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

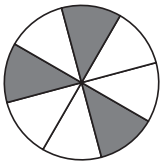
Allow 10 minutes to do Section A and 25 minutes to do Section B.
Work as quickly and as carefully as you can.

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?



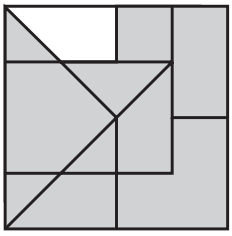
A $\frac{5}{8}$ **B** $\frac{1}{3}$ **C** $\frac{6}{9}$ **D** $\frac{3}{8}$ **E** $\frac{5}{18}$

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?





A **B** **C** **D** **E**

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?



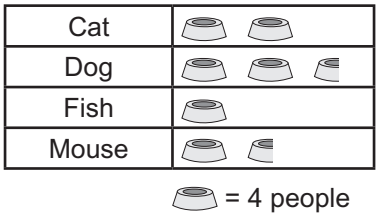
A **B** **C** **D** **E**

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 →→

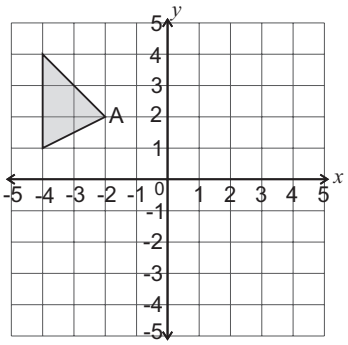
9. Sarinder asked her classmates what their favourite pet was.
She recorded her results in the pictogram.
How many more people liked dogs than fish?



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?

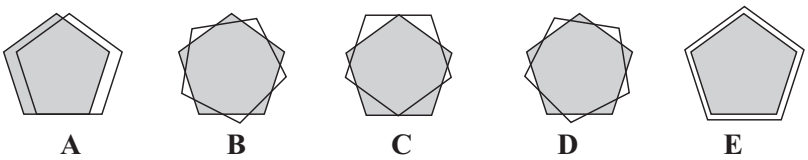
£ ☐☐.☐☐

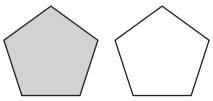
13. Where does the number 26 belong in this sorting table?

	Even numbers	Odd numbers
Multiples of 3		
Multiples of 7		

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

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°. Which of these shapes could be the shape David makes?





15. Mrs Burton often catches the bus from Oxton 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
Oxton	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 × 115 **B** 142 × 623 **C** 436 × 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 →→

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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

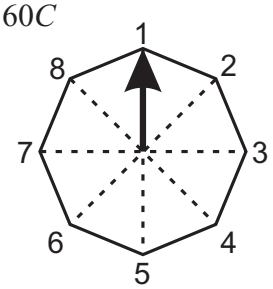
19. Which of the following statements is true?

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** $S + 60C$

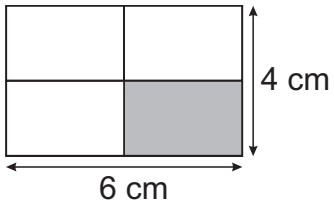
21. The arrow on the spinner is pointing at number 1. Charlotte spins the arrow round 315° anti-clockwise. Which number is the arrow pointing at now?



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?



cm²

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 nth term of this sequence?

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

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

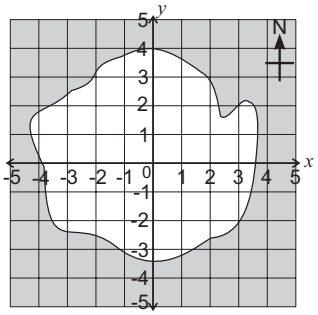
27. Julie divides a bag of 70 carrots between some rabbits. Each rabbit has exactly the same number of carrots. Julie doesn't have any carrots leftover and doesn't divide any whole carrots. How many rabbits is it possible for Julie to have fed?

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

Carry on to the next question →→

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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

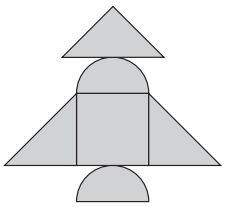
A Scramble, Blocks and Trivia Time
B Clueless, Brainium and Trivia Time
C Blocks, Clueless and Trivia Time
D Scramble, Blocks and Clueless
E Scramble, Clueless and Trivia Time

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 cm^2. She cuts some of the shapes in half. What is the area of her rocket?

☐☐ cm^2



Moses is tiling his rectangular bathroom floor.

4. Each tile is 0.04 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.

☐☐:☐☐

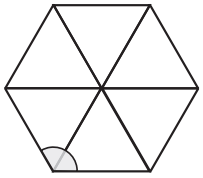
6. What is the total area of the bathroom floor that will be covered with black tiles?

☐☐.☐ m^2

Carry on to the next question →→

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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 cm × 50 cm × 20 cm. The matchboxes measure 5 cm × 2 cm × 1 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?

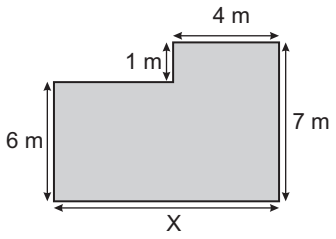
□□

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.

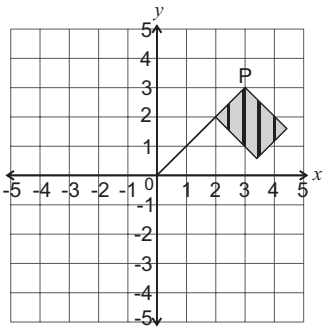


18. Harry draws the side elevation. The total perimeter is 32 metres. What is the length of X? ☐☐ m

19. What is the area of the side of his house? ☐☐ m²

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?



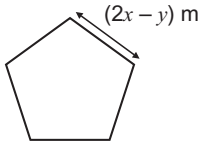
A (−3, 3) **B** (−2, 3) **C** (−3, 2) **D** (3, −3) **E** (1, −2)

22. Graham creates a sequence with the nth 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 cm³ of the cheese. What volume of cheese does Mark have left? ☐☐☐ cm³

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



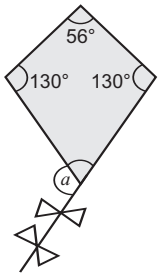
24. Each length of fence is $(2x - y)$ m long. What is the perimeter of the pen in terms of x and y?

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 m². 50 m² 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

/ 30

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