FOUNDED 1900

THE ENGLISH SCHOOL
A SECOND CENTURY OF EXCELLENCE

## YEAR 2 MID-PROGRAMME ENTRY EXAMINATIONS 2018

**MATHEMATICS**                                    **SATURDAY 2nd JUNE 2018**

## Time allowed: 2 hours

### Instructions to candidates

Answer the questions in the spaces provided – *there may be more space than you need.*
Without sufficient working, correct answers may be awarded no marks.

### Information to candidates

This paper has 27 questions.
There are 15 pages in this question paper.
There is one blank page at the end of this question paper. You may use this for any additional work.
Full marks may be obtained for answers to all questions.
The total marks for this paper is 120.
The marks for each question are shown in round brackets, e.g. **(2)**
**Calculators are NOT allowed.**

### Advice for candidates

Write your answers neatly and in good English.
Work steadily through the paper.
Do not spend too long on one question.
Show all stages in any calculations.

### Materials required for the paper

Calculator, ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen,
HB pencil, eraser. Tracing paper may be used.

1. Here are the ingredients to make dumplings.

100 grams of self-rising flour

$\frac{1}{4}$ teaspoon salt

50 grams of suet

$\frac{1}{3}$ teaspoon dried mixed herbs

Serves 4 people

Gina wants to make dumplings for 6 people. Work out the amounts of each ingredient she needs.

Flour: …………*g*      Salt: …………*teaspoon*      Suet: ………*g*      Herbs: ………*teaspoon*

(5)

**(Total for Question is 5 marks)**

2. In the following algebra wall, the expression in each brick is the sum of expressions in the two bricks below. Complete the algebra wall below to find an expression for the number in the top brick.



| $2(x-3)$ | $x(2x-1)$ | $2-x$ |

…………………………………………………

(5)
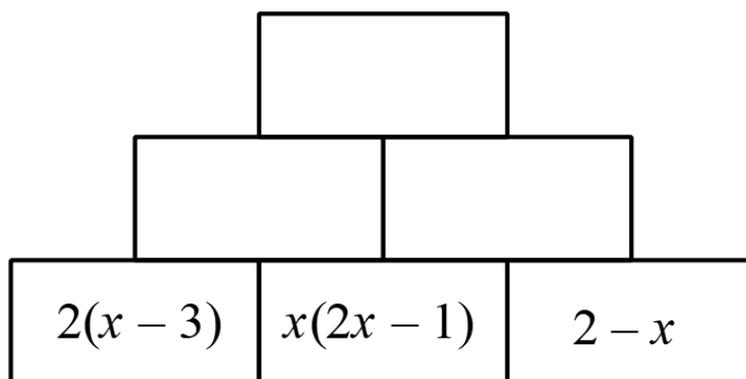
**(Total for Question is 5 marks)**

3. Use a ruler and a pair of compasses to construct the line bisector of the following line. You must show all construction lines.



(2)
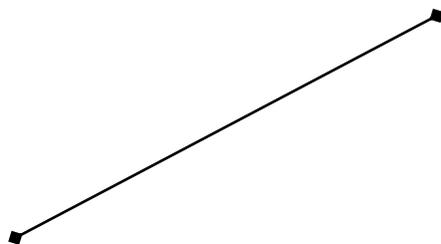
**(Total for Question is 2 marks)**

4. Calculate the following, showing clearly all your workings:

a. $-12 + 4 \div (-4) \times -1 + 4$

(3)

b. $(1 - 5)^2 \times (12 - 13)^2$

(3)

c. $0.14 \div 10^3$

(2)

**(Total for Question is 8 marks)**

5. a. Write down the next two term of the following sequence.

-5, -11, -17, -23, _____ , _____

(2)

b. Work out the $n$-term of the following sequence.

-5, -11, -17, -23, …

(2)

**(Total for Question is 4 marks)**

6. Jim is $t$ years old.

Five years ago, Jim's age was three-quarters of what it will be in five years' time.

a) Write down an equation to show this.

...............................................................

b) Work out Jim's age.

...............................................................

(2)

**(Total for Question is 4 marks)**

7. Expand the brackets and simplify each expression as much as possible.

a) $4 - 3(x - 3)$

(2)

b) $2x(x - y + 4) - x(2x - 2y - 1)$

(3)

c) $\frac{2a^2}{3}(6a^2 - 3ab)$

(2)

**(Total for Question is 7 marks)**

8.  Simplify these expressions as much as possible.

a)  $x \times x \times 3y \times 3x \times 2y \times 4 \times 3x$

(3)

b)  $(2s)^3 - \frac{1}{6}s \times 3s \times 8s$

(3)

**(Total for Question is 6 marks)**

9.  In the following diagram work out the value of $a$ and $b$.
    (Diagram NOT accurately drawn)



$a=$ .......................... $b=$ ..........................

(2)
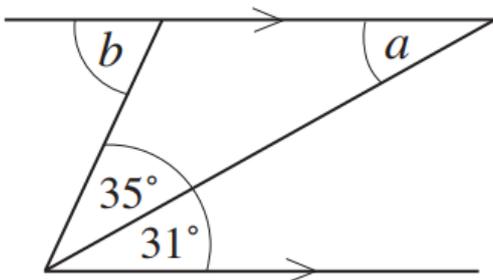
**(Total for Question is 2 marks)**

10. Alice reads a book that have 240 pages. She reads 2 pages in 220 seconds. Calculate the total time in hour and minutes for Alice needed to read all book?

..........................................................

(3)

**(Total for question = 3 marks)**

11. Solve the following equations

a) $\frac{x}{3} - 2 = 5$

(2)

b) $x - 2x + 2(2x - 1) = 10$

(3)

c) $\frac{1}{x-3} = 2$

(2)

**(Total for Question is 7 marks)**

12. Ann wins £160. She gives $\frac{1}{4}$ of £160 to Paula, $\frac{3}{8}$ of £160 to Julia and £28 to Peter.
    What fraction of the £160 does Ann keep? Give your answer as a fraction in its simplest form.

.........................................................

(3)

**(Total for question = 3 marks)**

13. Here are the temperatures in Troodos at midnight for one week.

$$-3°C \qquad -4°C \qquad -1°C \qquad 4°C \qquad 0°C \qquad 1°C \qquad 3°C$$

(a) Work out the mean temperature.

.............................................................°C

**(2)**

(b) Work out the range.

.............................................................°C

**(1)**

(b) Work out the Median.

.............................................................°C

**(1)**

**(Total for question = 4 marks)**

14. Put brackets in the following to make the calculation correct.

    a. $2 - 4 \times 7 + 12 - 4 \times 2 = 2$

**(1)**

**(Total for question = 1 mark)**

15. A tank in the shape of a cube has a capacity of 512 litres.

a) Express this capacity in $cm^3$.

............................................................ $cm^3$

**(1)**

b) Convert your answer to a) into $m^3$.

............................................................ $m^3$

**(1)**

c) Find the dimensions of the tank, in centimetres.

.............................................................cm

**(1)**

**(Total for question = 3 marks)**

16. In the following diagram work out the value of *a* and *b*. Show clear algebraic working where necessary.  (Diagram NOT accurately drawn)
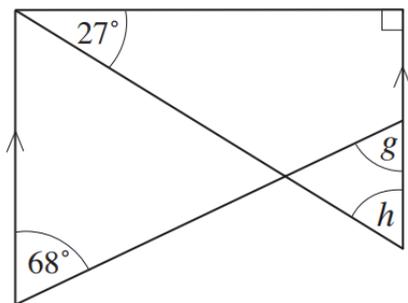


(a)  Write down the size of angle *g*.

.......................................................... °

(1)

(b)  Work out the size of angle *h*.

.......................................................... °

(1)

**(Total for question = 2 marks)**

17. A bag contains only red marbles and green marbles.

The bag contains a total of 400 marbles.

The ratio of the number of red marbles to the number of green marbles is 5 : 3

How many more red marbles are there than green marbles in the bag?

..........................................................

(4)

**(Total for Question is 4 marks)**

18. Here are two road signs.
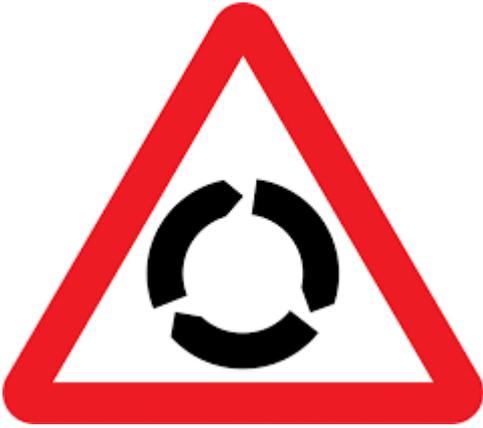


A



B

(a) How many lines of symmetry does sign (A) have?

..............................................................

**(1)**

(b) Write down the order of rotational symmetry of sign (B).

..............................................................

**(1)**

(c) Change 8 m$^2$ to cm$^2$.

.............................................................cm$^2$

**(1)**

(d) Change 125 m to kilometres.

.............................................................km

**(1)**

(e) Round off the number 1.977 to 1 decimal place

..............................................................

**(1)**

(f) Round off the number 299.994 to 2 decimal place

..............................................................

**(1)**

(g) Write 4% as a decimal.

..............................................................

**(1)**

(h) Write 4% as a fraction.
Give your fraction in its simplest form.

..............................................................

**(1)**

**(Total for question = 8 marks)**

19. The diagram shows a prism.
   The cross-section of the prism is an isosceles triangle.
   The lengths of the sides of the triangle are 12 m,
   12 m and 9 m.
   The perpendicular height of the prism is 11 m.
   The length of the prism is 16 m.
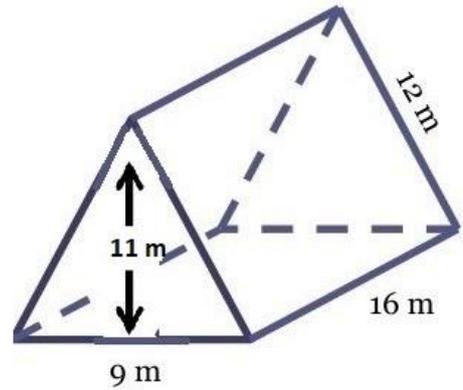
Work out the total surface area of the prism.



11 m

12 m

16 m

9 m

.......................................................... m$^2$

**(Total for Question is 4 marks)**

20. There are 250 Green 15 Black and 50 Yellow marbles in a bag. Find the ratio of the three colours.
   Give your answer in its simplest form.

..........................................................

**(Total for question = 3 marks)**

21.  A game is played with two spinners.

You *multiply* the two numbers on which the spinners land to get the score.

This score is $2 \times 3 = 6$

a) Copy and complete the table to show all the possible scores.
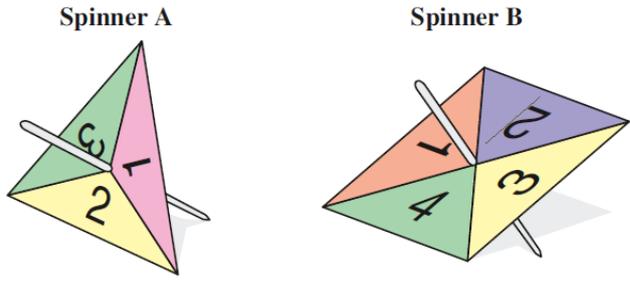
Spinner A

Spinner B

**Spinner B**

| × | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| **Spinner A** 1 | | | | |
| 2 | | | 6 | |
| 3 | | | | |

(2)

One score has been done for you. Simplify all of your answers.

b) Work out the probability of getting a score of 3.

.......................................................

(2)

c) Work out the probability of getting a score that is an odd number.

.......................................................

(2)

d) Work out the probability of getting a score that is a prime number.

.......................................................

(2)

e) Work out the probability of getting a score that is from a Fibonacci sequence.

.......................................................

(2)

**(Total for question = 10 marks)**

22. The diagram shows shape **A**.



3 cm

Diagram **NOT** accurately drawn

6 cm

**A**

2 cm

8 cm
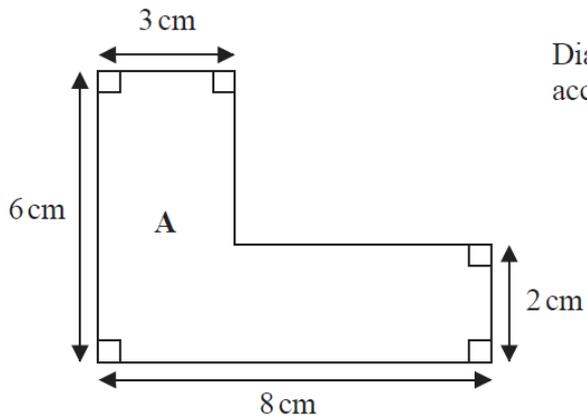
a) Work out the area of shape **A**.

..............................................................

(2)

Here is a prism with shape **A** as its cross section.



Diagram **NOT** accurately drawn

**A**

$h$ cm
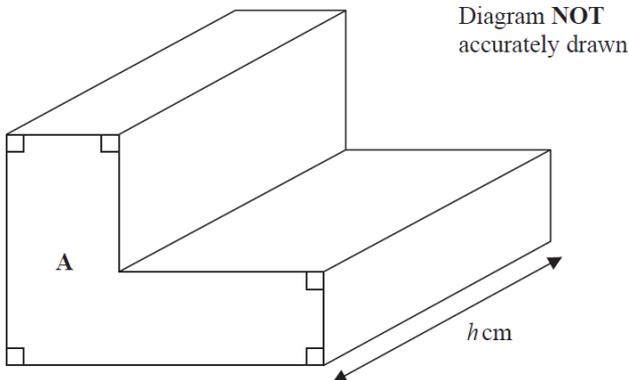
The volume of the prism is 350 cm$^3$

The length of the prism is $h$ cm.

b) Work out the value of $h$.

..............................................................

(2)

**(Total for question = 4 marks)**

*Turn over* ▶

23. The cost of hiring a bicycle is £5 plus a daily charge of 80 p per day.
    a) Find the cost of hiring the bicycle for 5 days.

...........................................................

    b) Obtain a formula for the cost, **£C**, of hiring the bicycle for *n* days.

...........................................................
(2)
**(Total for question = 4 marks)**

24. Work out the next two term in the sequence with the term-to-term rule 'add 7' and a first term of 5.

...........................................................
(2)

    b) Find the *nth* term of the sequence.

...........................................................
(2)

    c) One of the term of the sequence is 306. Find the number of term.

...........................................................
(2)

**(Total for question = 6 marks)**

25.



Diagram **NOT** accurately drawn

8 cm

17 cm

32 cm
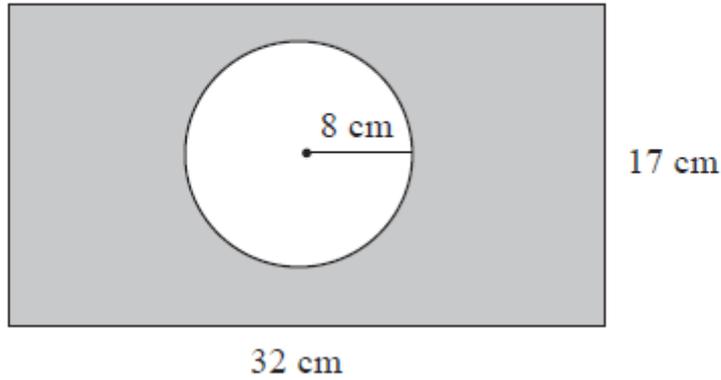
The diagram shows a circle inside a rectangle.

(a) Work out the area of the circle by using $\pi = 3$.

.......................................................... cm$^2$

(1)

(b) Work out the area of the shaded shape by using $\pi = 3$.

.......................................................... cm$^2$

(2)

**(Total for question = 3 marks)**

26. Fill the following table.

| Name | Number of faces | Number of edges | Number of vertices |
|---|---|---|---|
| Cuboid | | | |
| Triangular Prism | | | |
| Square based Pyramid | | | |

(3)

**(Total for question = 3 marks)**

27.
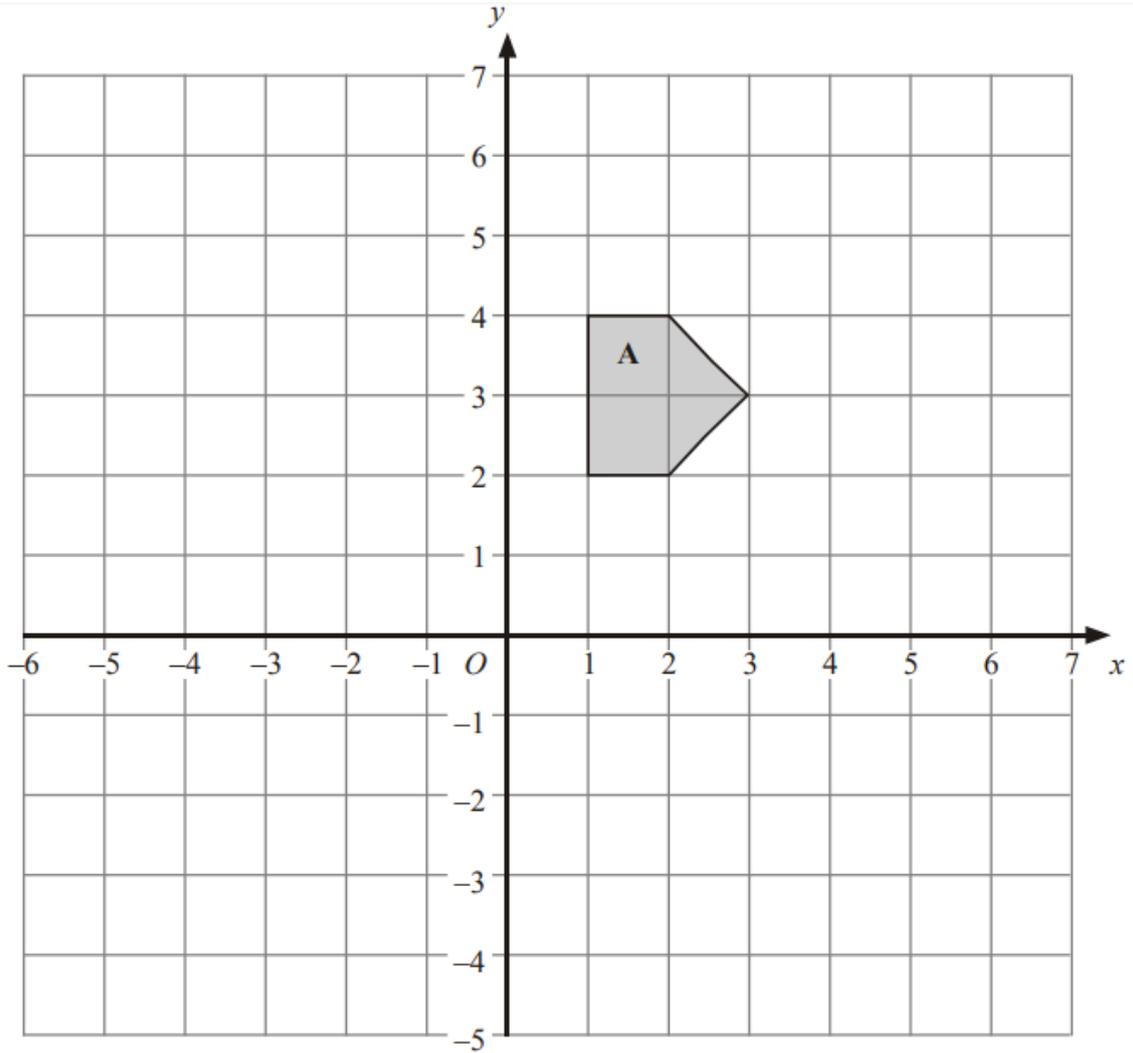


a)    (i) Draw the line $y = x$ by using the following table.

| -1 | 0 | 1 | 2 |
|----|---|---|---|
|    |   |   |   |

(2)

(ii) Reflect Shape A with the mirror line $y = x$ and label the shape B.

(1)

b)    Enlarge Shape A by scale factor 2 from the centre (3, 2).

Label the enlargement C.

(2)

(Total for question = 5 marks)

**END**

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