

## Sample 11+ Assessment Test for CEM (Durham University) Tests – Maths

Allow 10 minutes to do Section A and 25 minutes to do Section B.

Work as quickly and as carefully as you can.

If you want to answer these questions in multiple-choice format, use the separate multiple-choice answer sheet. If you'd prefer to answer them in standard write-in format, either write your answers in the spaces provided or circle the correct answer from the options A to E.

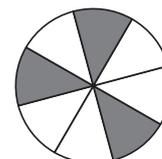
### Section A — Quick Maths

You have **10 minutes** to complete this section.

There are **30 questions** in this section.

1. This circle has been split into equal parts. What fraction has been shaded?

A  $\frac{5}{8}$       B  $\frac{1}{3}$       C  $\frac{6}{9}$       D  $\frac{3}{8}$       E  $\frac{5}{18}$



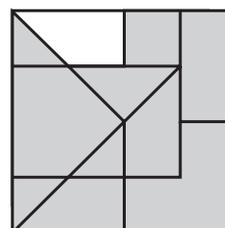
2. Bill goes to a car rally. He keeps a note of the race times of the cars in minutes:

122, 133, 142, 154, 122, 156, 134

What is the range of the times?

minutes

3. Tahsin is doing this shape puzzle. Which of the pieces below will complete the puzzle?



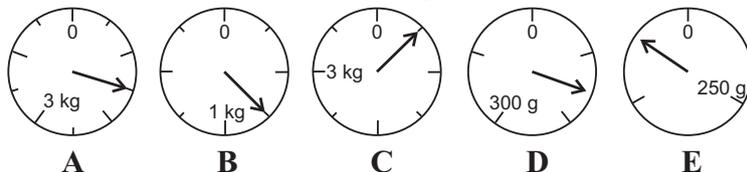
4. Which of the following is most likely to be the weight of a small can of baked beans?

A 250 g      B 2.5 kg      C 2.5 g      D 2500 g      E 25 g

5. Which of these numbers is  $21^2$ ?

A 42      B 441      C 4410      D 4200      E 44110

6. Which of these dials shows 750 g?



7. A scarf is 45 cm long. Jade buys 20 scarves.  
What is the total length of the scarves in metres?

m

8. Henry is 145.6 cm tall. Paul is 145.9 cm tall. Alfie is exactly halfway between the heights of Henry and Paul. How tall is Alfie?

. cm

**Carry on to the next question** → →

9. Sarinder asked her classmates what their favourite pet was. She recorded her results in the pictogram. How many more people liked dogs than fish?

Cat	 
Dog	  
Fish	
Mouse	 

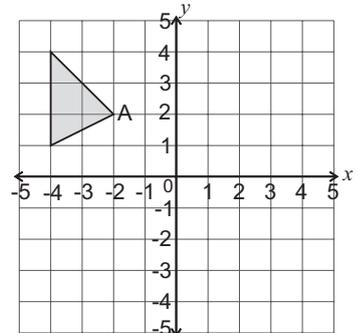
 = 4 people

10. Elsa has a bag of sweets containing 7 chocolates, 8 toffees and 3 liquorice laces. She takes out 2 sweets at random and eats them. They are both chocolate. What is the probability of her randomly picking a toffee next time?

- A  $\frac{1}{4}$       B  $\frac{1}{2}$       C  $\frac{1}{3}$       D  $\frac{3}{8}$       E  $\frac{4}{9}$

11. Ben reflects the triangle shown on this graph in the  $y$ -axis. What are the coordinates of the reflection of point A?



- A (3, 2)      C (1, 4)      E (2, 2)  
 B (-2, -2)      D (3, 0)

12. Eloise, Lucinda and Jennifer are given £150 by their aunt. They are told to share it in a 5:3:2 ratio. How much money will Lucinda receive?

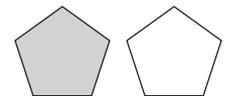
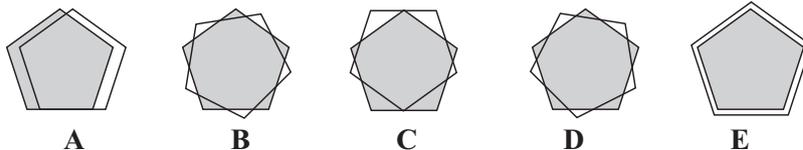
£   .

13. Where does the number 26 belong in this sorting table?

- A top left-hand box      D bottom right-hand box  
 B bottom left-hand box      E none of these  
 C top right-hand box

	Even numbers	Odd numbers
Multiples of 3		
Multiples of 7		

14. David has a shaded pentagon and a clear pentagon. He places the clear pentagon on top of the shaded one and then rotates it by  $180^\circ$ . Which of these shapes could be the shape David makes?



15. Mrs Burton often catches the bus from Oxtton to Brixal. Sometimes she takes Bus A, and sometimes she takes Bus B. How long does the longest bus ride take?

minutes

	Bus A	Bus B
Oxtton	09:44	11:39
Lymson	09:52	11:45
Barraw	10:31	12:16
Brixal	10:56	12:48

16. Which of these calculations will give an odd number as the answer?

- A  $113 \times 115$       B  $142 \times 623$       C  $436 \times 812$       D  $147 + 189$       E  $672 + 998$

17. Ten children in Class 6 were asked to give their favourite colour. The results are written in this list:

red, blue, green, silver, purple, red, gold, gold, green, red

What is the modal colour?

- A Red      B Blue      C Green      D Silver      E Purple      F Gold

**Carry on to the next question → →**

18. The table shows the number of prizes won by Ester at Bingo in a week. Ester won 32 prizes altogether. How many prizes did she win on Thursday?

Day	Number of prizes
Monday	5
Tuesday	8
Wednesday	4
Thursday	
Friday	6

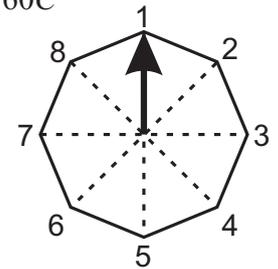
19. Which of the following statements is true?

**A**  $\frac{7}{100} > \frac{3}{4}$       **B**  $\frac{7}{100} > 0.65$       **C**  $\frac{7}{100} > 0.09$       **D**  $0.65 < \frac{3}{4}$       **E**  $0.65 < 0.09$

20. Lemone is opening up a plant stall in the market. She buys the stall for £ $S$  and boxes of cactus plants for £ $C$  each. Each box contains 12 cactus plants and Lemone buys 60 cactus plants altogether. Which expression shows the total cost in pounds?

**A**  $12SC$       **B**  $S + 5C$       **C**  $SC + 12$       **D**  $5SC$       **E**  $S + 60C$

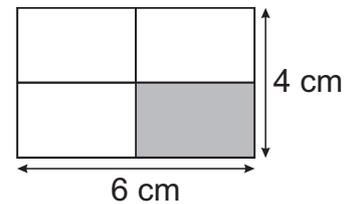
21. The arrow on the spinner is pointing at number 1. Charlotte spins the arrow round  $315^\circ$  anti-clockwise. Which number is the arrow pointing at now?



22. Bernard is running from Land's End to John O'Groats. The distance is 874 miles. If he runs 25 miles a day, how many days will it take him to run the distance?

**A** 36      **B** 27      **C** 32      **D** 35      **E** 26

23. The diagram shows a rectangular flag. It is split into four equal rectangles. What is the area of the shaded rectangle?

   $\text{cm}^2$ 


24. Hannah has 23 bags of sweets which each contain 14 individual sweets. She has 322 sweets in total. Jake has 46 bags of sweets. Each bag contains 140 individual sweets. How many individual sweets does Jake have in total?

**A** 1288      **B** 3220      **C** 64400      **D** 6440      **E** 12888

25. Penny has a drawer containing 36 socks. She picks out one sock at random. The probability that she will pick out a white sock is  $\frac{2}{3}$ . How many white socks are in the drawer?

26. Which expression gives the  $n$ th term of this sequence?

$-1, -1, -1, -1, -1$

**A**  $2n - 3$       **B**  $n - 1$       **C**  $n^2 - n$       **D**  $n - (n + 1)$       **E**  $(n - 1)^2$

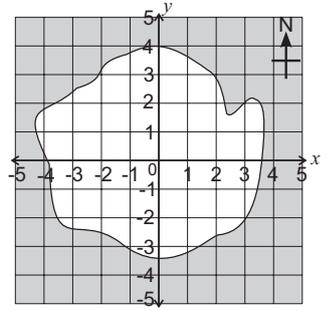
27. Julie divides a bag of 70 carrots between some rabbits. Each rabbit has exactly the same number of carrots. Julie doesn't have any carrots leftover and doesn't divide any whole carrots. How many rabbits is it possible for Julie to have fed?

**A** 3      **B** 4      **C** 5      **D** 6      **E** 8

**Carry on to the next question** → →

28. The grid shows a small island. Adam goes for a walk starting at  $(-1, -2)$ . He travels four squares north and two squares east. What are the coordinates of the point that he reaches?

A  $(-3, 2)$     B  $(-2, 2)$     C  $(0, 3)$     D  $(1, 2)$     E  $(1, 3)$



29. Jemima wants to plant a number of plants,  $p$ , and a number of trees,  $t$ . The area she needs can be written as  $3p + 18t$ . Which expression below is equivalent to Jemima's expression?

A  $3(6pt)$     B  $6(p + 3t)$     C  $21p - 3t$     D  $3(p + 6t)$     E  $2p + p + 3t^2$

30. 50 people were asked what colour their car was. 16 people said blue. What percentage of people did not say blue?

%

/ 30

### Section B — Long Maths

You have **25 minutes** to complete this section.

There are **30 questions** in this section.

The price of board games in a shop is shown in the table.

1. Jack gives the shopkeeper £30.00 and gets 50p change. Which games could he have bought?

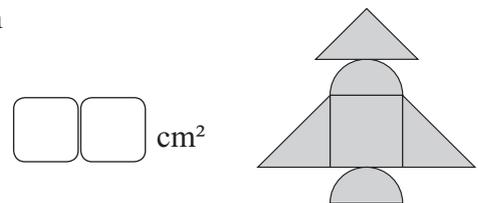
Blocks	Trivia Time	Clueless	Scramble	Brainium
£12.50	£10.50	£6.50	£11.50	£9.50

- A Scramble, Blocks and Trivia Time    D Scramble, Blocks and Clueless  
 B Clueless, Brainium and Trivia Time    E Scramble, Clueless and Trivia Time  
 C Blocks, Clueless and Trivia Time

2. Jill buys 2 copies of Brainium and 3 copies of Trivia Time. She pays with 3 £20 notes. How much change will Jill receive?

£   .

3. Lucy has some paper circles and some paper squares which she uses to make a rocket. The squares have sides of 4 cm and the circles have areas of  $10 \text{ cm}^2$ . She cuts some of the shapes in half. What is the area of her rocket?



Moses is tiling his rectangular bathroom floor.

4. Each tile is  $0.04 \text{ m}^2$  and he uses 100 whole tiles to cover the entire floor. If the width of his bathroom is 1 m, what is the length of his bathroom?

m

5. Moses plans on using 2 different types of tiles on his bathroom floor. 55% of the tiles will be white and 45% will be black. Write the ratio of white to black tiles in its simplest form.

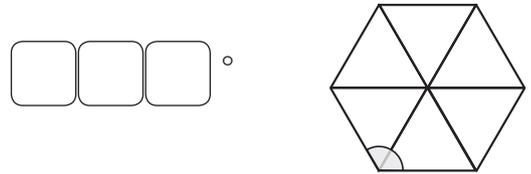
:

6. What is the total area of the bathroom floor that will be covered with black tiles?

.   $\text{m}^2$

Carry on to the next question → →

7. Fiona arranges 6 equilateral triangles to make the shape shown. What is the size of the shaded angle?



Lisa, Amy and Louise all collect handbags.

8. Lisa has  $H$  handbags, Amy has  $H + 2$  handbags and Louise has  $2H$  handbags. Altogether, Lisa, Amy and Louise have 26 handbags. How many handbags does Louise have?

9. Georgina has three times as many handbags as Amy. Which expression correctly expresses the number of handbags Georgina has?

**A**  $3H + 2$       **B**  $3H$       **C**  $3H + 6$       **D**  $3H + 3$       **E**  $3(H + 6)$

10. Duncan has £2.73. He has the same number of 2p and 1p coins, and these are the only coins that he has. How many 1p coins does he have?

11. 40 girls and boys played in a football tournament. The number of goals scored and saves made during the tournament were recorded in the table. How many saves were made in total?

	Girls	Boys	Total
Goals		4	
Saves	14		
Total	24		44

Bill is filling a large packing box with small match boxes. The packing box measures  $50 \text{ cm} \times 50 \text{ cm} \times 20 \text{ cm}$ . The matchboxes measure  $5 \text{ cm} \times 2 \text{ cm} \times 1 \text{ cm}$ .

12. How many matchboxes can he fit in the packing box?

13. Each match box contains 25 matches in total. How many matches are in the packing box if it has been completely filled with match boxes?

14. Raj is buying 2 family tickets for a concert. How much does he spend?

£   .

Concert Tickets	
Adults	£3.50
Children	£1.50
20% discount for family ticket (2 adults and 2 children)	

Sherrie is hosting a party for 24 children and 7 adults.

15. Sherrie buys 3 sausage rolls for each child and 5 sausage rolls for each adult. If the sausage rolls come in packets of 25, how many packets will Sherrie need to buy?

16. Sherrie wants to make some cakes for the party. She needs enough for each adult to have  $\frac{1}{7}$  of a cake and each child to have  $\frac{1}{8}$  of a cake. How many cakes will she need to bake?

17. A plant grows 0.025 m every 6 months. It is 1.5 m tall. How many years will it take to reach 2 m?

  years

**Carry on to the next question** → →

Harry wants to paint the side of his house.

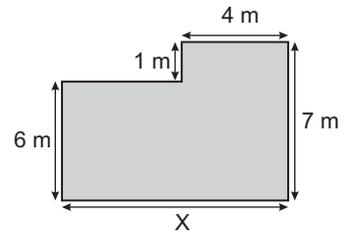
18. Harry draws the side elevation. The total perimeter is 32 metres. What is the length of X?

  m

19. What is the area of the side of his house?

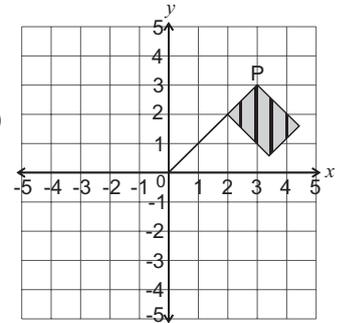
  m<sup>2</sup>

20. Harry uses 3 litres of red paint, 4 litres of blue paint and 5 litres of white paint to paint the side of his house. What percentage of the paint was red?

  %


21. This flag is rotated 90° clockwise on the grid about the point (0, 0). What will be the new coordinates of point P?

**A** (-3, 3)    **B** (-2, 3)    **C** (-3, 2)    **D** (3, -3)    **E** (1, -2)



22. Graham creates a sequence with the  $n$ th term  $3n^2 + 1$ . What are the first two terms in his sequence?

**A** 1, 3    **B** 4, 13    **C** 7, 13    **D** 10, 37    **E** 4, 7

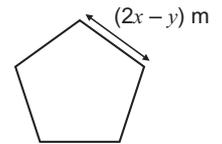
23. Mark has 3 cubes of cheese with sides of 2 cm. A mouse eats 12 cm<sup>3</sup> of the cheese. What volume of cheese does Mark have left?

   cm<sup>3</sup>

Brian is making a pen for his sheep in the shape of a regular pentagon.

24. Each length of fence is  $(2x - y)$  m long. What is the perimeter of the pen in terms of  $x$  and  $y$ ?

**A**  $8x - 4y$     **B**  $(2x - y) + 5$     **C**  $5x - 5y$     **D**  $10x - 5y$     **E**  $2x + 5y$



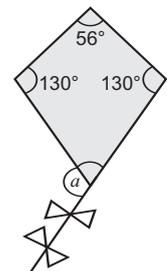
25. What is the perimeter of the pen if  $x = 10$  and  $y = 2$ ?

   m

26. The area of the pen is 555 m<sup>2</sup>. 50 m<sup>2</sup> is needed for every 3 sheep. How many sheep can Brian fit in this pen?

27. The diagram shows three of the angles on a kite. What is the size of angle  $a$ ?

   °


28. Carrie buys 4 chocolate bars at 49p each, and 7 bags of peanuts at 29p each. How much does she spend in total?

**A** £1.96    **B** £2.03    **C** £3.99    **D** £4.90    **E** £4.10

A barrel contains 2 litres of water. There are 5 holes in the bottom of the barrel, and each hole loses 50 ml of water each hour.

29. How many hours will it take for the barrel to completely empty?

   hours

30. Johnny manages to stopper one of the holes in the bottom of the barrel so no water is lost from it. How much longer will it take for the barrel to completely empty from full?

   minutes

# Answers to Sample 11+ Assessment Test for CEM (Durham University) Tests — Maths

## Section A

1. D

There are 8 segments and 3 are shaded. This is the fraction  $\frac{3}{8}$ .

2. 34 minutes

The range is the difference between the slowest time and the fastest time. The slowest time was 156 minutes and the fastest was 122 minutes.  $156 - 122 = 34$

3. B

You need to find the piece that is the right size and shape to fit in the gap. Shape B has been rotated by  $180^\circ$  but is the only shape that fits in the gap.

4. A

A small can of beans weighs around 250 g. All of the other weights are either too small or too large.

5. B

$21^2$  is  $21 \times 21$ . You can estimate the answer by rounding the numbers to the nearest 10 and working out  $20 \times 20$ .  $20 \times 20 = 400$ . The only realistic option is B: 441.

6. B

For B, the dial is split into 8 parts and 1 kg is at the 4th point, halfway round the scale. This means each point on the scale represents  $1 \text{ kg} \div 4 = 250 \text{ g}$ . As the arrow is pointing at the 3rd point, it is pointing at  $3 \times 250 \text{ g} = 750 \text{ g}$ .

7. 9 m

To find the length of 20 scarves you need to multiply 45 cm by 20.  $45 \times 20 = 900 \text{ cm}$ . There are 100 cm in 1 m, so  $900 \text{ cm} = 9 \text{ m}$

8. 145.75 cm

The difference between 145.6 and 145.9 is  $145.9 - 145.6 = 0.3$ .  $0.3 \div 2 = 0.15$  so the halfway point between the two numbers will be  $145.6 + 0.15 = 145.75$

9. 6

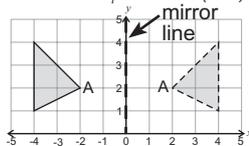
Dogs have  $2 \frac{1}{2}$  symbols and fish have 1 symbol so the difference between them is  $1 \frac{1}{2}$  symbols. Each symbol in the pictogram is equal to 4 people. So half of a symbol is  $4 \div 2 = 2$  people.  $1 \frac{1}{2}$  symbols is equal to 4 people + 2 people = 6 people

10. B

Elsa has  $7 + 8 + 3 = 18$  sweets to start with. She eats 2 chocolates so there are 16 sweets left ( $18 - 2 = 16$ ). There are still 8 toffees left, so the probability of picking a toffee next is  $\frac{8}{16}$ . Divide the numerator and denominator by 8 to find  $\frac{8}{16} = \frac{1}{2}$ .

11. E

The y-axis is the vertical axis so the coordinates of the reflected point A are (2, 2) (see the diagram).



12. £45

If you add up the portions that Eloise, Lucinda and Jennifer get all together,  $5 + 3 + 2 = 10$ . Calculate the amount in one share:  $\pounds 150 \div 10 = \pounds 15$   
Eloise, Lucinda and Jennifer share the money in a 5:3:2 ratio. Lucinda receives a share of 3, and therefore gets  $15 \times 3 = \pounds 45$

13. E

The number 26 is an even number, but it isn't a multiple of 3 or a multiple of 7, so it can't be placed in the sorting table.

14. C

When you rotate the clear pentagon by  $180^\circ$  it looks like this:



The only option where the clear pentagon looks like this is option C.

15. 72 minutes

Work out the length of time that the journey takes on each bus. On Bus A the journey takes 9:44 to 10:44 = 60 minutes plus 10:44 to 10:56 = 12 minutes.  $60 + 12 = 72$  minutes.  
On Bus B the journey takes 11:39 to 12:39 = 60 minutes plus 12:39 to 12:48 = 9 minutes.  $60 + 9 = 69$  minutes.  
The journey on Bus A is longer, so the longest time is 72 minutes.

16. A

When you multiply two odd numbers together you always make an odd number. So  $113 \times 115$  will give an odd number as the answer.

17. A

The mode is the most popular result. Silver, purple and blue were each chosen once, gold and green were each chosen twice but red was chosen three times, so red is the mode.

18. 9

Ester won 32 prizes altogether so subtract the number she won on the other days from 32 to find the number she won on Thursday:  $32 - 5 - 8 - 4 - 6 = 9$

19. D

Look at each statement and decide if it's true:  
A:  $\frac{3}{4} = \frac{75}{100}$ , so  $\frac{7}{100}$  isn't greater than  $\frac{3}{4}$ .  
B:  $\frac{7}{100} = 0.07$ , so  $\frac{7}{100}$  isn't greater than 0.65.  
C:  $\frac{7}{100} = 0.07$ , so  $\frac{7}{100}$  isn't greater than 0.09.  
D:  $\frac{3}{4} = 0.75$ , so 0.65 is less than  $\frac{3}{4}$ .  
E: 0.65 is greater than 0.09.

20. B

The cactus plants come in boxes of 12 and Lemone needs 60 plants so she needs  $60 \div 12 = 5$  boxes. The cost of 5 boxes is shown in the expression as  $5C$ . She needs to add this to the cost of the stall,  $S$ , so the complete expression is  $S + 5C$ .

21. 2

The total angle around the point at the centre of the spinner is  $360^\circ$  and there are 8 sections, so the size of each section is  $360^\circ \div 8 = 45^\circ$ .  $360^\circ - 45^\circ = 315^\circ$  so the arrow is being turned in an anti-clockwise direction through 7 segments ( $8 - 1 = 7$ ) which will leave it pointing at number 2.

22. D

$25 \times 4 = 100$ , so it takes 4 days to run 100 miles. The number of days to run 800 miles will be  $4 \times 8 = 32$  days. This leaves 74 miles left over.  $25 \times 3 = 75$  so it'll take 3 days to complete the last 74 miles.  $32 \text{ days} + 3 \text{ days} = 35 \text{ days}$

23. 6 cm<sup>2</sup>

You can work out the area of a rectangle by finding length  $\times$  width. So, the area of the flag is  $6 \times 4 = 24 \text{ cm}^2$ . The flag is split into 4 equal rectangles, so the area of the shaded rectangle is  $24 \div 4 = 6 \text{ cm}^2$

24. D

46 is 23 doubled, so  $46 \times 14$  is  $23 \times 14$  doubled. So  $46 \times 14 = 322 \times 2 = 644$   
140 is 10 times larger than 14, so  $46 \times 140 = 644 \times 10 = 6440$  sweets

25. 24

The probability of Penny picking a white sock from the drawer is  $\frac{2}{3}$ . This means  $\frac{2}{3}$  of the socks are white. There are 36 socks in total, so the number of white socks is  $\frac{2}{3}$  of 36.  $\frac{1}{3}$  of 36 =  $36 \div 3 = 12$   
So  $\frac{2}{3}$  of 36 is  $2 \times 12 = 24$  socks

26. D

$n$  is the number of the term. Test each formula by substituting different values for  $n$ .  
E.g for option D:  $n - (n + 1)$ :  
When  $n$  is 1:  $1 - (1 + 1) = 1 - 2 = -1$ .  
When  $n$  is 2:  $2 - (2 + 1) = 2 - 3 = -1$ .  
When  $n$  is 3:  $3 - (3 + 1) = 3 - 4 = -1$ .  
So  $n - (n + 1)$  is the correct formula.

27. C

For Julie to have shared the carrots equally, whilst having none left over and not having to divide any, the number of rabbits must be a factor of the number of carrots, 70. The only factor of 70 is 5 ( $70 \div 5 = 14$ ).

28. D

Four squares north takes Adam to  $(-1, 2)$ . Two squares east takes him to  $(1, 2)$ .

29. D

$3(p + 6t)$  means:  
 $p + 6t + p + 6t + p + 6t = 3p + 18t$

30. 68%

To find a percentage you need to write an equivalent fraction over 100.  $\frac{19}{50}$  people had a blue car and when you multiply the numerator and denominator in  $\frac{19}{50}$  by 2 you get  $\frac{38}{100} = 38\%$ . The percentage of people who didn't have a blue car is  $100\% - 32\% = 68\%$

## Section B

1. C

Add the prices of the sets of three board games together. You need to find the option that adds up to  $\pounds 30.00 - \pounds 0.50 = \pounds 29.50$ . This is easiest if you split the numbers and add the pounds and pence separately.  
Blocks + Clueless + Trivia Time =  $\pounds 12.50 + \pounds 6.50 + \pounds 10.50 = \pounds 12 + \pounds 6 + \pounds 10 + \pounds 0.50 + \pounds 0.50 + \pounds 0.50 = \pounds 28 + \pounds 1.50 = \pounds 29.50$

2. £9.50

Two copies of Brainium cost  $\pounds 9.50 \times 2 = \pounds 19$ . Three copies of Trivia Time cost  $\pounds 10.50 \times 3 = \pounds 31.50$ . Together they cost  $\pounds 19 + \pounds 31.50 = \pounds 50.50$ . Jill paid with  $3 \times \pounds 20 = \pounds 60$ . The change she received was  $\pounds 60 - \pounds 50.50 = \pounds 9.50$

3. 50 cm<sup>2</sup>

The area of each square is length  $\times$  width =  $4 \times 4 = 16 \text{ cm}^2$ . The area of  $\frac{1}{2}$  a square =  $16 \div 2 = 8 \text{ cm}^2$ . 1 whole square + 3 halves =  $16 + 8 + 8 + 8 = 40 \text{ cm}^2$ . She uses 2 half circles so 1 circle in total. The total area of the circle is  $10 \text{ cm}^2$ . So, the total area is  $40 + 10 = 50 \text{ cm}^2$

4. 4 m

The area of each tile is  $0.04 \text{ m}^2$  and Moses uses 100 tiles to cover the floor, so the total area of the bathroom is  $100 \times 0.04 = 4 \text{ m}^2$ . The area of the bathroom is calculated using length  $\times$  width, so area  $\div$  width = length:  $4 \div 1 = 4 \text{ m}$

**5. 11:9**

White tiles occupy 55% of the floor while black tiles cover 45%. Written as a ratio this is 55:45. The highest common factor of 55 and 45 is 5. Dividing both sides by 5 gives the ratio in its simplest form, 11:9.

**6. 1.8 m<sup>2</sup>**

The total area of the bathroom is 4 m<sup>2</sup>. 10% of the overall area is  $4 \div 10 = 0.4$  m<sup>2</sup> and 5% of the overall area is  $0.4 \div 2 = 0.2$  m<sup>2</sup>. Therefore 45% of the total area is  $(0.4 \times 4) + 0.2 = 1.6 + 0.2 = 1.8$  m<sup>2</sup>.

**7. 120°**

Each angle in an equilateral triangle is 60°. The shaded angle is made up of the angles from two equilateral triangles so it is  $60^\circ + 60^\circ = 120^\circ$

**8. 12**

In total, the girls have  $H + (H + 2) + 2H$  handbags. If they have 26 handbags altogether, this can be written as:  $26 = H + (H + 2) + 2H$ . This is simplified to:  $26 = 4H + 2$ . Subtract 2 from both sides:  $24 = 4H$ . So  $H = 24 \div 4$ , so  $H = 6$ . Louise has  $2H$  handbags.  $2 \times 6 = 12$  handbags.

**9. C**

Amy has  $H + 2$  handbags. Georgina has 3 times this.  $(H + 2) + (H + 2) + (H + 2) = 3H + 6$

**10. 91**

£2.73 is made up evenly of 2p and 1p coins. 1p out of every 3p is a 1p coin, so  $\frac{1}{3}$  of the money is made up from 1p coins. £2.73 is 273p and  $\frac{1}{3}$  of 273 is  $273 \div 3 = 91$ . So, 91 coins are 1p coins.

**11. 30**

	Girls	Boys	Total
Goals		4	
Saves	14	$= (20 - 4) = 16$	$= (16 + 14) = 30$
Total	24	$= (44 - 24) = 20$	44

The table shows how to find the total number of saves. Start by working out the boys' total goals and saves (20). Then use this to find the number of the boys' saves (16). Add this to the girls' saves to find the total number of saves (30).

**12. 5000**

The length of each matchbox is 5 cm. This will fit along one side of the box  $50 \div 5 = 10$  times. The width of each matchbox is 2 cm. This will fit along one side of the box  $50 \div 2 = 25$  times. So one layer of matchboxes =  $10 \times 25 = 250$  matchboxes. The height of each matchbox is 1 cm, so the box is high enough to fit  $20 \div 1 = 20$  layers of matchboxes in it. So the total number of matchboxes =  $20 \times 250 = 5000$

**13. 125 000**

In question 12, it was calculated that there were 5000 matchboxes in the packing box. If there are 25 matches in each match box, there are  $5000 \times 25$  matches in the packing box in total. You can calculate this by finding  $25 \times 1000 \times 5$ .  $25 \times 1000 = 25\,000$ ,  $25\,000 \times 5 = 125\,000$ .

**14. £16**

The cost of tickets for 2 adults and 2 children is  $\pounds 3.50 + \pounds 3.50 + \pounds 1.50 + \pounds 1.50 = \pounds 10$ . A family ticket is 20% cheaper — 10% of £10 is £1 so 20% is £2. So a family ticket is  $\pounds 10 - \pounds 2 = \pounds 8$ . Raj is buying two family tickets so the total cost is  $\pounds 8 \times 2 = \pounds 16$

**15. 5**

The number of sausage rolls eaten by the children is  $24 \times 3 = 72$  and the number eaten by the adults is  $7 \times 5 = 35$ . So the total number of sausage rolls eaten is  $72 + 35 = 107$ . The sausage rolls come in packets of 25.  $4 \times 25 = 100$  so Sherrie will need to buy 5 packets to have 107 sausage rolls.

**16. 4**

There are 7 adults who eat  $\frac{1}{7}$  of a cake each.  $7 \times \frac{1}{7} = 1$  cake. There are 24 children who eat  $\frac{1}{8}$  of a cake each.  $24 \times \frac{1}{8} = 24 \div 8 = 3$  cakes. In total Sherrie needs  $1 + 3 = 4$  cakes

**17. 10 years**

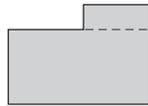
The plant needs to grow 0.5 m ( $2 - 1.5 = 0.5$ ). It grows 0.025 m in 6 months. There are 12 months in a year so it will grow  $0.025 \times 2 = 0.05$  m in a year.  $0.5 \text{ m} \div 0.05 \text{ m} = 10$ , so it'll take the plant 10 years to grow 0.5 m.

**18. 9 m**

The vertical sides of the shape measure  $1 + 6 + 7 = 14$  m. So, the total of the horizontal sides of the shape is  $32 - 14 = 18$  m. The bottom horizontal line is equal to the 2 top sides added together so the bottom horizontal line is half of the remaining perimeter. The length of X (the bottom) is  $18 \div 2 = 9$  m.

**19. 58 m<sup>2</sup>**

Area of a rectangle = width  $\times$  height. The house can be split up into two rectangles.



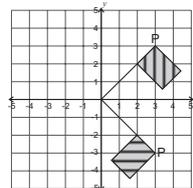
The bottom rectangle has an area of  $6 \times 9 = 54$  m<sup>2</sup>. The upper rectangle has an area of  $4 \times 1 = 4$  m<sup>2</sup>. The total area is  $54 + 4 = 58$  m<sup>2</sup>

**20. 25%**

The total amount of paint used by Harry is  $3 + 4 + 5 = 12$  litres. 3 litres of this was red paint, so the fraction of red paint used is  $\frac{3}{12}$ .  $\frac{3}{12}$  is simplified to  $\frac{1}{4}$  by dividing the numerator and denominator by 3, and  $\frac{1}{4} = 25\%$  ( $25\% \times 4 = 100\%$ ).

**21. D**

The diagram shows the flag when it has been rotated clockwise by 90° about (0, 0). The coordinates of point P are now (3, -3).

**22. B**

$n$  is the number of the term. To find the first term, substitute 1 for  $n$  in the expression  $3n^2 + 1$  (remember to follow BODMAS):  $3 \times 1^2 + 1 = 3 \times 1 + 1 = 3 + 1 = 4$ . To find the second term,  $n$  is 2:  $3 \times 2^2 + 1 = 3 \times 4 + 1 = 12 + 1 = 13$

**23. 12 cm<sup>3</sup>**

The volume of each cube of cheese is  $2 \times 2 \times 2 = 8$  cm<sup>3</sup>. There are 3 cubes of cheese, so the total volume of cheese is  $8 \times 3 = 24$  cm<sup>3</sup>. The mouse eats 12 cm<sup>3</sup> of cheese, so the amount left is  $24 - 12 = 12$  cm<sup>3</sup>

**24. D**

The regular pentagon has 5 sides that are all  $(2x - y)$  m.  $5(2x - y) = 2x - y + 2x - y + 2x - y + 2x - y + 2x - y = 10x - 5y$

**25. 90 m**

You can substitute the values  $x = 10$  and  $y = 2$  into the expression from question 24.  $10 \times 10 - 5 \times 2 = 100 - 10 = 90$  m. Alternatively, substitute the values of  $x$  and  $y$  into the expression for one side of the pen  $2 \times 10 - 2 = 20 - 2 = 18$  m. There are 5 sides to the pen so the total perimeter is  $18 \times 5 = 90$  m

**26. 33**

Brian needs 50 m<sup>2</sup> for every 3 sheep. You need to work out how many lots of 50 m<sup>2</sup> there are in 555 m<sup>2</sup>.  $555 \div 50 = 11$  remainder 5. For every 50 m<sup>2</sup> Brian can have 3 sheep. Since there are only 11 full lots of 50 m<sup>2</sup>, Brian can fit  $11 \times 3 = 33$  sheep in the pen. There is a remainder of 5 m<sup>2</sup> which is not big enough for one sheep.

**27. 136°**

A kite is a quadrilateral so the angles in a kite add up to 360°. This means that the angle missing in the kite is  $360^\circ - 130^\circ - 130^\circ - 56^\circ = 44^\circ$ . Angles on a straight line add up to 180°, so angle  $a$  is  $180^\circ - 44^\circ = 136^\circ$

**28. C**

Round up 49p to 50p and 29p to 30p to make the calculations easier. Carrie bought 4 chocolate bars so the approximate price of these is  $4 \times 50p = \pounds 2$ . She bought 7 bags of peanuts so the approximate price of these is  $7 \times 30p = \pounds 2.10$ .  $\pounds 2 + \pounds 2.10 = \pounds 4.10$ . You rounded each item up by 1p and there were 11 items in total ( $4 + 7 = 11$ ) so subtract 11p to find the exact total cost:  $\pounds 4.10 - 11p = \pounds 3.99$

**29. 8 hours**

Start by making sure everything is in the same units — there were 2 litres of water, so change this to millilitres by multiplying by 1000:  $2 \times 1000 = 2000$  ml. There are 5 holes each losing 50 ml each hour, so the amount of water being lost each hour is  $5 \times 50 = 250$  ml. Divide the total volume of water (2000) by the amount being lost each hour (250) to find the number of hours it'll take to empty:  $2000 \div 250 = 8$  hours

**30. 120 minutes**

If one hole is stoppered then only  $4 \times 50 = 200$  ml of water will be lost per hour.  $2000 \div 200 = 10$  hours. This is  $10 - 8 = 2$  hours more than when all 5 holes are losing water. 2 hours is  $60 \times 2 = 120$  minutes.