thursday = £2.40 × 2 = £4.80, Friday = £4.80 × 2 = £9.60.
So Phillipa was given £0.60 + £1.20 + £2.40 + £4.80 + £9.60 = £18.60.

11. £3.05
Sabina's sandwich has two main fillings, two salad fillings and one sauce. So her sandwich costs 1.25 + (0.5 × 2) + (0.3 × 2) + (0.2 × 1) = 1.25 + 1 + 0.6 + 0.2 = £3.05.

12. B
David wants a sandwich which has two main fillings and one sauce, so this will cost 1.25 + (0.5 × 2) + (0.2 × 1) = 1.25 + 1 + 0.2 = £2.45. This means he will have £3.50 − £2.45 = £1.05 left to spend on salad fillings.
Work out how many salad fillings he can get for £1.05:
£0.30 + £0.30 = £0.60, £0.60 + £0.30 = £0.90, £0.90 + £0.30 = £1.20. So David only has enough money to afford 3 salad fillings.

Puzzles 1 — page 11

Penny's Packing Problem



Nanny Carol's Cakes
Cake 1: Adam. Cake 2: Clive. Cake 3: Bill.
Cake 4: Ed. Cake 5: Dave.

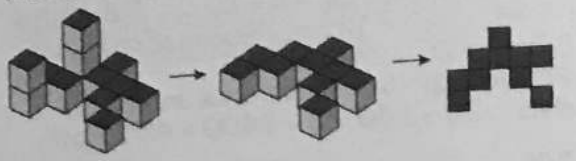
Test 4 — pages 12-14

1. C
7 rows of 9 chairs is 7 × 9 = 63 chairs, not 60.
All the other options give 60 chairs.

2. 72
$^1/_3$ of 54 = 54 ÷ 3. Using partitioning: 54 = 30 + 24. 30 ÷ 3 = 10. 24 ÷ 3 = 8. So 54 ÷ 3 = 10 + 8 = 18. So there are now 54 + 18 = 72 people working at the shop.

3. C

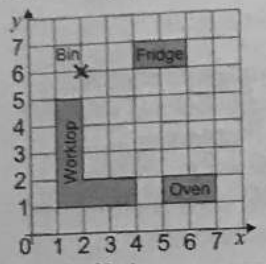
From above, you will only see the top face of the top cube.



4. 104 cm³

The volume of each block is width × length × height = $2 \times 2 \times 2 = 8$ cm³. There are 13 blocks in the model, so the total volume of the model is $13 \times 8 = 104$ cm³ (use partitioning).

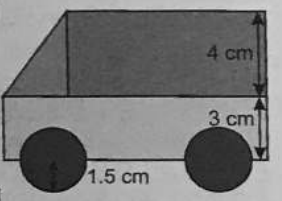
5. (2, 6)



Read off the new coordinates: (2, 6).

6. C

Find the height of both rectangles using the given areas and widths. The height of the top rectangle is $36 \div 9 = 4$ cm. The width of the bottom rectangle is $3 + 9 = 12$ cm, so the height of the bottom rectangle is $36 \div 12 = 3$ cm. Only the bottom half of the circles add to the height of the van. The diameter of the circle is 3 cm. So the radius of the circle is $3 \div 2 = 1.5$ cm. So in total, the van is $4 + 3 + 1.5 = 8.5$ cm tall.



7. £9.40

Work out how many lots of 5 points Felicity has earned by using partitioning to divide 235 by 5. $235 = 100 + 100 + 35$. $100 \div 5 = 20$. $35 \div 5 = 7$. So $235 \div 5 = 20 + 20 + 7 = 47$. She earns 20p for every 5 points, so her voucher will be worth $20p \times 47 = 940p = £9.40$.

8. B

Tom loses $^1/_8$ of 240 points which is $240 \div 8 = 30$ points. Work out how many lots of 5 points that Tom has lost: $30 \div 5 = 6$. So the value of Tom's voucher will decrease by $6 \times 20p = 120p = £1.20$.

9. C

If the number of men is m, then the number of women is $m + 7$. So $101 = m + m + 7 = 2m + 7$. So $2m$ must be $101 - 7 = 94$, and so $m = 94 \div 2 = 47$. So there are 47 men at the wedding.

10. 10

Angles in a triangle add up to 180°. So $180 = 5x + 6x + 7x = 18x$. So $x = 180 \div 18 = 10$.

11. D

Work out how many points Camilla scored in each section. Section $2 = 2 \times 31 = 62$ points. Section $4 = 4 \times 19 = 76$ points. Section $6 = 6 \times 15 = 90$ points. Section $8 = 8 \times 12 = 96$ points. Section $10 = 10 \times 7 = 70$ points. So Camilla scored the most points in section 8.

12. 16.8

Add up the total number of darts that landed on the board: $31 + 19 + 15 + 12 + 7 = 84$ darts. There are 5 sections, so to find the mean number of darts that landed in each section, divide the total number of darts by the number of sections on the dart board: $84 \div 5$. $84 \div 10 = 8.4$, so $84 \div 5 = 8.4 \times 2 = 16.8$.

Test 5 — pages 15-17

1. D

£349 950 = £349 000 + £950. 349 000 is three hundred and forty-nine thousand. 950 is nine hundred and fifty. So the price of the house is three hundred and forty-nine thousand, nine hundred and fifty pounds.

2. 52.0 m

For the fewest number of trips between the house and the bin, Miriam should carry 3×3 bags = 9 bags, plus 2 bags, which is 4 loads of bags. To carry one load of bags to the bin, Miriam would walk 6.5 m and then 6.5 m back to the house, which is 6.5 m + 6.5 m = 13 m in total. So for 4 loads of bags, she will walk $13 \times 4 = 52$ m.

3. A

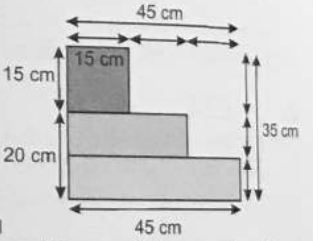
40% + 50% = 90% of the songs are rock and pop, which leaves 100% − 90% = 10% of the songs which must be hip hop. 10% of 550 = $550 \div 10 = 55$ hip hop songs.

4. 13.5 cm³

The volume of a whole cube of cheese is $3 \times 3 \times 3 = 9 \times 3 = 27$ cm³. So the volume of one piece of cheese is $27 \div 2 = 13.5$ cm³.

5. 160 cm

The edges of the cube are equal. So the vertical side of the cube face is 15 cm. So the sum of the heights of the cube and cuboids is 15 cm + 20 cm = 35 cm. The length of the bottom cuboid is 45 cm, so the sum of the lengths of the horizontal faces of the stack will be 45 cm. So the perimeter of the face of the stack is $35 + 35 + 45 + 45 = 70 + 90 = 160$ cm.



6. 1 hour 16 mins

Divide 6 hours and 20 mins by 5 using partitioning: 6 hours and 20 mins = 5 hours + 1 hour (60 mins) + 20 mins. 5 hours ÷ 5 = 1 hour, 60 mins ÷ 5 = 12 mins, 20 mins ÷ 5 = 4 mins. So Zachary revises each subject for 1 hour + 12 mins + 4 mins = 1 hour and 16 mins.

7. 0.295 kg

There is 500 cm³ of flour in the container. So the mass of the flour in the container is 500×0.59. $1000 \times 0.59 = 590$, so $500 \times 0.59 = 590 \div 2 = 295$ g. 1000 g = 1 kg, so $295\text{ g} \div 1000 = 0.295$ kg.

8. B

$^1/_6$ are chickens so the total number of animals can be divided exactly by 6. $^1/_4$ are cows so the total number of animals can be divided exactly by 4. $^1/_5$ are pigs so the total number of animals can be divided exactly by 5. The only option which divides exactly by 6, 4 and 5 is 60. (60 ÷ 6 = 10, 60 ÷ 4 = 15, 60 ÷ 5 = 12).

9. 255 m

On the second sprint, Jessica runs (30 × 2) – 15 = 60 – 15 = 45 m. On the third sprint, she runs (45 × 2) – 15 = 90 – 15 = 75 m. On the fourth sprint, she runs (75 × 2) – 15 = 150 – 15 = 135 m. On the fifth sprint, she runs (135 × 2) – 15 = 270 – 15 = 255 m.

10. B

10% of £480 is £480 ÷ 10 = £48. 5% of £480 is £48 ÷ 2 = £24. So 35% of £480 is £48 + £48 + £48 + £24 = £168. Marcel gives each friend an equal amount, so he gives each friend $^1/_3$ of £168 = 168 ÷ 3 = £56 (using partitioning).

11. D

The bar for ants on day 1 reads from 14 to 39, so 39 – 14 = 25 ants were collected on day 1. The bar for ants on day 2 reads from 8 to 28, so 28 – 8 = 20 ants were collected on day 2. 25 + 20 = 45 ants were collected in total. So $^{25}/_{45}$ ants were found on day 1. Simplify the fraction by dividing the top and bottom of the fraction by 5: $^5/_9$.

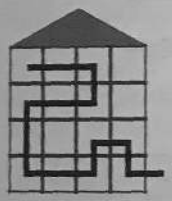
12. 262

Reading off the chart, there were 14 spiders and 39 – 14 = 25 ants collected on day 1. So the total number of ant and spider legs was (6 × 25) + (8 × 14). Use partitioning, 6 × 20 = 120, 6 × 5 = 30, 120 + 30 = 150 ant legs. 8 × 10 = 80, 8 × 4 = 32, 80 + 32 = 112 spider legs. So the total number of legs is 150 + 112 = 262 legs.

Puzzles 2 — page 18

Haunted House

The route out of the house is:



Test 6 — pages 19-21

1. 4

There are 3 × 7 = 21 ice cubes in the tray. She drops one, leaving 20 to share between the 5 glasses. 20 ÷ 5 = 4 ice cubes in each glass.

2. 180 m

The perimeter of the rink = 65 m + 25 m + 65 m + 25 m = 180 m.

3. 12

2 km × 1000 = 2000 m.
1 lap = 180 m. 10 laps = 180 × 10 = 1800 m.
11 laps = 1800 + 180 = 1980 m.
12 laps = 1980 + 180 = 2160 m.
So Mo needs to skate 12 laps to cover at least 2 km.

4. C

12:56 to 13:00 is 4 minutes, and so 12:56 to 13:11 is 4 + 11 = 15 minutes. Mo skates 10 laps in 15 mins, so one lap takes 15 ÷ 10 = 1.5 minutes.

5. 80

The person with the highest total score will also have the highest mean score. Total scores are:
Ana: 160, Baz: 105, Cat: 159, Dil: 159, Eve: 154.
So Ana has the highest mean, at 160 ÷ 2 = 80 marks.

6. 50%

The increase in Baz's score was 63 – 42 = 21.
As a fraction of his test 1 score, this is $^{21}/_{42}$.
Top and bottom can be divided by 21 to give $^1/_2$.
$^1/_2$ = 50% as a percentage.

7. £0.05

To multiply by £1.99, multiply by £2, then adjust:
5 × £1.99 = (5 × £2.00) – (5 × £0.01)
= £10 – £0.05 = £9.95. So if Cal pays with a £10 note, she will get £0.05 change.

8. 1.05 kg

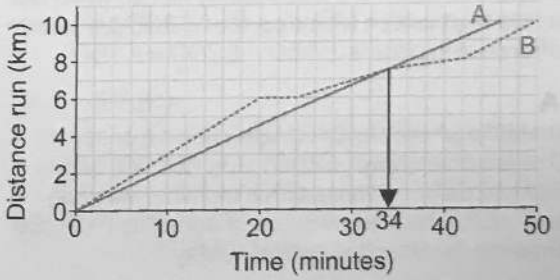
Each special offer packet contains 40% of 150 g more than 150 g of crisps. 10% of 150 g = 150 ÷ 10 = 15 g. 40% of 150 g = 15 × 4 = 60 g.
So each packet contains 150 g + 60 g = 210 g of crisps. Cal buys 5 special offer packets, so the total mass of crisps is: 5 × 210 g = 1050 g (use partitioning).
1 kg = 1000 g, so 1050 g ÷ 1000 = 1.05 kg.

9. E

From question 8, the total mass of crisps is 1050 g. Using partitioning:
1050 ÷ 25 = (1000 ÷ 25) + (50 ÷ 25) = 40 + 2 = 42.
So each person will get 42 g of crisps, which is option E.

10. C

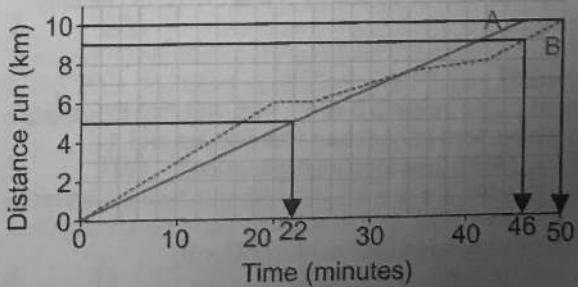
A overtook B at the point where the graphs cross:



30 minutes after 10:32 is 11:02, so 34 minutes after 10:32 is 11:02 + 4 minutes = 11:06 (option C).

11. B

Dev ran 0.2 km every minute, so he ran 2 km in 10 mins. Neither runner A or B did this, so neither can be Dev.



Runner A took 22 minutes to reach the halfway point (5 km) so this must be Tina, and runner B took 4 minutes to run the final kilometre (50 – 46 minutes) so this must be Scott. So option B is correct.

12. E

To find 10% of an amount, you divide that amount by 10. So to reduce an amount, F, by 10%, you take $(F \div 10)$ away from F. So $R = F - (F \div 10)$, which is option E.

Test 7 — pages 22-24

1. £316 008

Splitting up the number gives:
three hundred thousand: 300 000
sixteen thousand: 16 000
eight: 8
Adding the columns gives 316 008.

2. 42 hours

There are 24 hours in one day.
17:00 Weds + 24 hours = 17:00 Thurs
17:00 Thurs + 24 hours = 17:00 Fri
17:00 Fri − 6 hours = 11:00 Fri
So there are 24 + 24 − 6 = 42 hours until the flight.

3. 7

The perimeter = 2 + 2 + 1.25 + 1.25 = 6.5 m (use partitioning). So 7 rolls of fencing are needed.

4. 1.5 m²

The area of a parallelogram is base × height.
So the area of the bed is 2 × 0.75 = 1.5 m².

5. B

The fraction that grow into plants is $^{32}/_{40}$. Divide top and bottom of $^{32}/_{40}$ by 8 to give $^{4}/_{5}$, which is option B.

6. E

The total width = $16 \times 3\,^{1}/_{8}$. Using partitioning:
$(16 \times 3) + (16 \times {}^{1}/_{8})$
$= (10 \times 3) + (6 \times 3) + {}^{16}/_{8}$
= 30 + 18 + 2 = 50 inches (option E).

7. £150

The sunniest month (with the highest bar) is June, with a cost of £350 per week. The least sunny month (with the lowest bar) is September, with a cost of £200 per week. So the difference in price is £350 − £200 = £150.

8. A

The only months where the line graph shows a cost of £300 or lower are May (£250), July (£300) and September (£200). Of these three months, May has the highest weekly number of hours of sunshine (45). So the best month for Steph is option A, May.

9. A

The numbers 27, 4, 85 and 92 all have factors other than themselves and 1, so are not prime: 27 = 3 × 9, 4 and 92 are even so have 2 as a factor, and 85 ends in 5, so has 5 as a factor. The only option where both numbers are primes is option A, 2 and 37 (2 is the only even prime).

10. 2491

The largest prime below 53 is 47 (48, 49, 50, 51 and 52 all have factors other than themselves and 1).
53 × 47 = 2491 (use long multiplication).

11. C

A is incorrect because (90 × 1) + (30 × 9) = 90 + 270 = 360.
B is incorrect because (90 × 1) + (30 × 3) = 90 + 90 = 180.
C is correct because (90 × 3) + (30 × 1) = 270 + 30 = 300.
D is incorrect because (90 × 7) + (30 × 1) = 630 + 30 = 660.
E is incorrect because (90 × 10) = 900.

12. 6

Try different pairs of numbers of melons and limes and see which comes to £3 (300p):
1 melon and 2 × 1 = 2 limes: (90 × 1) + (30 × 2) = 90 + 60 = 150. So this can't be the correct pair.
2 melons and 2 × 2 = 4 limes: (90 × 2) + (30 × 4) = 180 + 120 = 300. So this is the correct pair.
2 melons + 4 limes = 6 in total.

Test 8 — pages 25-27

1. 121

Find the numbers on the cards which are square numbers: 81, 49, 121, 100. Damien's card has the highest.

2. 07:25

Working backwards, she needs to leave the house 25 minutes before 08:50, which is 08:25. She needs to get up one hour before this, which is 07:25.

3. N

360° is a full turn, so he will still be facing East after the two 360° turns. 90° is quarter of a turn, so he will be facing North after the 90° turn.

4. 40

1 litre = 1000 ml. Find 1000 ÷ 25. 100 ÷ 25 = 4, so 1000 ÷ 25 = 40. The bottle will last for 40 weeks.

5. D

A is incorrect because 9 × 21 − 1 =
(9 × 20) + (9 × 1) − 1 = 180 + 9 − 1 = 188.
B is incorrect because 9 × 23 − 3 =
(9 × 20) + (9 × 3) − 3 = 180 + 27 − 3 = 204.
C is incorrect because 9 × 24 − 4 =
(9 × 20) + (9 × 4) − 4 = 180 + 36 − 4 = 212.
D is correct because 9 × 25 − 5 =
(9 × 20) + (9 × 5) − 5 = 180 + 45 − 5 = 220.
E is incorrect because 9 × 28 − 8 =
(9 × 20) + (9 × 8) − 8 = 180 + 72 − 8 = 244.

6. 9

The sequences are as follows:

Term	1	2	3	4	5	6	7	8	9
Jen	1	8	15	22	29	36	43	50	57
Ben	100	93	86	79	72	65	58	51	44

So Jen's is bigger than Ben's on term 9.

7. C

For a team of 4 to have a mean of 7, the total of the scores must be 7 × 4 = 28. The total of the five friends is 10 + 9 + 7 + 5 + 4 = 35. So they need to leave out the person with a score of 35 − 28 = 7. This is Ash, which is option C.

8. 10 minutes

The temperature needs to rise by 17 °C + 3 °C = 20 °C. This will take 20 ÷ 2 = 10 minutes at 2 °C each minute.

9. 36

The cubes can be stacked 2 high (with a gap of 12 cm − 10 cm = 2 cm), 3 wide (with a gap of 17.5 cm − 15 cm = 2.5 cm) and 30 ÷ 5 = 6 deep (exactly). This gives a total of 2 × 3 × 6 = 6 × 6 = 36 cubes.

10. 15
Try some values for their ages:
When Johnny is 10, Jean will be 50 + 10 = 60, so total age = 10 + 60 = 70 — too low.
When Johnny is 20, Jean will be 50 + 20 = 70, so total age = 20 + 70 = 90 — too high.
When Johnny is 15, Jean will be 50 + 15 = 65, so total age = 15 + 65 = 80 — correct.

11. C
Johnny is now 15 and Jean is 65 (from the answer to question 10). So in ten years, Johnny will be 25 and Jean will be 75. So Johnny's age will be $^{25}/_{75}$ of Jean's age. Divide top and bottom of the fraction by 25 to get $^{1}/_{3}$, which is option C.

12. D
In each rectangle, the width is 1.5 times the height:
1.5 × 4 cm = 6 cm, 1.5 × 8 cm = 12 cm,
1.5 × 10 cm = 15 cm. So the width of a photo of height x = 1.5 × x = 1.5x, which is option D.

Puzzles 3 — page 28

An Age-Old Problem
Laurie (who is lying) is 11.

Save the Date
On the 8th June, Nina will have 150p + 155p + 6p + 12p + 18p + 24p + 30p + 36p + 42p + 48p = 521p = £5.21.

Test 9 — pages 29-31

1. E
Out of the given options, only the net of a triangular prism (option E) has 2 triangular faces and three rectangular faces.

2. 24
To have no one left out when divided by 2 or 3, the number needs to be a multiple of both 2 and 3, between 21 and 29.
Multiples of 2: 22, 24, 26, 28.
Multiples of 3: 21, 24, 27.
24 is the only number in both lists.

3. D
In order from largest to smallest, the masses are 7.901 kg (Bob), 7.191 kg (Betty) and 7.099 kg (Bill). So option D gives the correct order.

4. D
All of the fractions can be simplified to $^{2}/_{3}$, except for $^{10}/_{12}$, which simplifies to $^{5}/_{6}$ (dividing top and bottom by 2). So Rhys (option D) eats a different amount of pizza to the others.

5. 160
The mean number of buds is the total divided by 5:
(160 + 159 + 155 + 165 + 161) ÷ 5 = 800 ÷ 5.
800 ÷ 10 = 80, so 800 ÷ 5 = 80 × 2 = 160.

6. 94
MDCCCLXXXVI is 1000 (M) + 500 (D) + 300 (CCC) + 50 (L) + 30 (XXX) + 6 (VI) = 1886.
MCMLXXX is 1000 (M) + 900 (CM) + 50 (L) + 30 (XXX) = 1980.
So the building was restored 1980 − 1886 = 94 years after it was built.

7. 108°
There are 5 equal angles inside a regular pentagon, so the first angle (and the others) must be:
540° ÷ 5 = (500° ÷ 5) + (40° ÷ 5) = 100° + 8° = 108°.

8. 4
The area of the rectangular wall = width × height = 10 × 2.5 = 25 m².
1 tin covers 7.5 m², so 2 tins cover 7.5 × 2 = 15 m².
3 tins cover 15 + 7.5 = 22.5 m², which is not quite enough, so she will need 4 tins (which will cover 2 × 15 = 30 m²).

9. E
Both recipes have the same total mass, so an angle of 1° represents the same mass on each pie chart. Recipe 2 has a greater angle for flour than recipe 1, so statement A must be true. $^{1}/_{4}$ is always represented by 90° on a pie chart, so the angle of 80° for flour in recipe 1 is less than $^{1}/_{4}$, so statement B is true. In recipe 1, the angle for egg = 360° − 240° − 80° = 40°, and in recipe 2 the angle for egg = 360° − 160° − 96° − 64° = 40°. So statement C is true, and since $^{40°}/_{360°} = {}^{1}/_{9}$ (dividing top and bottom by 40), which is greater than $^{1}/_{10}$ or 10%, statement D must also be true. This leaves statement E, which is false, because $^{1}/_{3}$ of 360° = 120°, not 160°.

10. 300 g
In recipe 1, the fraction of the mass that is milk is $^{240°}/_{360°} = {}^{2}/_{3}$ (dividing top and bottom by 120).
$^{1}/_{3}$ of 450 g = 450 ÷ 3 = 150 g.
So $^{2}/_{3}$ of 450 g = 2 × 150 g = 300 g.

11. D
The total time for the job in minutes = 25 + (n × 1) + 20, which simplifies to 25 + n + 20 = 45 + n, which is option D.

12. £7.50
2 hours = 2 × 60 = 120 minutes. Taking off the time to get to and from the houses, this leaves 120 − 45 = 75 minutes to deliver leaflets, which is 75 leaflets at 1 leaflet each minute. So she would get paid 75 × 10p = 750p = £7.50 for the job.

Test 10 — pages 32-34

1. 24 000
The smallest of the three numbers is 23 500. This rounds up to 24 000 to the nearest 1000.

2. 925
The largest number is 27 664 and the second largest is 26 739. 27 664 − 26 739 = 925 (use column subtraction).

3. 700
From each sheet she can cut 21 ÷ 3 = 7 strips. So from 100 sheets she can cut 7 × 100 = 700 strips.

4. D
Each strip has a width of 3 cm, so the diameter of the circle should be 3 cm to fit exactly. Radius is half of diameter, so the radius should be 3 ÷ 2 = 1.5 cm, which is option D.

5. 125
2 spoons of sugar = 2 × 4 g = 8 g.
1 kg = 1000 g. 1000 g ÷ 8 g = 125 cups of tea (use short division).

6. C

If 1 pint is 568 ml, then 11 pints is 11×568 ml. Using partitioning: $11 \times 568 = (10 \times 568) + 568 = 5680 + 568 = 6248$ ml. 1000 ml = 1 litre, so $6248 \text{ ml} \div 1000 = 6.248$ litres, so she will need 7 litre bottles (option C).

7. D

Because the scale doesn't start at zero, the second bar looks like a small fraction ($^2/_{11}$) of the first bar, which suggests that the percentage reduction in crimes is a lot greater than it really is.

8. C

Each division on the chart is worth $(600 - 500) \div 5 = 100 \div 5 = 20$ crimes. Reading off the chart:
Before the lighting improvements, there were 720 crimes per month.
After the lighting improvements, there were 540 crimes per month.
This is a reduction of $720 - 540 = 180$ crimes.
As a fraction, this is $^{180}/_{720} = {}^{18}/_{72} = {}^{9}/_{36} = {}^{1}/_{4}$.
As a percentage, $^1/_4 = 25\%$, which is option C.

9. 66 cm

Each small division on the ruler is 0.5 cm. The broken ruler has 11 of these small divisions, so measures $11 \times 0.5 = 5.5$ cm. The width of the desk is 12×5.5 cm $= (12 \times 5) + (12 \times 0.5) = 60 + 6 = 66$ cm.

10. A

Use long division to share 3000 almonds between bags with 14 almonds in each bag:

```
     2 1 4 r4
14 | 3 0 0 0
    -2 8
       2 0
      -1 4
         6 0
        -5 6
           4
```

So Ruth fills 214 bags, with 4 almonds left over for Ezra, which is option A.

11. 60

The angles should add up to 360°:
$a° + 2a° + 3a° = 360°$, so $6a° = 360°$.
This means that $a = 360 \div 6 = 60$.

12. 64

The number of glasses in each layer is: layer number + 1, squared: Layer 1 $= (1 + 1)^2 = 2^2 = 4$, Layer 2 $= (2 + 1)^2 = 3^2 = 9$, Layer 3 $= (3 + 1)^2 = 4^2 = 16$.
So Layer 7 $= (7 + 1)^2 = 8^2 = 64$.

Puzzles 4 — page 35

Red and Yellow and Pink and Green...

There will be:
15 red squares (prime numbers)
6 yellow squares (square numbers)
2 green squares (cube numbers)
26 pink squares (other numbers)

Test 11 — pages 36-38

1. C

5 is in the 'millions' column, so its value is 5 000 000.

2. 56 litres

The tank is leaking at a rate of 4 litres every hour. It takes 14 hours for the tank to empty completely, so its capacity must be $4 \times 14 = (4 \times 10) + (4 \times 4) = 40 + 16 = 56$ litres.

3. £2.76

Chris spends $79\text{p} + 65\text{p} + 80\text{p} = 224\text{p} = £2.24$.
So he receives $5.00 - 2.24 = £2.76$ in change.

4. B

10% of $70\text{p} = 70\text{p} \div 10 = 7\text{p}$. So 20% of 70p is $2 \times 7\text{p} = 14\text{p}$. So the reduced price of a chocolate bar is $70 - 14 = 56\text{p}$.

5. 12 seconds

The sum of the four times is $10.2 + 12.3 + 11.5 + 14 = 48$ seconds. $48 \div 4 = 12$, so the mean time is 12 seconds.

6. 137.6 m

The diameter is twice the radius, so the diameter of the cricket ground is 2×68.8. You can use partitioning: $(2 \times 60) + (2 \times 8) + (2 \times 0.8) = 120 + 16 + 1.6 = 137.6$ m.

7. 86 m

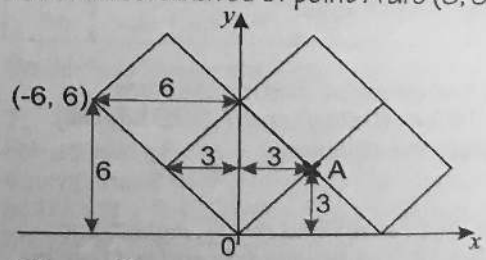
$25\% = {}^1/_4$. $^1/_4$ of $68.8 = 68.8 \div 4 = 17.2$ (use partitioning), so the new radius of the ground is $68.8 + 17.2 = 86$ m.

8. B

Going forward in Darragh's sequence, the difference between numbers increases by 1 each time. The second number is 9 more than 34, the third number is 10 more than 43 and the fourth number is 11 more than 53. This means the fifth number will be $64 + 12 = 76$, and the sixth number will be $76 + 13 = 89$.

9. (3, 3)

The y-axis has an x-coordinate of 0 and the corner of the square has an x-coordinate of -6, so the distance between opposite corners of each square is 6 units. So the distance between the centre of a square and one corner of a square is $6 \div 2 = 3$ units. The point marked A is 3 units right and 3 units up from point (0, 0).
So the coordinates of point A are (3, 3).



10. C

The number of voters increased, rather than fell, by 1500 after online voting was introduced — on the graph, larger numbers appear lower down on the y-axis.

11. D

300 ml of soap cleans 6 m² of window, so a 200 ml bottle would clean $^2/_3$ of $6 \text{ m}^2 = 4 \text{ m}^2$. This means 16 bottles of soap would clean $16 \times 4 = 64 \text{ m}^2$.

12. £55.99

Replace n with 30 in the formula: $1.2 \times 30 + 19.99 = 12 \times 3 + 19.99 = 36 + 19.99 = £55.99$.

Test 12 — pages 39-41

1. 12:18
The train leaves Cambridge at 11:25. Add 53 minutes to this time by adding 1 hour to get 12:25, then taking away 7 minutes to get 12:18.

2. A
Convert all of the masses to the same unit (g). 1 kg = 1000 g, so 0.65 kg is the same as 650 g, 0.9 kg is the same as 900 g and 1.6 kg is the same as 1600 g. So the spade is the heaviest and the compost is the second heaviest.

3. 1.8 m^2
The flag is a triangle, so its area is $^1/_2$ × base × height = $^1/_2 \times 3 \times 1.2 = 3 \times 0.6 = 1.8$ m^2.

4. A
The angles in a triangle add up to 180°. The sum of the two angles given is 90° + 35° = 125°, so the third angle is 180° − 125° = 55°.

5. E
86.687 s rounds to 87 s to the nearest whole second. Chloe takes around 87 seconds to type 100 words, so 500 words will take her approximately 5 × 87 = 435 seconds (use partitioning). So E is the best estimate.

6. 87.087 s
4 tenths = 0.4. Adding this on gives:

$$\begin{array}{r} 86.687 \\ +\,00.400 \\ \hline 87.087 \\ \hline 1 \end{array}$$

So Siobhan takes 87.087 s.

7. 8.10 m
The mean distance of all 5 jumps is 8.00 m, so the sum of all the distances is 8 × 5 = 40 m. Subtracting all of the other distances gives 40 − (8.65 + 6.90 + 9.00 + 7.35) = 40 − 31.90 = 8.10 m (use partitioning).

8. D
$^1/_2$ of 2130 = 2130 ÷ 2 = 1065 and $^1/_3$ of 2130 = 2130 ÷ 3 = 710, so Branislav's total spend on rent, bills and car is 1065 + 710 = 1775. This means he has 2130 − 1775 = £355 remaining each month.

9. C
The terms in the sequence will all be odd, because you're adding 3 to a multiple of 2 (which is always even). 256 is even, so it cannot appear in this sequence.

10. 12
The 'other' sector forms a right angle (90°), so it makes up $^1/_4$ of the pie chart (360°). $^1/_4$ of 80 = 80 ÷ 4 = 20. 60% of 20 musicians want to play jazz. 10% of 20 = 20 ÷ 10 = 2, so 60% of 20 is 6 × 2 = 12.

11. 135°
20 musicians make up 90° on the pie chart, meaning 10 musicians = 90° ÷ 2 = 45°. So 30 musicians = 90° + 45° = 135°.

12. A
5p = £0.05. Abigail earns £0.05 for every word she translates and translates w words, which gives $0.05w$. She earns £30 a day on top of this, so in total she earns $0.05w + 30$.

Test 13 — pages 42-44

1. 33.28 °C
The values in order are 26.29 °C, 28.95 °C, 33.28 °C, 36.43 °C and 41.74 °C. 33.28 °C is the middle value.

2. 45
Work through the multiples of 15 to see if 3, 5 and 9 are also factors. The first multiple of 15 is 15, but 9 is not a factor. The next multiple of 15 is 30, but 9 is not a factor. The next multiple of 15 is 45. 3, 5 and 9 are all factors of 45, so 45 is the smallest number of CDs that could be in Harry's collection.

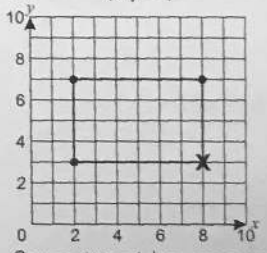
3. A
1 litre = 1000 ml, so 0.3 litres = 300 ml. So the total volume of the cup of tea in ml is 300 + 25 = 325 ml. In litres, this is 325 ÷ 1000 = 0.325 litres.

4. B
The side view is a quadrilateral. Angles in a quadrilateral add up to 360°, so angle x is 360° − 90° − 90° − 31° = 149°.

5. C
MMVII = 2007. The first film was made in 2007, so the sequel was made in 2007 + 7 = 2014. 2014 in Roman numerals is MMXIV.

6. 1200 cm^3
Convert all values to centimetres. 1 cm = 10 mm, so 100 mm = 10 cm, 200 mm = 20 cm and 60 mm = 6 cm. The volume of one brick is 10 cm × 20 cm × 6 cm = 1200 cm^3.

7. (8, 3)



Opposite sides on a rectangle must be parallel and of equal length, so when drawn on the grid the final corner (marked with a cross) will be at (8, 3).

8. 5
1 hour = 60 minutes, so 2 hours = 2 × 60 = 120 minutes. Ruby plays for the following times: Week 1: 12 minutes, Week 2: 2 × 12 = 24 minutes, Week 3: 2 × 24 = 48 minutes, Week 4: 2 × 48 = 96 minutes, Week 5: 2 × 96 = 192 minutes. So Ruby will first play for over 2 hours (120 minutes) in Week 5.

9. 12 km
The shop is 9 km away from home, and Roger cycled 3 km on the way back before stopping and turning around. So Roger cycled 9 + 3 = 12 km in total.

10. D
Fifteen laptops cost £8670 in the sale, so one laptop costs £8670 ÷ 15 = £578 (use long division).

11. £10404
The sale price of 15 laptops is £8670. $^1/_5$ of £8670 = £8670 ÷ 5. £8670 ÷ 10 = £867, so £8670 ÷ 5 = £867 × 2 = (800 × 2) + (60 × 2) + (7 × 2) = £1734. So the shop would make £8670 + £1734 = £10404 if it sold fifteen laptops at the new price.

12. B
The basic fare at night is 2.50 + 1.50 = £4, and the cost per kilometre is 0.50 + 0.25 = £0.75. The taxi travels k kilometres, which gives $0.75k$.
So in total the journey costs $4 + 0.75k$.

Puzzles 5 — page 45

Board Games
Helena Bonham Darter wins with a score of 98.
180 is the highest score that can be achieved with 3 darts — with all three landing on treble 20.
23 is the lowest score that cannot be achieved with a single dart.

Test 14 — pages 46-48

1. E
You are rounding to the nearest hundred, so look at the tens column. There is a 6 in the tens column, so round up to get 32 600 feet.

2. 22 km
Four laps would be $4 \times 5.5 = (4 \times 5) + (4 \times 0.5)$ $= 20 + 2 = 22$ km.

3. 42 minutes
Write down the multiples of 7 until you reach one that is also a multiple of 6. 7, 14, 21, 28, 35, 42.
$42 \div 6 = 7$, so both cars cross the start line at the same time after 42 minutes.

4. £12.10
The total cost is £13 + £14 + £12.10 + £9.30 = £48.40. So the mean cost is £48.40 ÷ 4 = £12.10 (use partitioning).

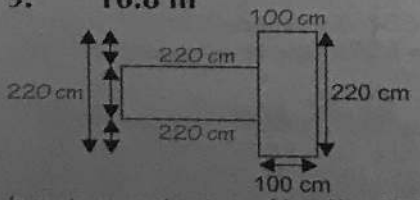
5. C
$^1/_{11}$ of 55 is 55 ÷ 11 = 5, so $^6/_{11}$ is 6 × 5 = 30 wins.
So the hockey team did not win 55 − 30 = 25 matches.

6. C
The total number of cars on sale is 5 + 10 + 14 + 8 + 3 = 40. 5 of these cars are less than £5000 and 3 are at least £20 000. So Sandy can buy 40 − 5 − 3 = 32 cars. $^{32}/_{40} = {}^8/_{10}$ (divide top and bottom by 4).
$^8/_{10}$ is equivalent to 80%.

7. 4 hours 35 minutes
The big hand is pointing at XI (= 11), so it's five to the hour. The little hand is just before IX (= 9), so it's five minutes to nine, or 08:55. From 08:55 until 9:00 is 5 minutes. Then from 9:00 until 13:30 is 4 hours and 30 minutes. So from 08:55 until 13:30 is 4 hours and 35 minutes.

8. E
100 cm = 1 m, so 220 cm = 2.2 m.
The area of one table is $1 \times 2.2 = 2.2$ m^2.
So the area of two tables is $2.2 \times 2 = 4.4$ m^2.

9. 10.8 m



In metres, perimeter = $(1 \times 2) + (2.2 \times 4) = 2 + 8.8 =$ 10.8 m.

10. 45°
Two equal sectors form a right angle (90°), so $x = 90 \div 2$ $= 45°$.

11. 136 cm
The length of one spoke is 64 cm. $^1/_{16}$ of 64 $= 64 \div 16 = 4$, so the width of the tyre is 4 cm.
The radius of the wheel is 64 + 4 = 68 cm. The diameter is twice the radius, so the diameter of the whole wheel is $68 \times 2 = 136$ cm.

12. A
The sequence is as follows: 1, 1, 2, 3, 5, 8, 13 (5 + 8), 21 (8 + 13), 34 (13 + 21), 55 (21 + 34), 89 (34 + 55), 144 (55 + 89). 144 is greater than 100 and the twelfth term in Luke's sequence.

Test 15 — pages 49-51

1. 10
4 bales of hay feeds 12 horses, so 1 bale of hay feeds $12 \div 4 = 3$ horses. $30 \div 3 = 10$, so the farmer would need 10 bales of hay to feed 30 horses.

2. 7.0 °C
Lowest temperature = −2.4 °C. Highest = 4.6 °C.
Difference = 4.6 + 2.4 = 7.0 °C.

3. E
The face marked 5 will be opposite the star.

4. 27 cm^3
The total length of 4 faces is 12 cm, so the length of 1 face = 12 ÷ 4 = 3 cm. Volume of cube is $3 \times 3 \times 3 =$ 27 cm^3.

5. 180 g
$^{20}/_{25} = {}^4/_5$ (divide top and bottom by 5). So Simon has $^4/_5$ of 225 g of butter. $^1/_5$ of 225 is 225 ÷ 5 = 45, so $^4/_5$ of 225 is $45 \times 4 = 180$ g.

6. A
The angle between south west and west is 45°. Angles on a straight line (between west and east) add up to 180°, so Tracey turns 45 + 180 = 225° clockwise.

7. 8
It will take Alice 850 ÷ 50 = 17 days to finish the book (do 85 ÷ 5 using short division). 25 − 17 = 8, so Alice would finish the book with 8 days to spare.

8. B
From the graph, 4 km is about 2.5 miles. $9 \times 4 = 36$, so 36 km is about $9 \times 2.5 = (9 \times 2) + (9 \times 0.5) = 18 + 4.5$ $= 22.5$ miles. The nearest answer is B, 22.4 miles.

9. C
36 km × 5 = 180 km, so Tony travels 180 km in five days. 9 litres of petrol lasts for 100 km, so 0.9 litres lasts for 10 km. 180 km = 100 km + (8 × 10 km), so 180 km requires 9 litres + (8 × 0.9 litres) = 9 litres + 7.2 litres = 16.2 litres.

10. (15, 7)
Point P is 7 squares to the left of the mirror line. Its reflection will be 7 squares to the right of the mirror line. The coordinates of this point are (15, 7).

11. 8

The factors of 56 are 1, 2, 4, 7, 8, 14, 28 and 56. 2 and 7 are prime numbers. $56 \div 2 = 28$ and $56 \div 7 = 8$, so 8 is the minimum number of players possible.

12. C

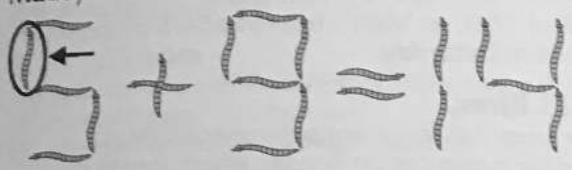
The waiter is paid £6.95 per hour and works for h hours, which gives $6.95h$. 50% can also be expressed as $^1/_2$, which is the same as dividing by 2. So 50% of the tips is $t \div 2$. So in total the waiter is paid $6.95h + (t \div 2)$.

Puzzles 6 — page 52

Bogged Down

The route through the swamp is as follows:
2, 10, 19, 28, 36, 43, 52, 61.

Muddy Maths



Test 16 — pages 53-55

1. 37°

Angles inside a triangle add up to 180°.
The unlabelled angle must be a right angle as it is on a straight line with another right angle.
So if b is 53°, then $a = 180° - 90° - 53° = 37°$.

2. B

One chocolate bar weighs 50 g, so the number of chocolate bars that weigh 1500 g is $1500 \div 50$. This is the same as $150 \div 5 = 30$.

3. 119 minutes

Four adverts at $3^1/_2$ minutes each add $4 \times 3^1/_2 = (4 \times 3) + (4 \times {}^1/_2) = 12 + 2 = 14$ minutes to the length of the show. So the total time is $105 + 14 = 119$ minutes.

4. C

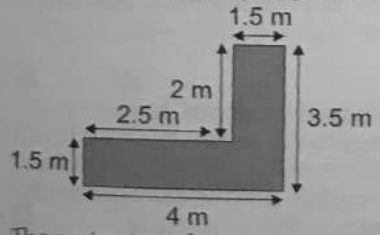
$105 \div 5 = (100 \div 5) + (5 \div 5) = 20 + 1 = 21$ minutes.

5. 45

$^1/_5$ of $225 = 225 \div 5 = (200 \div 5) + (25 \div 5) = 40 + 5 = 45$. So the second store has $^4/_5$ of $225 = 4 \times 45 = 180$ toys in stock. The third store has a quarter of this $= 180 \div 4 = 45$ toys in stock.

6. 15 m

Fill in the two missing lengths on the diagram, as below.

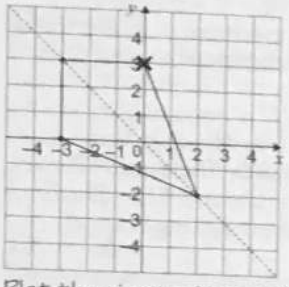


The perimeter of the sofa $= (2 \times 1.5) + 3.5 + 2.5 + 2 + 4 = 3 + 6 + 6 = 15$ m.

7. 9 m²

Divide the sofa into two rectangles. $2 \times 1.5 = 3$ m² and $4 \times 1.5 = 6$ m², so the total area of floor covered by the sofa is $3 + 6 = 9$ m².

8. (0, 3)



Plot the given points on the grid as above. The fourth point (marked with an X) must be at coordinates (0, 3) to form a kite shape.

9. £14.44

10% of £19 = £19 ÷ 10 = £1.90, so 20% of £19 = £1.90 × 2 = £3.80. The reduced price of the book is £19 − £3.80 = £15.20. Amy's voucher removes another 5% from the price. 10% of £15.20 = £1.52, so 5% of £15.20 = £1.52 ÷ 2 = £0.76. So Amy pays £15.20 − £0.76 = £14.44.

10. £517.00

Use long division to divide the bonus of £9823 between 19 people, as below.

```
      517
19 | 9823
     95
     ---
      32
      19
     ---
     133
```

Each member of staff would receive £517.00.

11. 64

Angles around a point add up to 360°, so layer A would give $360 \div 15 = 24$ slices and layer B would give $360 \div 12 = 30$ slices. There are 118 slices of wedding cake in total, so $118 - (24 + 30) = 118 - 54 = 64$ slices of wedding cake are from layer C.

12. D

George is y cm tall. Louise is 3 cm shorter than George, so the expression for Louise's height is $y - 3$. Duncan is twice as tall as Louise, so the expression for Duncan's height is $2(y - 3)$.

Test 17 — pages 56-58

1. C

The price of one chocolate bar is 55p, so three chocolate bars cost $55 \times 3 = 165$p, or £1.65. Buying three chocolate bars would leave Mohammad with £2 − £1.65 = £0.35, which is not enough to pay for an extra bar, but he also gets a fourth bar for free.

2. 49.6 m

Rhombuses have four sides of equal length, so the perimeter of Rashid's allotment is $4 \times 12.4 = (4 \times 12) + (4 \times 0.4) = 48 + 1.6 = 49.6$ m.

3. 42°

Angles in a triangle add up to 180°, so the size of angle a is $180° - (90° + 48°) = 180° - 138° = 42°$.

4. 726 ml
10% of 600 ml = 600 ÷ 10 = 60 ml, so 20% of 600 ml = 2 × 60 = 120 ml. 1% of 600 ml = 600 ÷ 100 = 6 ml. The bucket now contains 600 + 120 + 6 = 726 ml.

5. 1
Reading off the graph, there are 12 − 7 = 5 girls in rounders club and 7 − 3 = 4 girls in nature club. So there is 5 − 4 = 1 more girl in rounders club than nature club.

6. 15
Reading off the graph, there are 14 − 8 = 6 girls in reading club and 3 boys in nature club. There are 12 children in rounders club, so half of them is 12 ÷ 2 = 6. So there are 6 + 3 + 6 = 15 children waiting in total.

7. B
The total number of children attending after-school clubs is 14 + 7 + 12 + 11 = 44. $^1/_4$ of 44 = 44 ÷ 4 = 11, so $^3/_4$ of 44 = 3 × 11 = 33 children.

8. E
56.8 g of dye colours 50 g of fabric. 450 g is nine times greater than 50 g, so 450 g of fabric needs 9 × 56.8 = (9 × 50) + (9 × 6) + (9 × 0.8) = 450 + 54 + 7.2 = 511.2 g of dye.

9. 10
Jacob adds 2 tiles during the first hour, 4 tiles during the second hour, 6 tiles during the third hour and 8 tiles during the fourth hour.
The number of tiles added increases by 2 each time, so Jacob will add 8 + 2 = 10 tiles during the fifth hour.

10. A
The difference between terms in the sequence increases by 2 each time. Jacob adds 10 tiles during the fifth hour to reach 20 + 10 = 30 tiles in total. During the sixth hour he adds 12 tiles and during the seventh hour he adds 14 tiles, so the total number of tiles after seven hours is 30 + 12 + 14 = 56.

11. 13
Sarah starts with 13 buttons, 8 of them blue and 5 of them black. She gives 60% (which is $^3/_5$) of 5 = 3 black buttons to Robin, leaving her with 10 buttons in total. She also receives 75% (which is $^3/_4$) of 4 = 3 purple buttons from Robin, so Sarah ends up with 10 + 3 = 13 buttons.

12. E
Angles in a quadrilateral add up to 360°. The first angle in the quadrilateral is 61° and the second is 97°, as this is the only prime number between 90 and 100. So the sum of the third and fourth angles is 360° − (61° + 97°) = 360° − 158° = 202°. The third and fourth angles are equal, so the size of each angle is 202° ÷ 2 = 101°.

Test 18 — pages 59-61

1. B
70 out of 90 pairs of shoes at the bowling alley are in children's sizes, so 90 − 70 = 20 out of 90 pairs are in adult sizes. $^{20}/_{90}$ can be simplified to $^2/_9$ by dividing top and bottom by 10.

2. 39
Marvin has 3 × 52 = 156 playing cards (use partitioning). He divides them between four players. So each player gets 156 ÷ 4 = 39 playing cards (use short division).

3. B
1 km = 1000 m, so 5.5 km × 1000 = 5500 m. The total distance of Kevin's route including a detour of 150 m is 5500 + 150 = 5650 m.

4. 69°
Angles on a straight line add up to 180°, so the size of angle x is 180° − 111° = 69°.

5. B
The total amount of water used on Saturday was
(2 × 7) + (5 × 9) + 75 + (2 × 6) + 4
= 14 + 45 + 75 + 12 + 4 = 150 litres.
75 is half of 150, so Matt's bath was 50% of the total water used on Saturday.

6. 33 litres
A shower uses 7 litres of water per minute. Matt showered for 6 minutes on Sunday, which used 6 × 7 = 42 litres of water. So Matt saved 75 − 42 = 33 litres of water by taking a shower instead of a bath.

7. D
$^1/_8$ of 128 minutes = 128 ÷ 8 = 16 minutes (using short division). $^3/_8$ of 128 minutes = 16 × 3 = 48 minutes (option D).

8. 2100 cm²
The area of the base of the drawer is 30 × 30 = 900 cm². The area of one side of the drawer is 10 × 30 = 300 cm², so the area of four sides is 300 × 4 = 1200 cm². The total area of plastic used is 1200 + 900 = 2100 cm².

9. A
The line is at its steepest between 0-10 minutes, so this is when the hot chocolate is cooling down the quickest, because the temperature drops the most in those 10 minutes.

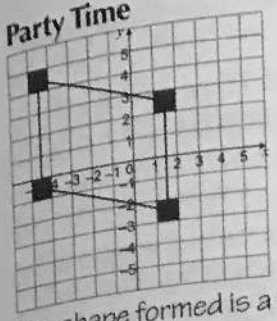
10. 30%
The temperature of the hot chocolate after 60 minutes was 27 °C. So as a fraction of its original temperature it was $^{27}/_{90}$. Divide the top and bottom of the fraction by 9 to give $^3/_{10}$, which equals 30%.

11. £2.10
The price in pence of an ice cream with marshmallows is given by the expression 65s + 15, where s is the number of scoops. So three scoops of ice cream with marshmallows costs (65 × 3) + 15 = 195 + 15 = 210p, or £2.10.

12. D
Tom gets 10p off each scoop of ice cream, so the expression for the price in pence of an ice cream with marshmallows becomes (65 − 10)s + 15 = 55s + 15. Tom also adds sauce for another 25p, so the expression for the price of his ice cream is 55s + 15 + 25 = 55s + 40.

Puzzles 7 — page 62

Party Time



The shape formed is a parallelogram.

Test 19 — pages 63-65

1. C

40 is 10 before 50 (XL), and 3 is III, so 43 written in Roman numerals is XLIII.

2. 23 bpm

The values in order from lowest to highest are 89 bpm, 93 bpm, 98 bpm, 101 bpm and 112 bpm. The difference between the highest and lowest values is 112 – 89 = 23 bpm.

3. 130 cm

The frame is 2 cm wide all the way around the glass, so the width of the frame is 36 + (2 × 2) = 40 cm and the height of the frame is 21 + (2 × 2) = 25 cm. So the perimeter of the outside of the frame is (40 × 2) + (25 × 2) = 80 + 50 = 130 cm.

4. D

The glass is 36 cm wide and 21 cm high, so the area of the glass is 36 cm × 21 cm. Round 21 down to 20 and use estimation = 36 × 20 = 720. You rounded down, so the actual area will be a bit greater than this. So the only sensible option is D, which is 756 cm^2.

5. 67 miles

The sum of the four maximum distances in the table is 91 + 18 + 75 + 84 = 268 miles, so the mean maximum distance is 268 ÷ 4 = (240 ÷ 4) + (28 ÷ 4) = 60 + 7 = 67 miles.

6. E

The distance the van can travel in one hour is reduced by 12 miles. 84 – 12 = 72, so the van's new maximum distance is 72 miles. 72 and 84 are both multiples of 12, so $^{72}/_{84}$ can be simplified to $^{6}/_{7}$ by dividing top and bottom by 12.

7. 120 km

5 miles is approximately 8 kilometres, so divide by 5 then multiply by 8 to convert the distance from miles to kilometres. A lorry can travel 75 miles, which is (75 ÷ 5) × 8 = 15 × 8 = 120 km.

8. 56

$^{1}/_{4}$ of the people have one pet, 168 ÷ 4 = (160 ÷ 4) + (8 ÷ 4) = 40 + 2 = 42 people. So the number of people with two pets is 42 + 14 = 56.

9. $^{1}/_{6}$

Half of the people have either two or three pets, 168 ÷ 2 = 84 people. So 84 – 56 = 28 people have three pets. $^{28}/_{168}$ have three pets. Divide the top and bottom of the fraction by 2 to give $^{14}/_{84}$, divide again by 7 to give $^{2}/_{12}$, and again by 2 to give $^{1}/_{6}$. So $^{1}/_{6}$ of the people have three pets.

10. D

All of the angles in a regular hexagon are the same size, so the angles in a hexagon must add up to 120° × 6 = 720°. This also applies to irregular hexagons, so the size of angle a is 720° – 120° – 270° – (3 × 90°) = 720° – 660° = 60°.

11. 3:2

The printing company uses 70 ink cartridges each month, of which 42 are black, so the number of coloured ink cartridges used is 70 – 42 = 28. So the ratio of black to coloured ink is 42:28. Dividing both sides by 7 gives 6:4, and then dividing both sides by 2 simplifies it further to 3:2.

12. A

The company only needs to pay for half of the black and coloured cartridges as they get the other half free. So they will pay for 42 ÷ 2 = 21 black ink cartridges and 28 ÷ 2 = 14 coloured ink cartridges. Black ink cartridges cost £b, which gives 21b. Coloured ink cartridges cost £c, which gives 14c. So the overall cost in pounds of ink cartridges each month is given by the expression 21b + 14c.

Test 20 — pages 66-68

1. 199 854

One hundred and ninety-nine thousand is written 199 000 in figures. Eight hundred and fifty-four is written 854 in figures. Add these together to give 199 854.

2. 4

5 pupils said that they drink 4 glasses of water per day, which is more than any one of the other responses.

3. D

There are 31 days in October. 2 weeks = 14 days, so add 14 days to October 19th in stages. Adding 12 days takes you to October 31st, and the remaining 2 days take you to November 2nd.

4. 106°

Angles in a triangle add up to 180°, so the missing angle is 180° – (37° × 2) = 180° – 74° = 106°.

5. 38

456 coat hangers need to be divided equally between 12 rails, so the number of coat hangers on each rail will be 456 ÷ 12. 456 = 360 + 96. 360 ÷ 12 = 30 and 96 ÷ 12 = 8. So 456 ÷ 12 = 30 + 8 = 38.

6. C

95 × 2 = 190, so $^{95}/_{190} = {}^{1}/_{2}$. So the width of a single mattress is $^{1}/_{2}$ of its length.

7. D

A single mattress is 95 cm wide and a double mattress is 133 cm wide, so a double mattress is 133 – 95 = 38 cm wider than a single mattress. 10% of 95 = 95 ÷ 10 = 9.5 cm and 38 = 4 × 9.5, so the width of a double mattress is 4 × 10% = 40% greater than the width of a single mattress.

8. 75°
Angles around a point add up to 360°, so the angle between two consecutive numbers on a clock is $360 \div 12 = 30°$. The hour hand and the minute hand are separated by 2.5 numbers on the clock, so the angle between them is $2.5 \times 30 = (2 \times 30) + (0.5 \times 30) = 60 + 15 = 75°$.

9. B
The patio has $10 \times 10 = 100$ squares. Each chair takes up 3 squares, and there are 5 chairs, which take up a total of $3 \times 5 = 15$ squares. So $^{15}/_{100}$ squares are taken up by chairs. The top and bottom of the fraction can be divided by 5, to give $^{3}/_{20}$.

10. 3.2 m
If the area of the patio is 16 m^2, then the width of it must be 4 m (because $4^2 = 16$). The width is 10 squares, so each square must have a width of $4 \div 10 = 0.4$ m. The perimeter of one chair is 8 widths of a square, so the perimeter = $8 \times 0.4 = 3.2$ m.

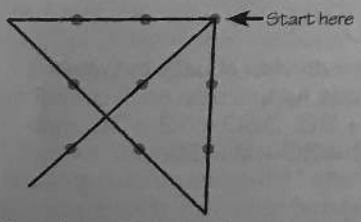
11. £11.75
The expression for the price of a pizza in pounds is $1.25t + 8$, where t is the number of toppings. Isaac orders a pizza with 3 toppings, so the price is $(1.25 \times 3) + 8 = 3.75 + 8 = £11.75$.

12. C
Polly has £17.50 for a pizza, which leaves £17.50 − £8 = £9.50 to spend on toppings, at £1.25 each. Trying the different numbers of toppings: 7 toppings costs $£1.25 \times 7 = £8.75$ and 8 toppings costs $£1.25 \times 8 = £10$, which is too expensive. So 7 is the maximum number of toppings Polly could have on her pizza.

Puzzles 8 — page 69

The Great Pyr-add-mid
The stones numbered 3 and 4 must go at the ends of the base. E.g. 3, 1, 2, 4, or 4, 1, 2, 3.
24 is the highest number you can get on the top stone. You get this by putting 1 and 2 at the ends of the base.

Logo No Go



The above diagram is one example of the solution. You can start drawing the logo from any of the four corners of the grid.

Test 21 — pages 70-72

1. 81
Subtract 44 from 125 using partitioning. $44 = 40 + 4$. $125 - 40 = 85$, $85 - 4 = 81$.

2. C
Isosceles triangles have two sides of equal length.

3. 1565
In Roman numerals, M = 1000, D = 500, L = 50, X = 10, V = 5. So $1000 + 500 + 50 + 10 + 5 = 1565$.

4. 35 cm
The sum of the four heights is $43 + 27 + 51 + 19 = 140$ cm. Mean = $140 \div 4 = 35$ cm.

5. 97.5 cm
10% of 75 cm = 7.5 cm. So 30% of 75 cm is $7.5 \times 3 = 22.5$ cm (use partitioning). New height = $75 + 22.5 = 97.5$ cm.

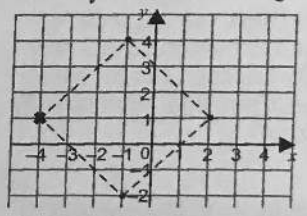
6. 111
$2 + 3 = 5$, so the total number of 'parts' in the ratio is 5. $185 \div 5 = 37$ (use short division), so each 'part' is 37 sweets. The chewy sweets make up 3 'parts', so the number of chewy sweets is $37 \times 3 = 111$ chewy sweets.

7. 80
Add up the totals of each bar.
$11 + 17 + 20 + 4 + 16 + 12 = 80$ pupils.

8. C
$^{16}/_{80}$ pupils voted for strawberries. Divide the top and the bottom of the fraction by 8 to give $^{2}/_{10}$, which simplifies to $^{1}/_{5}$.

9. C
After turning 180° he faces north west. After turning 45° clockwise he faces north. $135° = 90° + 45°$.
After turning 90° anticlockwise he faces west.
After turning 45° anticlockwise he faces south west.

10. (−4, 1)
Plot the position of the three known corners.
The fourth corner must be at (−4, 1) so that the square has equal sides and right angles.



11. 25
The number of people is $900 \div 36$.
You can use long division to find this:

$$\begin{array}{r} 25 \\ 36\overline{)900} \\ -72 \\ \hline 180 \\ -180 \\ \hline 0 \end{array}$$

12. B
When n is £137.50, the bill will be $137.50 + (137.50 \div 10) = 137.50 + 13.75$. Use partitioning. $13.75 = 13 + 0.70 + 0.05$. $137.50 + 13 = 150.50$. $150.50 + 0.7 = 151.20$. $151.20 + 0.05 = 151.25$. So the bill will be £151.25.

Test 22 — pages 73-75

1. 24 000 miles
You're rounding to the nearest thousand, so look at the hundreds column, which is 7. This is more than 5, so 23 781 rounds up to 24 000 miles.

2. 42%
$^{84}/_{200}$ pupils can play an instrument. Divide the top and the bottom of the fraction by 2 to give $^{42}/_{100} = 42\%$.

3. B
To make 3 pancakes, you need $^3/_{12} = {}^1/_4$ of the milk needed for 12 pancakes. So to make 3 pancakes you need $300 \div 4 = 75$ ml of milk.

4. C
Divide the total length of wool by the number of pieces when cut. $42 \div 6 = 7$, so each new strand of wool is $4.2 \div 6 = 0.7$ m long.

5. 12
$2 + 9 = 11$, so the total number of 'parts' in the ratio is 11. $66 \div 11 = 6$, so each 'part' is 6 sheep. The black sheep make up 2 'parts', so the number of black sheep is $6 \times 2 = 12$ black sheep.

6. 11
The section of the pie chart for football has an angle of 120° out of 360°. $36 \div 12 = 3$, so $360° \div 120° = 3$, which means $^1/_3$ of the pupils chose football. So the number of pupils who chose football is $33 \div 3 = 11$.

7. A
Multiply the mean waiting time by the number of times spent waiting. Anisa spends $13 \times 5 = 65$ minutes waiting during the week. 60 minutes = 1 hour, so 65 minutes = 1 hour 5 minutes.

8. 47.5 m^2
The area of the wall is 3.8×25. $3.8 \times 100 = 380$. $25 = 100 \div 4$, so $3.8 \times 25 = 380 \div 4 = 95$ m^2. So the area of the wall that has been painted is $95 \div 2 = 47.5$ m^2.

9. B
$112 + 64 = 176$ pies were filled with either apple or cherry. So $200 - 176 = 24$ pies were filled with blueberry. $^{24}/_{200}$ pies had a blueberry filling. Divide the top and the bottom of the fraction by 8 to give $^3/_{25}$.

10. 6 cm
Volume = height × width × depth. $288 = 4 \times$ width $\times 12$. $288 \div 4 = 72$ (use short division). So $72 =$ width $\times 12$. So the width of the box is $72 \div 12 = 6$ cm.

11. 6 hours 45 minutes
25% of $16 = 16 \div 4 = 4$, so in Week 2 Kelsey watches $16 - 4 = 12$ hours. 25% of $12 = 12 \div 4 = 3$, so in Week 3 she watches $12 - 3 = 9$ hours.
25% of $9 = 9 \div 4$. Divide 9 by 2 and then divide by 2 again: $9 \div 2 = 4.5$ then $4.5 \div 2 = 2.25$. So in Week 4 Kelsey watches $9 - 2.25 = 6.75$ hours $= 6\,^3/_4$ hours = 6 hours 45 minutes.

12. E
Max starts off with 15 shirts and buys x new shirts. This is $15 + x$. He donates twice as many shirts as he buys, which is $2x$. So Max has $15 + x - 2x = 15 - x$ shirts in his wardrobe.

Test 23 — pages 76-78

1. C
Angle x is an acute angle. Acute angles are less than 90°. Angle x is bigger than half a right angle ($90° \div 2 = 45°$). Only option C is between 45° and 90°.

2. 44
$^1/_5$ of the total houses is $55 \div 5 = 11$. So 11 houses have a blue door. So $55 - 11 = 44$ house do not have a blue door.

3. 69 cm
The diameter is double the radius.
So diameter $= 34.5 \times 2 = 69$ cm (use partitioning).

4. 9.6 km
1 mile = 1.6 km. So each week he runs 6×1.6 km. Use partitioning. $1.6 = 1 + 0.6$. $6 \times 1 = 6$ km. $6 \times 6 = 36$, so $6 \times 0.6 = 3.6$ km. So each week Dennis runs $6 + 3.6 = 9.6$ km.

5. 55 minutes
The train arrives at Oldtown at 09:15. There is one hour (60 minutes) from 08:20 to 09:20. 09:15 is 5 minutes before 09:20. So the train takes $60 - 5 = 55$ minutes to get to Oldtown.

6. 50 minutes
The first train journey is 55 minutes (previous answer). There is 15 minutes from 08:45 to 09:00, and 30 minutes from 09:00 to 09:30. So the second train journey is $15 + 30 = 45$ minutes. The third train journey is 50 minutes. The total length of the three train journeys is $55 + 45 + 50 = 150$ minutes. So the mean journey time is $150 \div 3 = 50$ minutes.

7. D
$500 - 160 = 340$ (use partitioning), so $^{340}/_{500}$ pigs are fed in the afternoon. Divide the top and bottom of the fraction by 10 to give $^{34}/_{50}$. Multiply the top and bottom of the fraction by 2 so that the denominator is 100: $^{68}/_{100}$. So 68% of the piglets are fed in the afternoon.

8. C
0.49 kg can be rounded up to 0.5 kg. 0.5×340 is the same as $340 \div 2$, which is 170 kg (use partitioning). 166.6 kg (option C) is the only option close to 170 kg.

9. 7
Work through the prime numbers, checking if each is a factor of 91. 91 is odd, so 2 is not a factor of 91. $3 \times 30 = 90$, 91 is only 1 more than 90 so 3 is not a factor of 91. Multiples of 5 always end with a 0 or 5, so 5 is not a factor of 91. $91 = 70 + 21$, $70 \div 7 = 10$, $21 \div 7 = 3$, so $91 \div 7 = 10 + 3 = 13$. So 7 is a factor of 91. This means that 7 is the smallest number of cards that can be in each pile.

10. D
£1 = 100p, so £3 = 300p.
For x hot chocolates, the cafe makes $300x$ pence.
For y cups of tea, the cafe makes $100y$ pence.
So in total, the cafe makes $300x + 100y$.

11. 350 000
The least watched Episode is 7 with 150 000 views.
The most watched is Episode 10 with 500 000 views.
500 000 − 150 000 = 350 000 views.

12. B
Episode 4 had 300 000 views. So Episode 11 had 300 000 + 250 000 = 550 000 views.
Episode 6 had 400 000 views. $^1/_{10}$ of 400 000 is 400 000 ÷ 10 = 40 000. $6 \times 4 = 24$, so Episode 12 had $6 \times 40\,000 = 240\,000$ views.
In total, Episodes 11 and 12 had 550 000 + 240 000 = 790 000 views.

Puzzles 9 — page 79

Difficult Directions
Rover's house is at square 7.

Test 24 — pages 80-82

1. 11
Maya reads 20 pages each night. So it will take her 220 ÷ 20 nights to read the book. 220 ÷ 20 is the same as 22 ÷ 2 = 11, so it takes Maya 11 nights to read the whole book.

2. B
There were 2 + 1 + 4 = 7 red cars. So $^{7}/_{35}$ cars were red. Divide the top and the bottom of the fraction by 7 to give $^{1}/_{5}$.

3. 4
The mean number of blue cars that drove past each day is the total number of blue cars divided by the number of days. 6 + 3 + 3 + 4 = 16. Mean = 16 ÷ 4 = 4 blue cars.

4. 540°
All of the angles in a regular pentagon are the same. So the sum of the angles is 108° × 5 = 540° (use partitioning).

5. £7.50
If he saves 70% he spends 100 − 70 = 30%. 10% of £25 = £2.50. 30% = £2.50 × 3 = £7.50 (use partitioning).

6. C
Round 8.2 down to 8. The number of km travelled in 1 minute (60 seconds) is about 8 × 60 = 480. 480 rounds to 500, so in 9 minutes the rocket travels about 500 × 9 = 4500. C is the only close option.

7. 7500 cm²
The width of each platform is 3.75 m ÷ 3.
Use partitioning, 3.75 = 3 + 0.75. 3 ÷ 3 = 1, 0.75 ÷ 3 = 0.25, 1 + 0.25 = 1.25 m.
1 m = 100 cm, so 1.25 m = 125 cm.
Area = width × height = 125 × 60. Use partitioning, 125 = 100 + 25. 100 × 60 = 6000. 25 × 6 = 150, so 25 × 60 = 1500. The area of the platform is 6000 + 1500 = 7500 cm².

8. D
Jeff's brothers share $^{3}/_{3} - {}^{1}/_{3} = {}^{2}/_{3}$ of the watermelon between them. So each brother has $^{2}/_{3} \div 3 = {}^{2}/_{9}$ of the watermelon.

9. E
6.5 = 6 + 0.5. 6 × 13 = 78, 0.5 × 13 = 13 ÷ 2 = 6.5. So the width of 13 books measuring 6.5 cm is 78 + 6.5 = 84.5 cm, which is the width of the shelf.

10. 41 m
The horizontal sides are equal to 6 m × 4 = 24 m.
The vertical sides are (6 m × 2) + (2.5 × 2) = 12 + 5 = 17 m. So perimeter = 24 + 17 = 41 m.

11. 319
Each term in the sequence is double the previous term, plus 1. The sixth term is (79 × 2) + 1 = 159.
So the seventh term is (159 × 2) + 1 = 319.

12. D
For h hours, Jordan earns 6.75 × h = 6.75h. He has £8 taken out of his pay so subtract 8. So Jordan was paid 6.75h − 8.

Test 25 — pages 83-85

1. B
Convert all masses to grams. 1 kg = 1000 g.
1.75 kg = 1750 g. 0.5 kg = 500 g.
So heaviest mass is 2000 g, and second heaviest is 1.75 kg.

2. £2.60
£1.50 = 150p. £5 = 500p.
Seth spends 150 + 30 + 60 = 240p. So he gets 500 − 240 = 260p = £2.60 change.

3. A
40% = $^{40}/_{100}$. Divide the top and the bottom number of the fraction by 20 to give $^{2}/_{5}$.

4. 6 hours
336 minutes is 300 minutes + 36 minutes. 1 hour = 60 minutes. 300 ÷ 60 = 5, so 300 minutes = 5 hours. 36.25 minutes is more than half an hour, so 336.25 minutes rounds up to 6 hours.

5. 4.87 cm
The radius of a circle is half of the diameter.
9.74 = 9 + 0.74.
9 ÷ 2 = 4.5. 74 ÷ 2 = 37, so 0.74 ÷ 2 = 0.37.
So the radius of the wheel is 4.5 + 0.37 = 4.87 cm.

6. 24
The total number of pencils is 18 × 8 = 144 (use short multiplication). So if the pack is divided into six groups, there will be 144 ÷ 6 = 24 pencils in each group (use short division).

7. 70°
Acute angles must be less than 90°. The acute angles below 90° in the table are: 55° which occurs once, 70° which occurs 3 times and 60° which occurs twice.
So the most common acute angle across the four shapes is 70°.

8. A
A rhombus, parallelogram, square and rectangle all have at least one pair of equal angles. The angles in Shape 3 are all different, so Shape 3 must be a trapezium, which can have all different angles.

9. 142.25 km
Divide the distance the train travels in 3 hours by 3.

$$3\overline{)4^{1}26.7^{1}5}\quad 142.25$$

So the train travelled 142.25 km in one hour.

10. 26
Each number is a square number + 1, in descending order. 101 = 10² + 1. 82 = 9² + 1. 65 = 8² + 1. 50 = 7² = 1. 37 = 6² + 1. So the next number in the sequence will be 5² + 1 = 25 + 1 = 26.

11. B
Helen makes £20 − £12 = £8 profit on each chair that she sells. So if she sells n chairs, $P = 8n$.

12. E

$^2/_3$ of 144 g of strawberries are in Archie's smoothie. $^1/_3$ of 144 g = 144 ÷ 3. Use partitioning, 144 = 120 + 24. 120 ÷ 3 = 40, 24 ÷ 3 = 8, so 144 ÷ 3 = 40 + 8 = 48 g. $^2/_3$ of 144 g = 2 × 48 g = 96 g. Each serving contains 16 g of strawberries. 96 ÷ 8 = 12, so 96 ÷ 16 = 12 ÷ 2 = 6 servings.

Puzzles 10 — page 86

Colin's Cube Cages

Set C

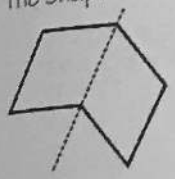
Top Secret

Pip's one-letter code name is W.

Test 26 — pages 87-89

1. E

The shape has 6 sides, as shown below. So it's a hexagon.



2. C

The time is 16:14 and Ciara's train left 20 minutes ago. You can take away 20 minutes from 16:14 in stages. Take away 14 minutes to get 16:00 and then the remaining 6 minutes to get 15:54.

3. 65 cm

1 m = 100 cm, so the diameter 1.3 m × 100 = 130 cm. The compasses should be set to half of the diameter, which is 130 cm ÷ 2 = 65 cm.

4. D

Only options A, D and E have an area of 64 m^2. Option E has the same length and width as Zone P so must have the same perimeter. Option A has a perimeter of (32 × 2) + (2 × 2) = 64 + 4 = 68 m, and Option D has a perimeter of 4 × 8 = 32 m. So only Option D could be Zone Q, with a smaller perimeter than Zone P.

5. 35

Using BODMAS:
Kelly gets: 5 + 6 × 8 − 7 = 5 + 48 − 7 = 53 − 7 = 46.
Jonah gets: (5 + 6) × 8 − 7 = 11 × 8 − 7 = 88 − 7 = 81.
So the difference is 81 − 46 = 35.

6. D

In all the calculations except D, you do the multiplication 6 × 8 or 8 × 6 first to get 48. In D, you first do the subtraction: 5 + 6 × (8 − 7) = 5 + 6 × 1 = 5 + 6 = 11

7. £10.00

$^1/_3$ of £15 = £15 ÷ 3 = £5, so $^2/_3$ = £5 × 2 = £10.
10% of £15 = £15 ÷ 10 = £1.50, so 30% = 3 × £1.50 = £4.50. So '30% off' is £15 − £4.50 = £10.50.
£15 − £4.75 = £10.25.
So the lowest of these three prices is £10.

8. £10.25

As shown in the answer to question 7, the three prices are £10, £10.50 and £10.25, which have a total of £30.75. £30.75 ÷ 3 = (30 ÷ 3) + (0.75 ÷ 3) = 10 + 0.25 = £10.25.

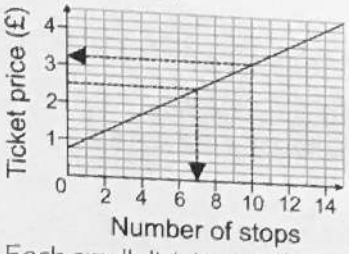
9. E

Each bowl contains $^1/_5 \div 3 = {}^1/_{5\times3} = {}^1/_{15}$ of the packet.

10. 107

$^1/_{15}$ of 1605 = 1605 ÷ 15
= (1500 + 90 + 15) ÷ 15
= (1500 ÷ 15) + (90 ÷ 15) + (15 ÷ 15)
= 100 + 6 + 1 = 107 sultanas in each bowl.

11. £3.25



Each small division on the vertical scale is worth £1 ÷ 4 divisions = £0.25.
Reading off the graph above, if Liz has paid £2.50, she has paid enough for 7 stops. Jane is travelling through 7 + 3 = 10 stops. Reading off the graph, this will cost £3.25.

12. £5.75

Substitute 20 for S to give $C = 0.75 + 0.25 \times 20$
$= 0.75 + 0.25 \times 2 \times 10 = 0.75 + 0.5 \times 10 = 0.75 + 5$
= £5.75.

Test 27 — pages 90-92

1. £4.80

£4.73 = 473p. The multiples of 20 either side of this are 460 and 480. 473 is closer to 480 than 460, so it rounds to 480p = £4.80 to the nearest 20p.

2. 24

From question 1, Kim will need 480p to pay the bill. 480 ÷ 20 = 48 ÷ 2 = 24. So she will need 24 coins.

3. 270°

18:00 = 6:00 pm. The hour hand will have moved from the 9 to the 6, which is 3 quarter turns clockwise = 3 × 90° = 270°.

4. C

Rounding each amount to the nearest pound makes the total £1 + (£1 × 2) + (£1 × 3) + £4 = £10. The closest answer to this from the options given is C: £9.74.

5. A

1 m = 100 cm, so the tower is 1.8 m × 100 = 180 cm high. If each box had a height of 10 cm, the tower would be 15 × 10 = 150 cm. You need another 180 − 150 = 30 cm in height. 2 × 15 = 30 cm. So each box must have a height of 10 + 2 = 12 cm.

6. 8000 cm^3

The width of each box is 120 cm ÷ 6 = 20 cm. So the volume of one box = 20 × 20 × 20 = 8000 cm^3.

7. 2400 cm^2

Each triangle has a height of 40 cm and a base of 30 cm. Area of a triangle = $^1/_2$ × base × height, so the area of the four triangles = $4 \times {}^1/_2 \times 30 \times 40 = 2 \times 30 \times 40 =$
60 × 40 = 2400 cm^2.

8. 10
If the mean age of the three sisters is 11, then their total age is $11 \times 3 = 33$. Geri is 3 years older, so subtract this extra 3. $33 - 3 = 30$. $30 \div 3 = 10$. So Eva and Frankie are both 10 (and Geri is 13).

9. E
The numbers go up in twos, so the house 10 doors down from n will be $n + (10 \times 2) = n + 20$.

10. A
1 pound = 16 ounces = 16×28 g. Round 28 g to 30 g. $16 \times 30 = 480$ g.
1 kg = 1000 g, so $480 \text{ g} \div 1000 = 0.48$ kg.
Option A, 0.448 kg is the only option close to this.

11. 18°
Each large square on the chart is worth 20 homes, so each small square is worth $20 \div 4 = 5$ homes. This means there are $20 + 5 = 25$ cottages.
There are $^{25}/_{500} = {}^{1}/_{20}$ homes which are cottages, which should give an angle of $360° \div 20 = 18°$ on a pie chart.

12. D
There are currently $^{50}/_{500}$ homes which are flats.
For each option, add the number to the top and bottom of this fraction to see which simplifies to $^{1}/_{4}$ (25%):
A gives a fraction of $^{75}/_{525} = {}^{1}/_{7}$.
B gives a fraction of $^{100}/_{550} = {}^{2}/_{11}$.
C gives a fraction of $^{125}/_{575} = {}^{5}/_{23}$.
D gives a fraction of $^{150}/_{600} = {}^{1}/_{4}$.
E gives a fraction of $^{200}/_{650} = {}^{4}/_{13}$.
So option D is correct.

Test 28 — pages 93-95

1. C
To find the difference, add 13 to −13 to get to 0, then add another 5 to get to 5. 13 °C + 5 °C = 18 °C.

2. 15 m²
When opened out, the canvas sheet will be a rectangle with a width of 2.5 + 2.5 = 5 m, and a length of 3 m. So the area = $5 \times 3 = 15$ m².

3. B
The triangle is isosceles, which means that the other unmarked angle will be the same as x. The angles in a triangle add up to 180°, so $x + x = 180° - 90° = 90°$. So $x = 90° \div 2 = 45°$.

4. D
2 litres = 2000 ml. 6×200 ml = 1200 ml.
2000 − 1200 = 800 ml left.

5. 0.4 kg
One banana has a mass of $0.48 \div 6 = 0.08$ kg. So the remaining 5 bananas has a mass of $0.08 \times 5 = 0.4$ kg.

6. D
The total heights of the 3 bars are 4 + 9 + 7 = 20 divisions. The height of Tilly's bar is 9, so she raised $^{9}/_{20}$ of the total.

7. 20%
Bella's bar has a height of 4 divisions, so she raised $4 \times £5 = £20$. This is out of £100, so the percentage must be 20%.

8. £35
20 divisions of the scale (the total height of the three bars) are worth £100, so each division is worth $£100 \div 20 = £5$. Xan's bar has a height of 7 divisions, so he raised $7 \times £5 = £35$.

9. 94 500
There will be 350×270 words $= 35 \times 27 \times 10 \times 10$. Using long multiplication, $35 \times 27 = 945$. So there are $945 \times 10 \times 10 = 94\,500$ words.

10. 23
Lauren's story will be 8050 ÷ 350 pages long = 805 ÷ 35. Using long division:

```
      23
35 | 805
   -70
    105
   -105
      0
```

So the story is 23 pages long.

11. C
Multiplication can be done in any order, so the correct option should include either $XY = 60$ or $YX = 60$, which leaves either B, C or E. If $X + Y = 17$, then $X = 17 - Y$, which means option C is correct.

12. 7
The pairs of whole numbers that multiply to give 60 are as follows: 1 and 60, 2 and 30, 3 and 20, 4 and 15, 5 and 12, 6 and 10. Of these, only 5 and 12 add together to give 17, so X must be 5 and Y (the bigger number) must be 12. So $Y - X = 12 - 5 = 7$.

Puzzles 11 — page 96

Pint Sized Problem
For example, to get 1 pint: Pour 5 pints from the 8 pint container into the 5 pint container, and from this pour 3 pints into the 3 pint container. So the containers now contain 3 pints, 2 pints and 3 pints. Empty the contents of the 3 pint container back into the 8 pint container, and the 2 pints in the 5 pint container into the now empty 3 pint container (So there are 6 pints, 0 pints and 2 pints). Fill up the 5 pint container again from the 8 pint container. She now has 1 pint in the 8 pint container (and 5 pints in the 5 pint container and 2 pints in the 3 pint container).

To get half a gallon (4 pints): As above, then, top up the 3 pint container from the 5 pint container (1 pint, 4 pints and 3 pints). Finally, put the 3 pints from the 3 pint container back into the 8 pint container, so there are 4 pints in the 8 pint container and 4 pints in the 5 pint container — and the 8 pints of lemonade have been split exactly into two.

Test 29 — pages 97-99

1. D
The number 1 is in the 'tens of thousands' column, so it represents 10 000 (ten thousand).

2. 12 800 km
You are rounding to the nearest hundred, so look at the figure in the 'tens' column. It's a 5, so round up to 12 800 km.

3. 1.8 m
Each cereal box is 30 cm wide and there are 6 of them in total, so the minimum shelf length required to store all 6 boxes is $6 \times 30 = 180$ cm. 180 cm = 1.8 m.

4. £1.04
100 pairs of socks cost £80, so 1 pair of socks costs 80 ÷ 100 = £0.80 = 80p. Ribbons cost 7p each and 2 pieces of ribbon are needed for each pair of socks. 7 × 2 = 14p. Bows cost 5p each and 2 bows are needed for each pair of socks. 5 × 2 = 10p, so the total amount spent on each pair of socks is 80 + 14 + 10 = 104p = £1.04.

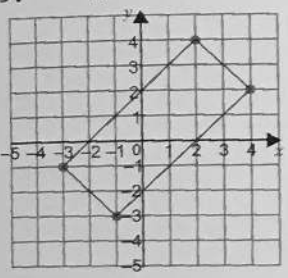
5. 25 cm
There was 260 mm of rain in August and 10 mm of rain in December, so 260 − 10 = 250 mm more rain fell in August than in December. 250 mm = 25 cm.

6. D
200 mm of rain fell in July. The total rainfall over the course of six months is 200 + 260 + 90 + 30 + 10 + 10 = 600. So the fraction of the total rainfall that fell in July is $^{200}/_{600} = {}^{1}/_{3}$.

7. 21
The ratio of cats to dogs is 4 : 7, so to calculate the number of dogs, divide the number of cats by 4 and multiply by 7. There are 12 cats at the shelter, so the number of dogs is (12 ÷ 4) × 7 = 3 × 7 = 21 dogs.

8. 135°
Angles around a point add up to 360°. Angle x covers 3 sides of the octagon and there are 8 sides in total, so angle x is $^{3}/_{8}$ of 360°. $^{1}/_{8}$ of 360° = 360 ÷ 8 = 45°, so $^{3}/_{8}$ of 360° = 3 × 45 = 135°.

9. C



10. £216
10% of £48 = 48 ÷ 10 = £4.80. 30% = 3 × 10% = 3 × £4.80 = £14.40. For 15 chairs Asanti paid £14.40 × 15 = (14.40 × 10) + (14.40 × 5) = 144 + 72 = £216.

11. D
You need to find the option that is a multiple of 3, 6, 7 and 14. 280 = 14 × 20, so 280 is a multiple of 14 and so also of 7. However, short division shows 280 is not a multiple of 6. 294 is 14 more than 280, so is also a multiple of 7 and 14. 294 ÷ 6 = 49 (use short division), so 294 is also a multiple of 6, and so also of 3.

12. A
The number of pupils that take the bus is given by x. The number of pupils that walk is three times the number that take the bus, which gives $3x$, and the number of pupils that cycle is 25. So the total number of pupils in Year 6 is $3x + x + 25 = 4x + 25$.

Test 30 — pages 100-102

1. (7, 3)
Squares have four equal sides, so the fourth corner is located directly below (7, 9) and directly to the right of (1, 3). The coordinates of the fourth corner are (7, 3).

2. £8.50
1400 one pence coins = 1400p = £14. The total price of a sandwich and a coffee is £3.50 + £2 = £5.50. £14 − £5.50 = 14 − 5 − 0.50 = 9 − 0.50 = £8.50.

3. B
There are 5 cards leftover, so the players have 89 − 5 = 84 cards between them. Of the options given, only 7 is a factor of 84, so only 7 is a possible number of players.

4. 1250 ml
3 litres = 3000 millilitres. $^{1}/_{2}$ of 3000 ml = 3000 ÷ 2 = 1500 ml, and 1500 − 250 = 1250 ml, so there is 1250 ml of milk left in the container.

5. D
The two biggest numbers selected by the lottery machine are 56 and 37. 56 + 37 = 93, which is not a multiple of 33 (33 × 1 = 33, 33 × 2 = 66 and 33 × 3 = 99).

6. £130 000
The sum of the five house prices is 100 000 + 125 000 + 150 000 + 75 000 + 200 000 = £650 000. So the mean price is 650 000 ÷ 5 = £130 000.

7. £174 000
The most expensive house on sale costs £200 000. 87% of £100 000 = £87 000, so 87% of £200 000 = 2 × 87 000 = £174 000.

8. C
1 minute = 60 seconds, so Henry has been silent for 510 × 60 = (51 × 6) × 100 = 306 × 100 = 30 600 seconds.

9. E
Gavin spends $^{1}/_{6} + {}^{1}/_{4} = {}^{4}/_{24} + {}^{6}/_{24} = {}^{10}/_{24} = {}^{5}/_{12}$ of the total time washing the cutlery and the plates. So the fraction of the total time to do the rest of the washing up is $^{12-5}/_{12} = {}^{7}/_{12}$.

10. 36
Eric owns 6 times as many stamps as Shona, so the ratio of Eric's stamps to Shona's stamps is 6 : 1. Dividing 252 into seven equal parts gives 252 ÷ 7 = 36, so Shona owns 36 stamps to Eric's 216 stamps.

11. C
Divide the carpet into two rectangles. The total area of the carpet is (3 × 6) + (2 × 1.5) = 18 + 3 = 21 m². The carpet costs £15 per m², so Huw's carpet costs 15 × 21 = £315 (use partitioning).

12. B
Carpet costs £9.99 per m², so an area of carpet measuring A m² costs $9.99A$. $10A - 0.01A = 9.99A$, so $10A - 0.01A$ is the correct expression.

Test 31 — pages 103-105

1. 12 m²
Area of each zone = 72 m² ÷ 6 = 12 m².

2. E
The number 6 is in the 'hundreds of thousands' column, so it represents 600 000.

3. 4.5 cm
The perimeter of the face is 45 cm, and it can be divided into 10 sections of equal length. So the length of the section labelled on the diagram is 45 ÷ 10 = 4.5 cm.

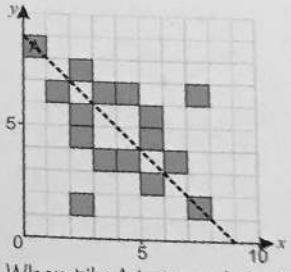
4. B

$^{24}/_{120}$ girls have the same first name as another girl. Dividing top and bottom by 4 and then by 6 gives $^{1}/_{5}$.

5. £21.75

Claudia earns £4.35 for helping with the housework and Flora earns four times as much as Claudia. So the total amount of pocket money earned by both girls is £4.35 + (4 × £4.35) = 5 × £4.35 = (5 × 4) + (5 × 0.30) + (5 × 0.05) = 20 + 1.50 + 0.25 = £21.75.

6. 1



When tile A is translated 2 squares left and 5 squares up, there is only one line of symmetry (as shown).

7. A

The mean score is 16, so the sum of all fives scores is 16 × 5 = 80. 80 − (16 + 15 + 17 + 19) = 80 − 67 = 13, so Liam's score in the fifth test is 13.

8. 195

There are 28 boxes of books in the stock cupboard to start with, but 2 + 5 + 8 = 15 boxes are taken, so there are 28 − 15 = 13 boxes left. Each box contains 15 books, so there are 13 × 15 = (10 × 15) + (3 × 15) = 150 + 45 = 195 books left in the stock cupboard.

9. 4.15

Each term is 0.45 greater than the previous term, so the sixth term is 3.25 + 0.45 = 3.7 and the seventh term is 3.7 + 0.45 = 4.15.

10. C

The area of the top face of the jewellery box is 17 × 22 = (10 × 22) + (5 × 22) + (2 × 22) = 220 + 110 + 44 = 374 cm^2.

11. 40°

Angles in a triangle add up to 180°, so the missing angle in the triangle formed by the chain is 180 − 20 − 20 = 140°. Angles around a point add up to 360°, so angle x is 360 − 90 − 90 − 140 = 40°.

12. D

After giving 4 sweets to Sandy, Neville has $x - 4$ sweets. Sandy now has twice as many as Neville, which is $2(x - 4)$.

Puzzles 12 — page 106

Coin Conundrum

There are three 2p coins, one 5p coin and two 20p coins in the sock.

Wild Animal Weighing

Three giraffes should replace the question mark to make the scales balance.