



FOUNDED 1900

THE ENGLISH SCHOOL
A SECOND CENTURY OF EXCELLENCE

YEAR 2 MID-PROGRAMME ENTRY EXAMINATIONS 2016

MATHEMATICS

SATURDAY 4th JUNE 2016

Time allowed: 2 hours

Instructions to candidates

Answer the questions in the spaces provided.
Without sufficient working, correct answers may be awarded no marks.

Information to candidates

This paper has 28 questions.
There are 13 pages in this question paper.
Full marks may be obtained for answers to all questions.
The total marks for this paper is 120.
The marks for each question is 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

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

1. Round the following numbers to the specified accuracy:

Number	1 decimal place	2 decimal places
5.3548		
8.9989		

(2)

Number	1 significant figure
8 654 351	
39 798 149	

(1)

2. Calculate the following showing your working out where appropriate. Simplify your final answer.

a) $\frac{2}{3} \div 4 + 5\left(\frac{2}{3} - \frac{1}{5}\right) = \dots\dots\dots$

b) $3 \times -6 + 4 \times (-3)^2 = \dots\dots\dots$

c) $\sqrt{64} - (-11 + 3) \div (-2)^2 = \dots\dots\dots$

d) $\frac{7}{8} \div 1\frac{3}{4} = \dots\dots\dots$

(11)

3. a) The shape that has two pairs of equal angles (none of which is a right angle) and four equal sides is a _____.

b) **Underline** all the quadrilaterals given below having a rotational symmetry of order 2.

- i) Rectangle, ii) Square, iii) Rhombus, iv) Arrowhead.

(3)

4. Expand and simplify:

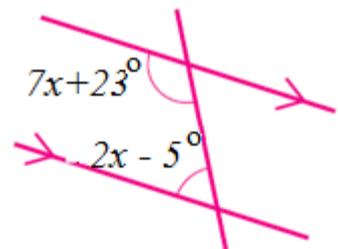
(i) $3x(2x+7) - \frac{1}{2}(2x+12) =$

.....
(3)

(ii) $2n(3-2n) - 5n(4n-7) =$

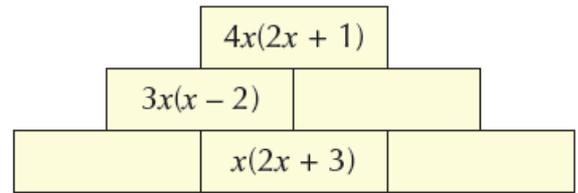
.....
(3)

5. By setting up and solving an equation calculate x in the diagram shown below:



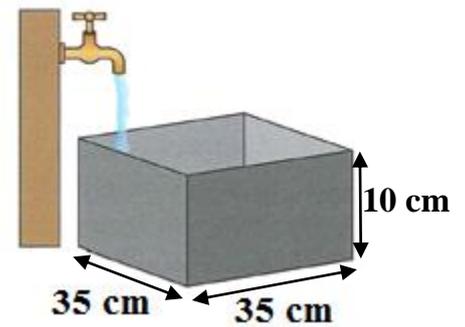
$x =$
(3)

6. This is an algebra wall. The expression in each brick is the sum of the expressions in the two bricks below it. Work out the expressions missing from the empty bricks.



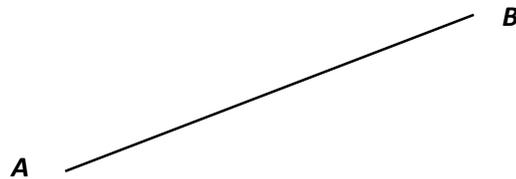
(3)

7. Every second, 200 cm^3 of water comes out of a tap into a cuboid water tank. The base of the tank is 35 cm by 35 cm . The height is 10 cm . How long does it take to fill the tank? Give your answer correct to one decimal place.



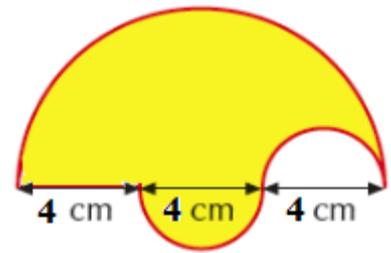
(3)

8. Using a compass and a ruler only, construct the *mid-point* (M) and the *perpendicular bisector* of the line AB . Show all your construction lines.



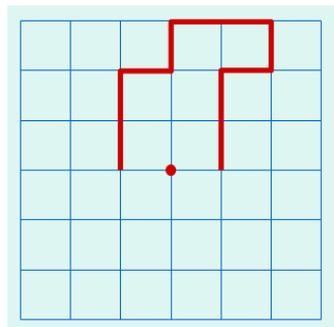
(3)

9. Calculate the perimeter and area of the following shape giving your answer to one decimal place. Use $\pi = 3.14$.



Perimeter =, Area = (6)

10. Complete the diagram so that the final shape has a rotational symmetry of order 2.



(2)

11. Convert:

48 000 m² to hectares =

5.7 cm² to mm² =

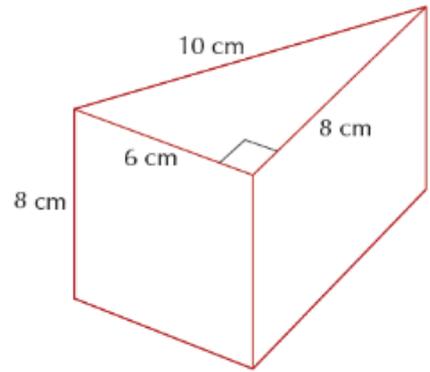
7 300 000 cm³ to m³ =

1.24 m³ to litres =

(4)

12. The diagram shows the dimensions of a triangular prism.

- Calculate, a) the area of cross section,
 b) the total surface area and,
 c) the volume of the prism.



Area of =, Total Surface =, Volume =
 Cross section Area (4)

13. A group of 1900 people went on a journey from Paris to London. They travelled in 32-seater coaches.

- a) How many coaches did they need?
 b) Each coach cost €380. What was the total cost of the coaches?
 c) How much was each person's share of the cost?

(4)

14. Find the *next two terms* for each of the following sequences and write down the name of each sequence:

- a) 1, 1, 2, 3, 5,,
 b) 1, 3, 6, 10,,

(4)

15. Given the following number sequence

7 , 10, 13, 16 , . . .

calculate:

- a) the 5th term
- b) the nth term
- c) the 50th term by showing your working where appropriate.

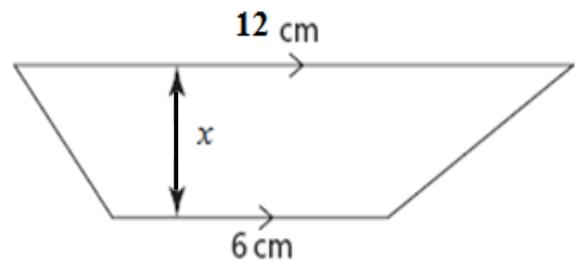
5th term:

nth term :

50th term:

(3)

16. If the area of the shape below is 45cm², calculate the unknown length x , showing all your working.



$x = \dots\dots\dots$

(3)

17. Write algebraic expressions to illustrate the following sentences:

a) Divide x by three and subtract six

b) Multiply y by itself and add two

c) Add four to x , square the answer and add five

(3)

18. Calculate the value of the following expressions if $t = 4$ and $x = -5$.

a. $(2t)^2 =$

b. $-tx^2 =$

c. $xt^2 =$

(3)

19. Simplify:

a) $p + p + p + p + p =$

b) $x - 2x + 7x - 4x - 7y - 2y =$

c) $2a \times 3b \times 5c =$

d) $7t^6 \div t^2 =$

(7)

20. By showing your working, solve the following equations:

a) $6 - 2q = -16$

$q =$ (1)

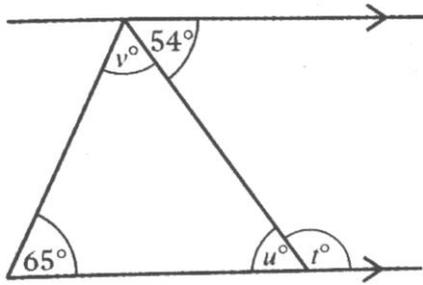
b) $\frac{20}{x+7} = 2$

$x =$ (3)

c) $2(2g - 4) = 3(2 - g)$

$g =$ (3)

21. Calculate the missing angles on the following diagram, showing your working where applicable.



Angle $t =$

Angle $u =$

Angle $v =$

(3)

22. I bought four identical textbooks and five identical pencil cases. Let the cost of one textbook be t euros.

a) Each pencil case costs 3 euros less than a textbook. Write down an expression for the cost of a pencil case in terms of t .

Cost of a pencil case:

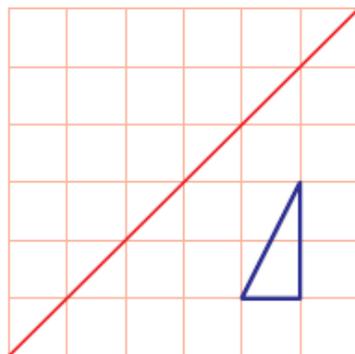
b) Altogether it cost me 84 euros. Use this information to form an equation in terms of t .

Equation:

c) Solve your equation to find out the cost of a pencil case.

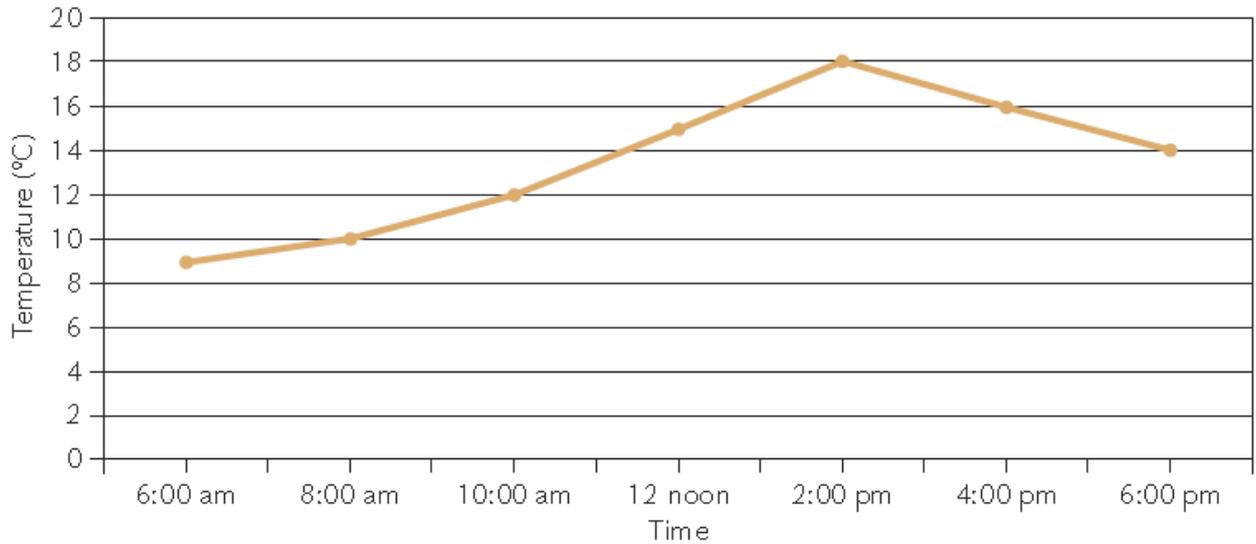
Cost of a pencil case: (4)

23. Reflect the following shape in the mirror line given.



(2)

24. The line graph shows the temperature, in °C, in Leeds over a 12-hour period.



a) What is the temperature at midday?

.....

b) What is the temperature at 3 pm?

.....

c) Write down the range for the temperature over the 12-hour period

.....

(3)

25. The table below shows the speeds of 30 cars along a road.

Speed (mph)	30	40	50	60	70	
Number of cars (Frequency)	3	7	13	4	3	

a) Calculate the mode, the median and range. Show all your working where appropriate.

Mode =

Median =

Range =

(3)

b) Calculate the mean showing all your working.

Mean =

(2)

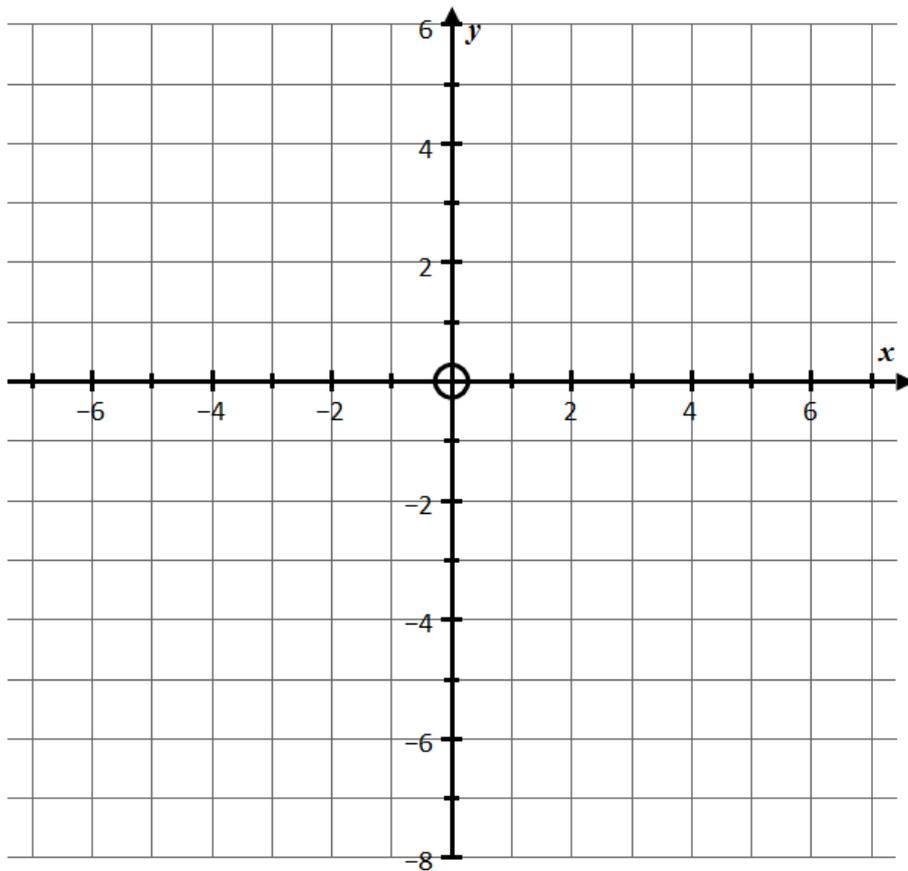
26. a) Complete the table for the equation $y = 2x - 2$.

x	-3	-2	-1	0	1	2	3	4
y			-4			2		

(2)

b) Draw the graph of $y = 2x - 2$ on the grid below by plotting your points from the table above. (1)

c) Draw and label the graphs of $x = 3$ and $y = -3$ on the same set of axes. (2)



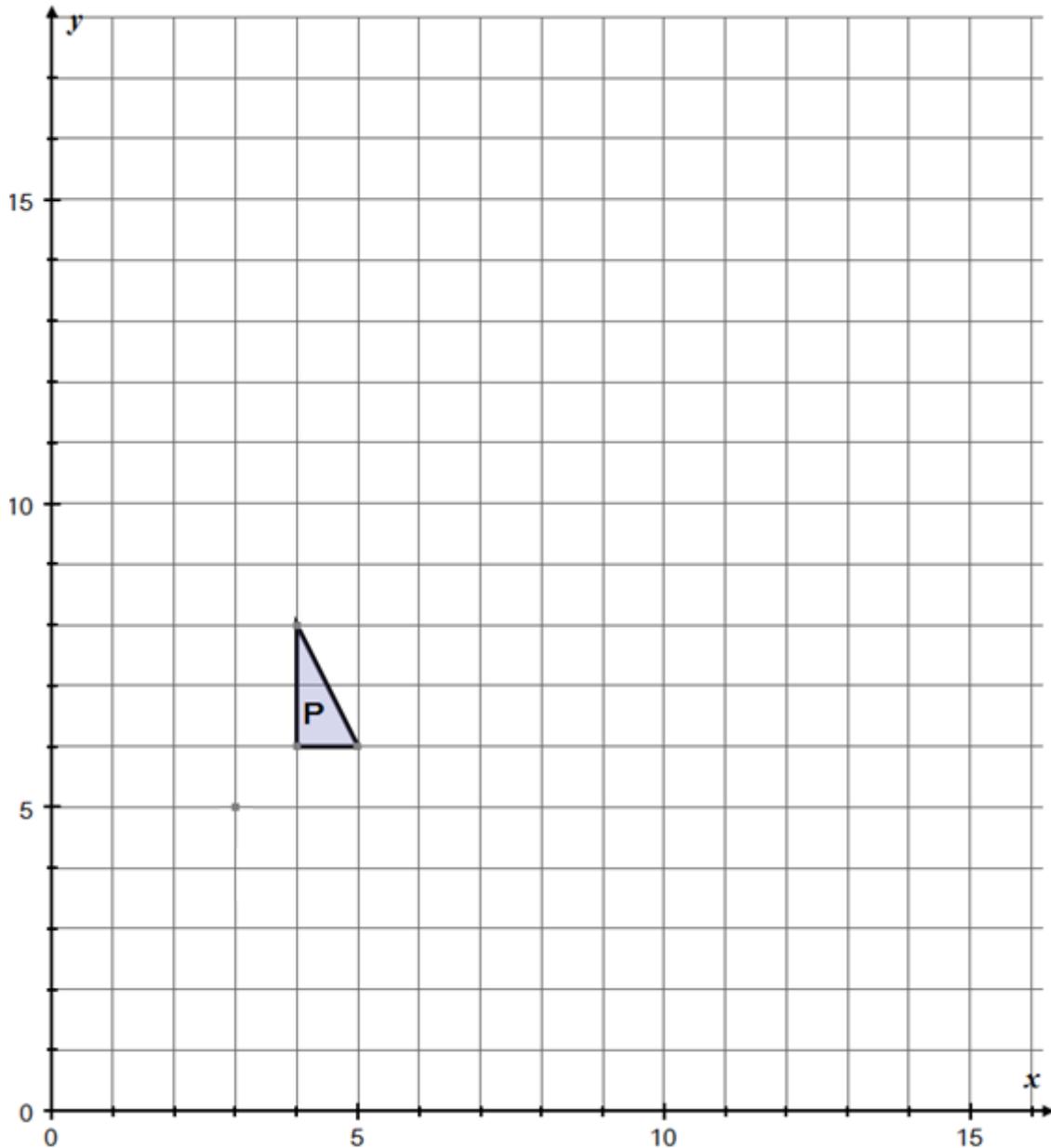
d) Write down the coordinates of the point of intersection $y = 2x - 2$ and $x = 3$.
 (.....,) (1)

e) Is the point (11, 20) on the line $y = 2x - 2$? Show all your calculations.

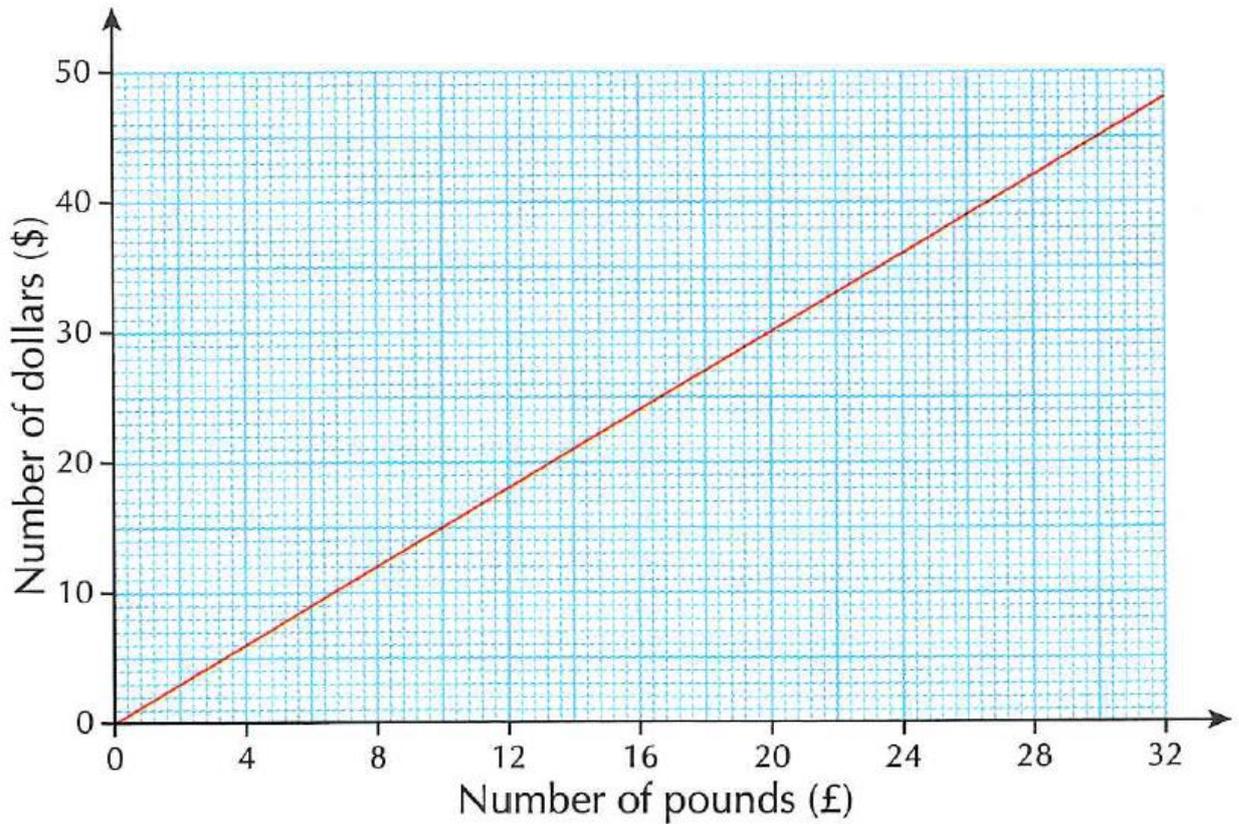
Answer: (1)

27. The grid below shows a triangle P .

- Rotate triangle P by 90° clockwise about the point $(3, 5)$. Label the new triangle Q . (2)
- On the grid, enlarge triangle P with scale factor 3 and centre $(3, 5)$. Label the new triangle R . (2)
- On the grid, translate triangle P , 2 units to the left and 4 units up. Label the new triangle S . (2)
- Reflect triangle P in the line $y = 4$. Label the new triangle T . (2)



28. The conversion graph shows the relationship between dollars (\$) and pounds (£).



- a) How many pounds would you get for \$30? (1)
- b) How many dollars would you get for £28? (1)
- c) Write down a formula connecting the number of dollars (D) and the number of pounds (P) in the form $D = aP$, where a is a number to be found.

..... (1)

END