



FOUNDED 1900

THE ENGLISH SCHOOL
A SECOND CENTURY OF EXCELLENCE

YEAR 3 MID-PROGRAMME ENTRY EXAMINATIONS 2017

MATHEMATICS

SATURDAY 3rd JUNE 2017

Time allowed: 2 hours

Instructions to candidates

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

Information to candidates

This paper has 24 questions.
There are 19 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)

Calculator may be used.

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. On a farm the number of cows and the number of sheep are in the ratio 6 : 5.
The number of sheep and the number of pigs are in the ratio 2 : 1.

The total number of cows, sheep and pigs on the farm is 189.

How many pigs are there on the farm?

Answer..... (3)

2. John pays 12% simple interest per year on a loan of \$40,000. He pays interest for six years.
a) Work out how much interest he pays altogether.

Answer..... (2)

- b) What percentage of the loan is the total interest?

Answer..... (2)

3. After a 24% decrease in the value, a car is now worth £7,600. Work out the original value.

Answer..... (3)

4. Expand the following expression

a) $(x + 2)(x - 3)(x + 1)$

Answer..... (4)

5. Factorise the following expressions:

a) $x^2 - 6x - 16$

Answer..... (2)

b) $x^2 - 16$

Answer..... (2)

c) $2x^2 - 242$

Answer..... (3)

6. Given that $v = u + at$. Make a the subject of the formula.

Answer $a = \dots\dots\dots$ (2)

7. A formula for s is given by $s = ut + \frac{1}{2}at^2$. Find s , if $u = 2$, $a = 4$ and $t = 10$.

Answer $s = \dots\dots\dots$ (2)

8. There are 3.6 million milliseconds in an hour.

a) Write this number in standard form.

Answer..... (2)

b) How many milliseconds are there in a week?

Give your answer in standard form.

Answer..... (2)

9. Simplify the following expressions.

a) $\frac{3a-10}{8} - \frac{2a-7}{4}$

Answer..... (3)

b) $\frac{x^2y^3}{wy} \div \frac{(xy)^2}{x^3w^2}$

Answer..... (3)

10. Solve the following equations.

a) $3(2x - 5) - 4 = -x + 2$

Answer $x = \dots\dots\dots$ (3)

b) $\frac{2x+5}{5} = \frac{1}{2}$

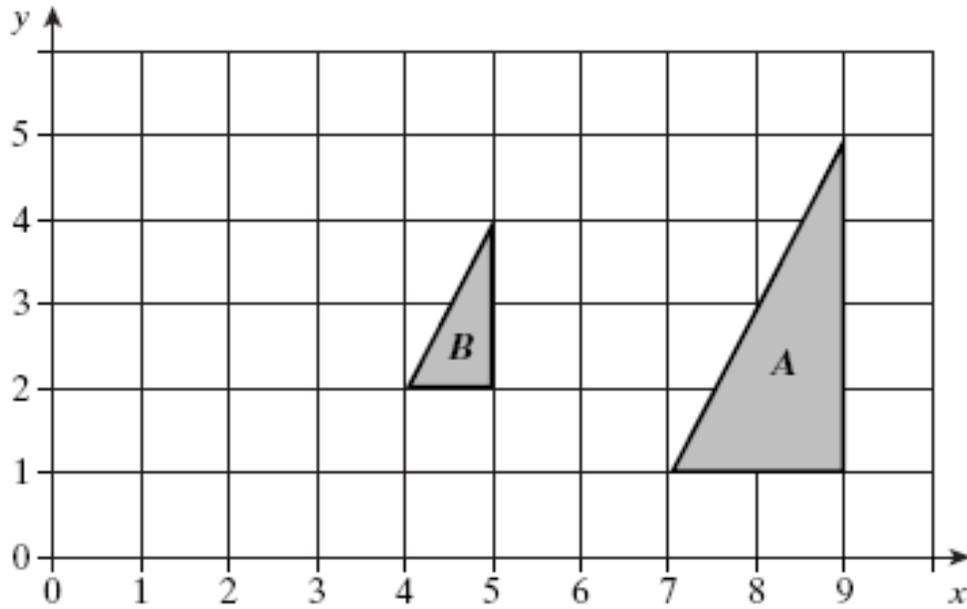
Answer $x = \dots\dots\dots$ (3)

11. Solve the following equation, showing ALL steps in your working.

$$5x^2 - 3 = 177$$

Answer $x = \dots\dots\dots$ (4)

12.



Triangle B is an enlargement of triangle A.

a) Find the coordinates of the centre of enlargement.

Answer..... (2)

b) What is the scale factor of the enlargement?

Answer..... (1)

c) Enlarge triangle A about the point (5, 1) by a scale factor of $\frac{1}{4}$ and label the triangle C.

(3)

13. The diagram shows a regular pentagon inside a circle, centre O .
 The points A and B lie on the circle such that AB is a side of the pentagon.
 $OA = 7 \text{ cm}$.
Angle OAT is a right angle.

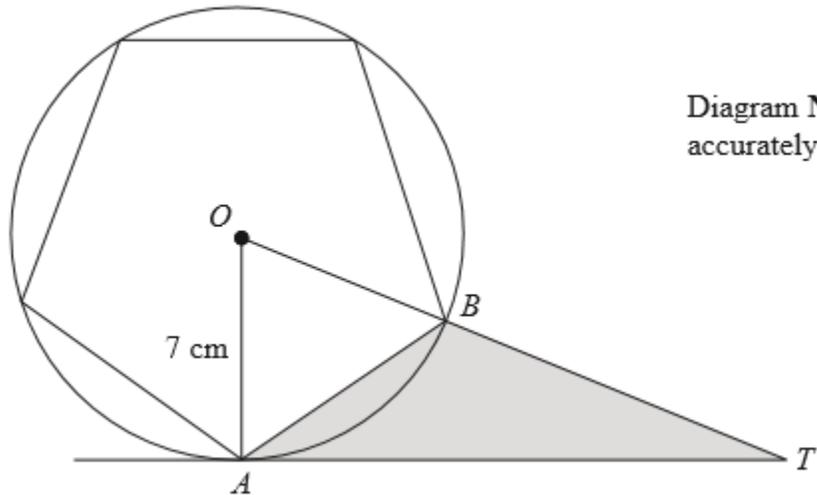


Diagram NOT accurately drawn

- a) Calculate angle AOB .

Answer..... $^{\circ}$ (3)

- b) Calculate the length of AT correct to 3 significant figures.

Answer.....cm (2)

- c) Calculate the area of triangle OAT giving your answer to 3 significant figures.

Answer..... cm^2 (2)

14. There are some green counters, some yellow counters, some blue counters and some red counters in a bag. The table shows the probabilities that a counter taken at random from the bag will be green, yellow, blue or red.

Colour	Green	Yellow	Blue	Red
Probability	0.16	0.4		0.24

Mary takes at random a counter from the bag.

a) Work out the probability that the counter will be blue.

Answer..... (2)

b) Work out the probability that the counter will be green or red.

Answer..... (2)

Mary puts the counter back into the bag. There are 125 counters in the bag.

c) Work out the number of green counters in the bag.

Answer..... (2)

A counter is taken and replaced 25 times.

d) Find the expected number of times a red counter will be selected.

Answer..... (2)

15. A formula for T is:

$$T = \frac{2X - U}{R}$$

If $X = 20$ correct to 2 significant figures, $U = 12$ correct to 2 significant figures and $R = 4$ to the nearest whole number, calculate the maximum possible value of T giving your answer to 2 significant figures.

Answer..... (3)

16. The distance between two towns, A and B on a map measures 6 cm. If the map ratio is 1 : 50,000 :

a) Find the true distance between the towns giving your answer in kilometres.

Answer.....km (2)

The true distance between A and C is 400 km and C is also shown on the same map.

b) Find the distance between A and C on the map giving your answer in centimetres.

Answer.....cm (2)

17.

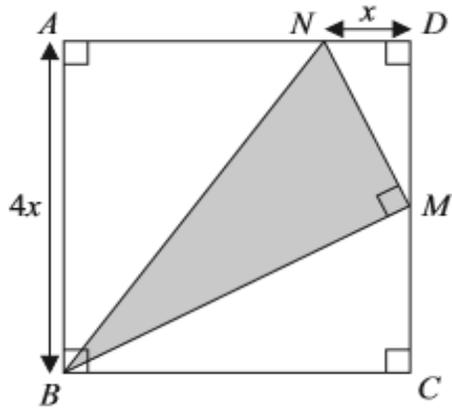


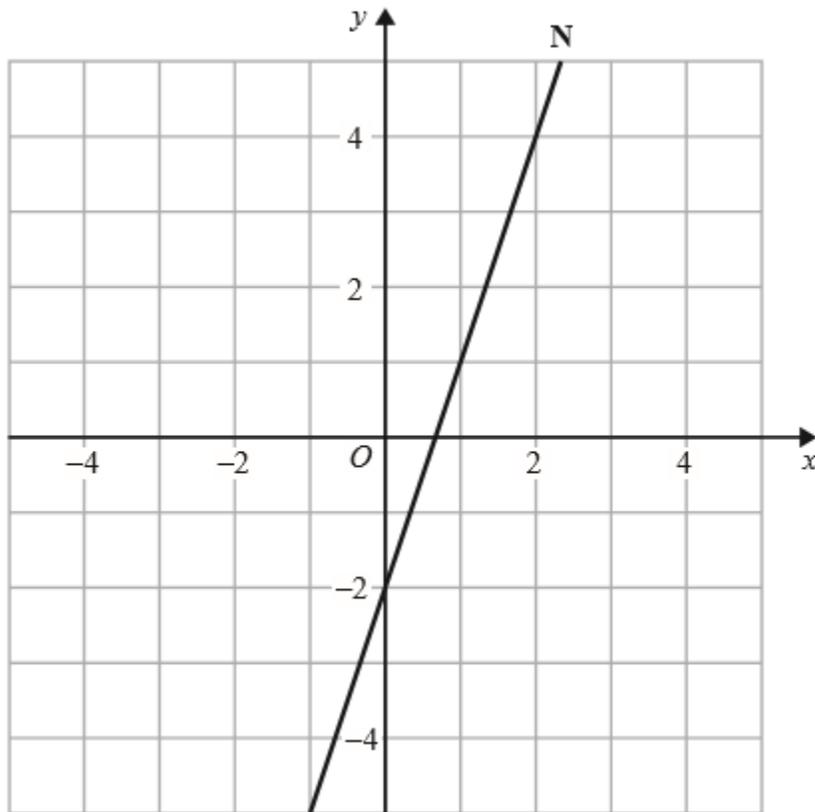
Diagram not drawn accurately

- ABCD* is a square with a side length of $4x$.
- M* is the midpoint of *DC*.
- N* is the point on *AD* where $ND = x$.
- BMN* is a right-angled triangle.

Find an expression, in terms of x , for the area of shaded triangle *BMN*. Give your expression in its simplest form.

Answer..... (5)

18 .The graph shows a straight line N.



a) Write down the equation of the straight line.

Answer..... (2)

b) On the graph above draw the graph of $y = 2 - x$.

(2)

19. The diagram shows a large tin of pet food in the shape of a cylinder.

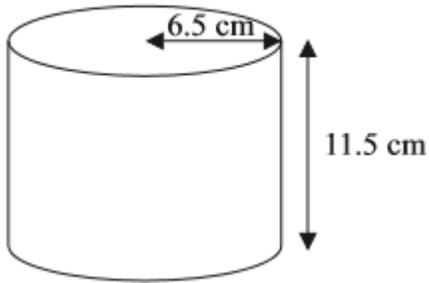


Diagram NOT accurately drawn

Using the calculator value of π find to 3 significant figures:

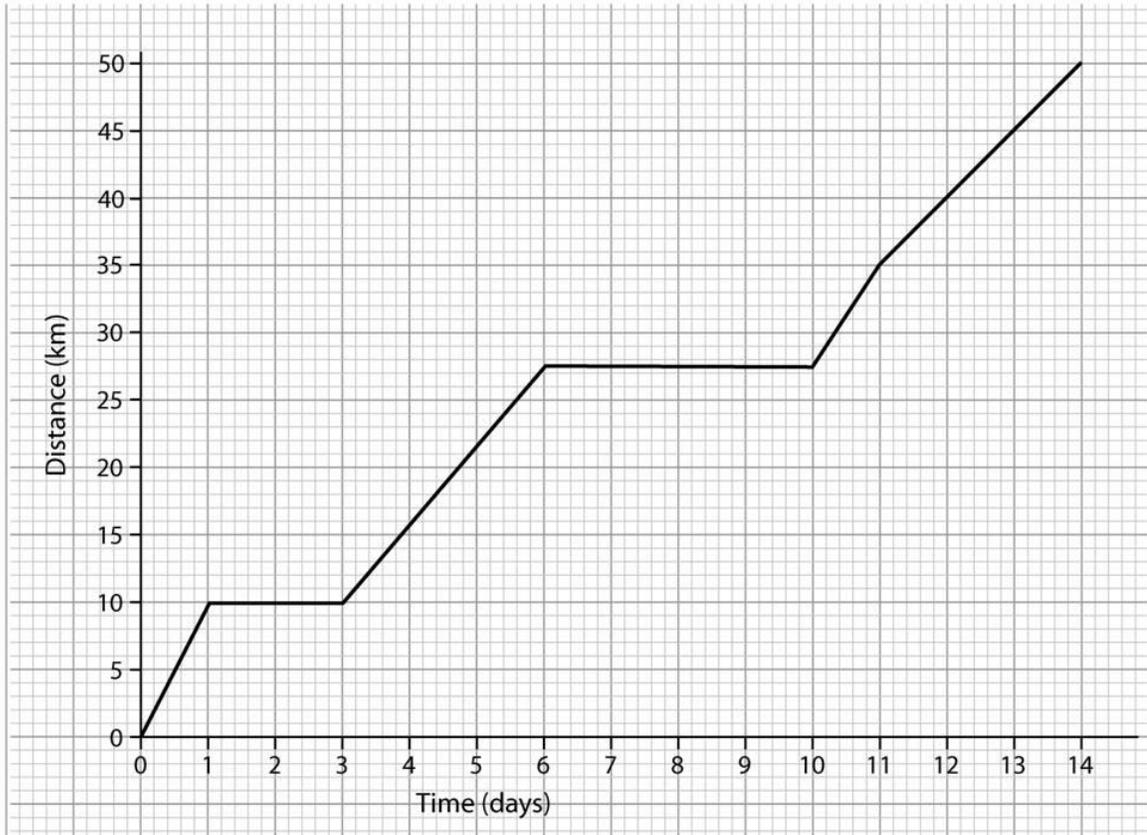
a) the volume of the tin.

Answer.....cm³ (3)

b) the curved surface area of the tin

Answer.....cm² (3)

20. The graph shows the distance covered by an elephant during a 14 day period.



a) What is the total distance covered by the elephant during this period?

Answer.....km (1)

b) How many days were required for the elephant to cover half the distance during this period.

Answer.....days (2)

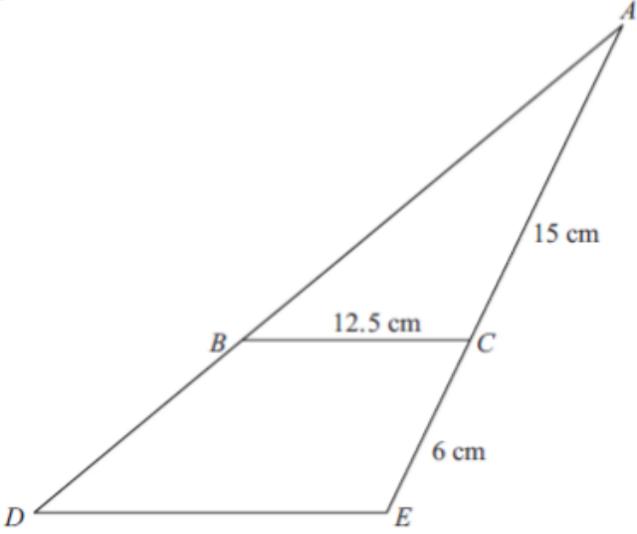
c) On which day did the elephant cover the most distance?

Answer..... (1)

d) Find the average speed of the elephant for the whole period including the stops.

Answer.....km/day (2)

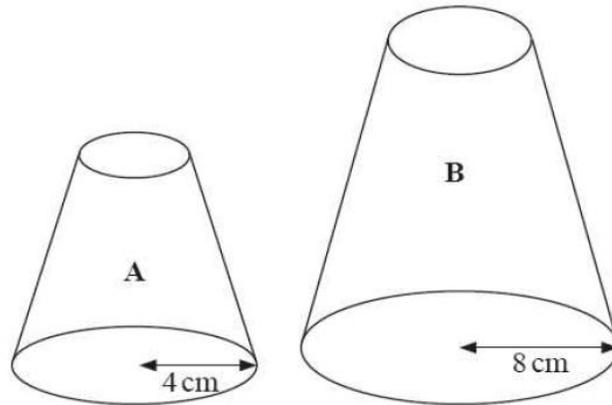
21. The triangles ABC and ADE are similar.



Find the length of DE.

Answer.....cm (4)

22.



The two solid shapes A and B are mathematically similar.

The base of shape A is a circle with radius 4 cm.

The base of shape B is a circle with radius 8 cm.

The surface area of shape A is 80 cm^2 .

a) Work out the surface area of shape B.

Answer..... (3)

The volume of shape B is 600 cm^3 .

b) Work out the volume of shape A.

Answer..... (3)

23. The table shows two pairs of x and y values.

x	4	10
y	8	

a) (i) Find an equation involving x and y if the two quantities are directly proportional.

Answer..... (2)

(ii) Find the value of y .

Answer..... (1)

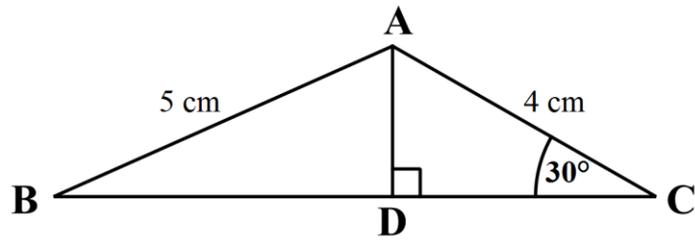
b) (i) Find an equation involving x and y if the two quantities are inversely proportional.

Answer..... (2)

(ii) Find the value of y .

Answer..... (1)

24.



In triangle ABC, $AB = 5$ cm, $AC = 4$ cm and angle $ACB = 30^\circ$.

a) Calculate the height AD of the triangle.

Answer.....cm (3)

b) Using your answer to a) find angle ABC correct to 3 significant figures.

Answer..... $^\circ$ (3)

c) Find the length of the base BC, giving your answer to 3 significant figures.

Answer.....cm (4)

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