YEAR 4 MID-PROGRAMME ENTRY EXAMINATIONS 2017

MATHEMATICS   **SATURDAY 3rd JUNE 2017**

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 24 questions.
There are 16 pages in this question paper.
Full marks may be obtained for answers to all questions.
The total mark for this paper is 120.
The marks for each question is shown in round brackets, e.g. (**2**)
Calculators 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. Given that

$$p^2 = \frac{x-y}{xy}$$

and $x = 8.5 \times 10^9$, $y = 4 \times 10^8$,

find the value of p^2. Give your answer in standard form correct to 2 significant figures. Show all steps in your working out.

Answer…………………….. (3)

2. Simplify the following expressions:

a) $\frac{2x-1}{2} - \frac{x-4}{3}$

Answer…………………….. (3)

b) $\frac{(4pq)^2}{pt^2} \div \frac{2p^2q^3}{p^2t^2}$

Answer…………………….. (3)

3. Toby invests £4500 at 4% compound interest per annum for 2 years in a savings account.

   a) Calculate how much Toby will have in his savings account after 2 years?

   Answer……………………..   **(2)**

   b) Jaspir invested £2400 at 7.5% per annum compound interest for n years in a savings account. At the end of the n years he had £3445.51 in the savings account.

   Work out the value of n.

   Answer……………………..   **(2)**

4. Ann and Bob shared £240 in the ratio 3 : 5 . Ann gave a half of her share to Colin. Bob gave a tenth of his share to Colin. What fraction of the £240 did Colin receive?

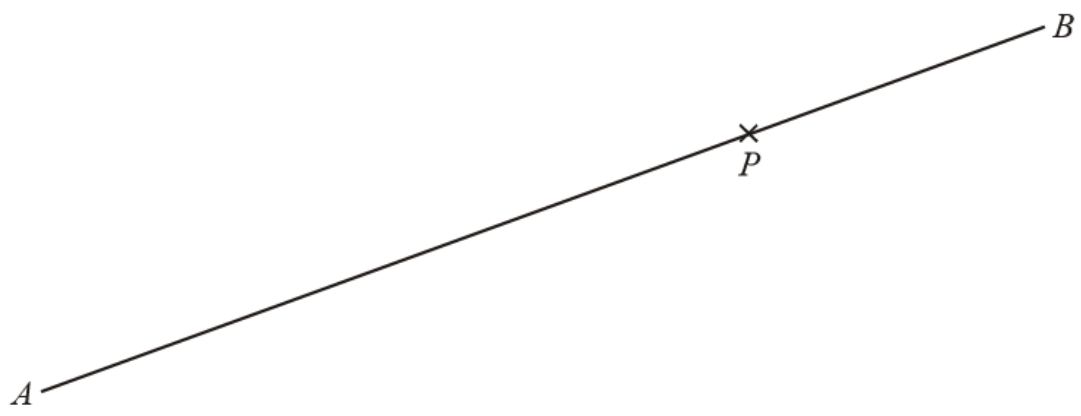   **Answer……………………..**   **(4)**

5. Factorise the following expressions:

   a) $2ut^2 + 6u^3t - 2u$

   Answer……………………..   **(2)**

   b) $20r^2 - 125s^2$

   Answer……………………..   **(3)**

TURN OVER

6. Use the ruler and a pair of compasses to construct the perpendicular to the line segment AB that passes through the point P. You must show all construction lines.

B

×
P

A

(2)

7. Solve the following equations. Give your answer(s) as fractions where necessary.
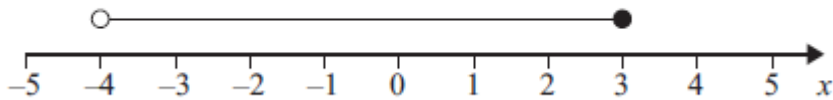
a) $6\sqrt{x} - 18 = 18$

Answer…………………….. **(2)**

b) $\dfrac{3x-2}{2} - \dfrac{4x-2}{3} = 3$

Answer…………………….. **(3)**

8. a) n is an integer $-1 \leq n < 3$. List the possible values of n.

Answer…………………….. (2)

b) Write down the inequality shown in the diagram.

Answer…………………….. (2)

c) Solve $2y < 3y - 3 < y + 6$

Answer…………………….. (3)

9. Jenny is organising a barbecue. There are 30 bread rolls in a pack. There are 16 sausages in another pack. She needs the same number of bread rolls as sausages.
    What is the smallest number of each pack she must buy?
    You must show all your working.

Answer…………………….. (4)

TURN OVER

10. The diagram shows a regular hexagon and a regular
    octagon. Calculate the size of the angle marked x.
    You must show all your working.
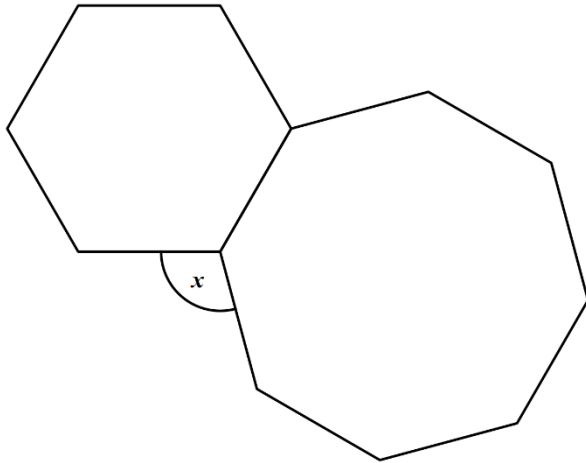

Diagram **NOT**
accurately drawn

Answer…………………….. **(4)**

11. Work out the coordinates of the point of intersection of the lines with equations
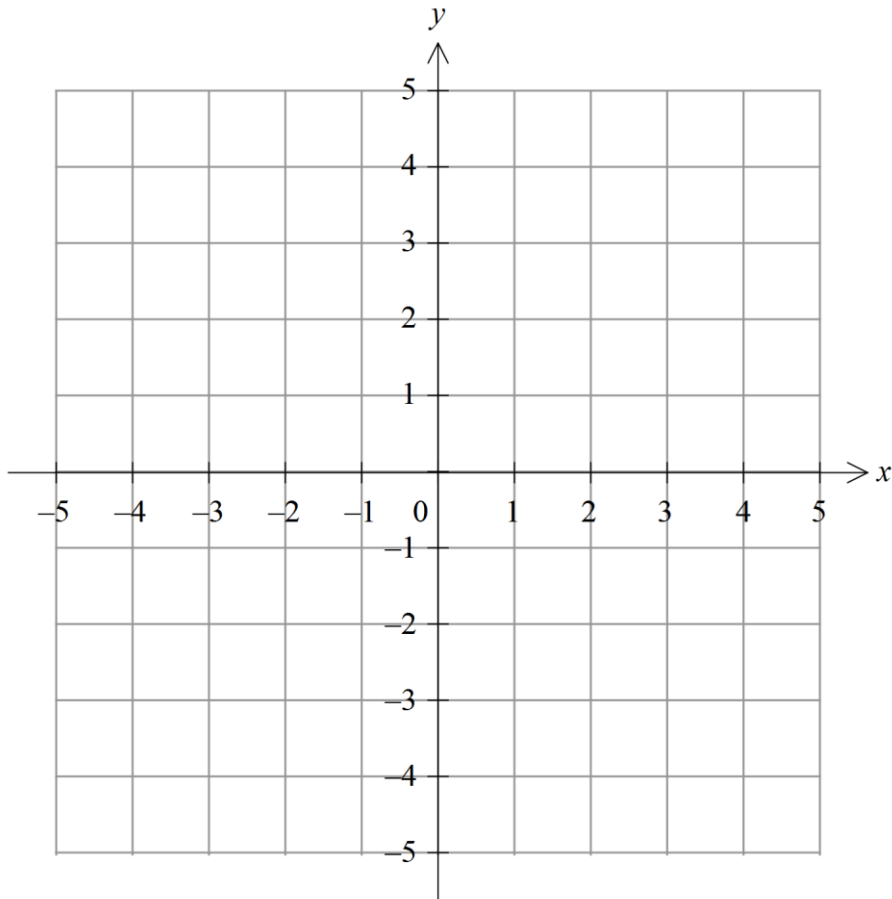 $6x - 5y = 5$ and $4x - 4y = 3$.

Answer…………………….. **(4)**

12. Make a the subject of the formula.

$$s = ut + \frac{1}{2}at^2$$

Answer…………………….. **(3)**

TURN OVER

13. On the grid, shade the region that satisfies all three inequalities.
Label your region **R**.

$$x \leq 3, \ y < 2x - 2 \ \text{and} \ y > -3$$

(4)

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14. Given that: $M = \{3,6,9\}, S = \{1,4,9,16\}, P = \{2,3,5,7,11\}, \mathcal{E} = \{1,2,3,4,5,6,7,9,11,16\}$
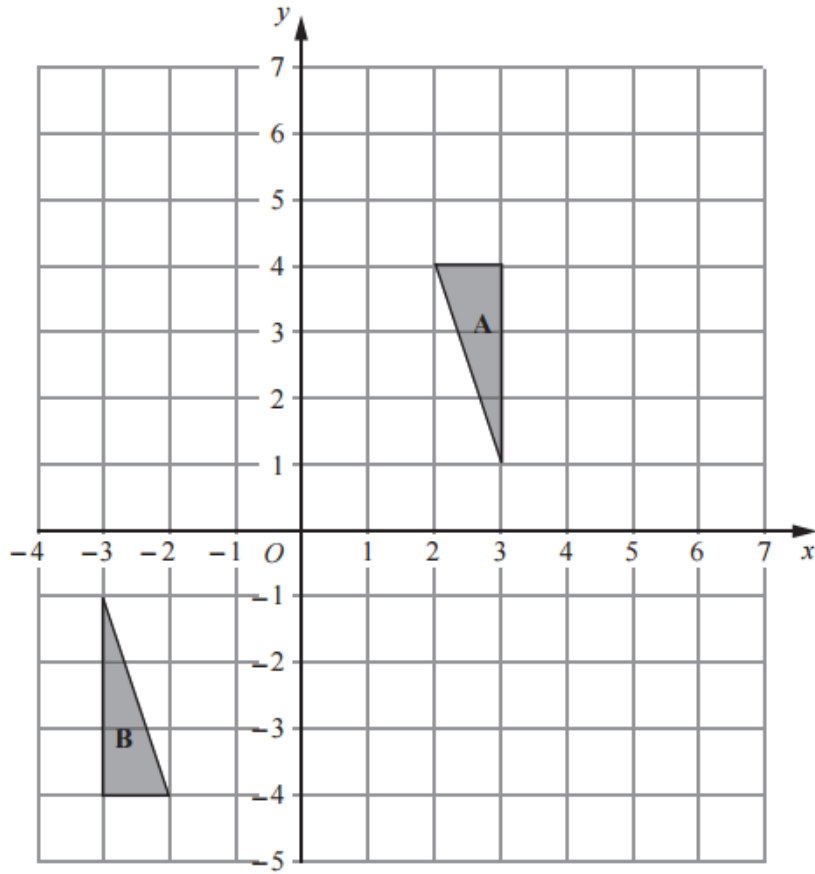
a) Draw a Venn diagram to show this information.

(3)

b) Write down the value of $n(M \cap P')$.

Answer…………………….. **(1)**

___

TURN OVER

15.

a)   Describe fully the single transformation which maps triangle A onto triangle B.

....

....

(3)

b) Translate triangle A 3 units to the right. Label the new triangle C.

(2)

c) Reflect triangle B in the *y*-axis . Label the new triangle D.

(2)

16. The table shows information about the heights of 40 bushes.

Height (h cm)	Frequency		
$170 \leq h < 175$	5		
$175 \leq h < 180$	18		
$180 \leq h < 185$	12		
$185 \leq h < 190$	4		
$190 \leq h < 195$	1		

a) Work out an estimate for the mean height of bushes.

Mean $\approx$…………………….. **(4)**

b) Complete the cumulative frequency table.

Height (h cm)	Cumulative Frequency
$170 \leq h < 175$	
$170 \leq h < 180$	
$170 \leq h < 185$	
$170 \leq h < 190$	
$170 \leq h < 195$	

(1)

TURN OVER

c) On the grid, draw a cumulative frequency graph for your table.

Cumulative frequency

40

30

20

10

0

170   175   180   185   190   195

Height (*h* cm)
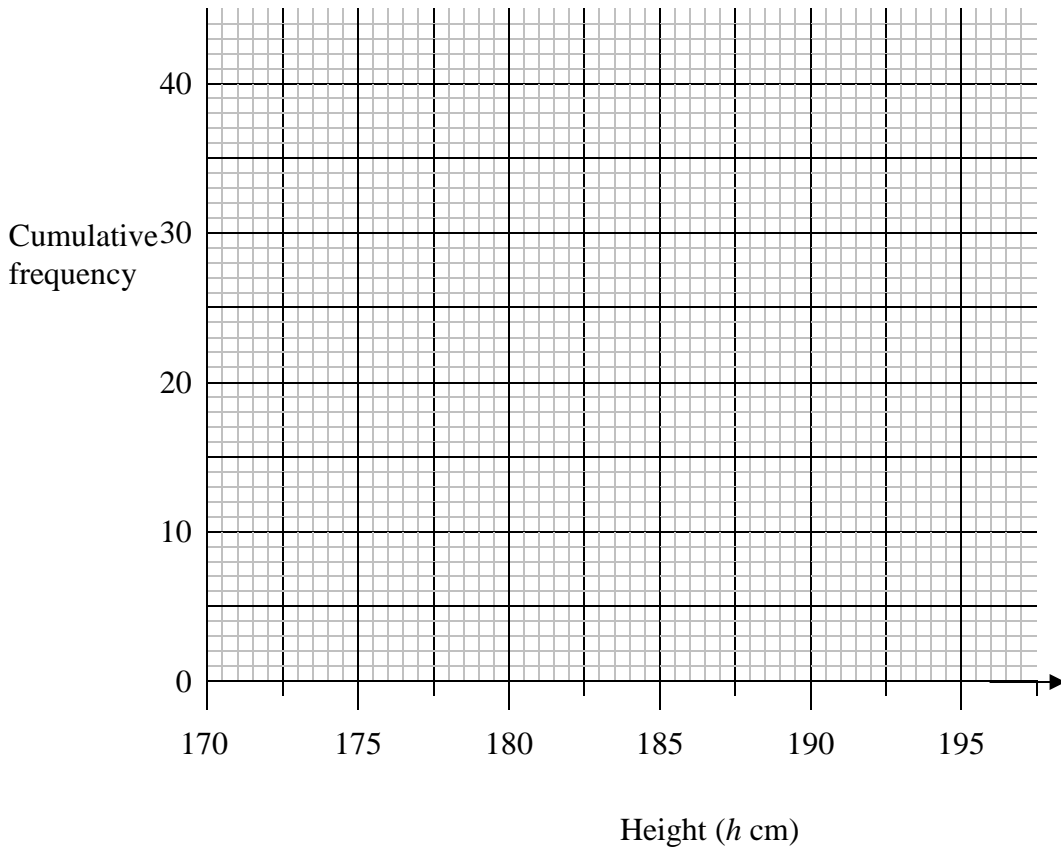
(2)

d) Use the graph to find an estimate for the median height and IQR of the bushes.

Median ……………………..

IQR ……………………..

(4)

e) Use your graph to find an estimate for the number of bushes which are more than 186m.

Answer……………………..   (2)

TURN OVER

17. The line *AB* is tangent, at *D*, to a circle centre *O*. The line *CE* passes through the centre of the circle and is parallel to the line *FG*. Angle *ODF* = 32°.
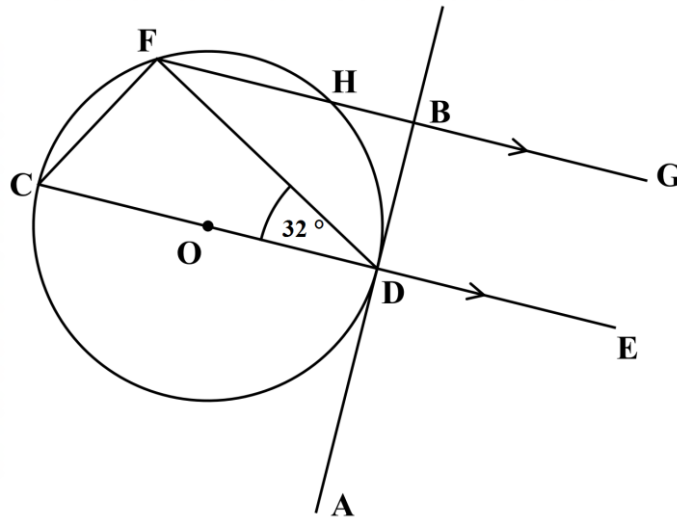
a) Find the size of angle *DFG*.
Give a reason for your answer.

Answer……………………..

Reason …………………………………………………………………………………………

(2)

b) Find the size of angle *DCF*.
Give a reason for your answer.

Answer……………………..

Reason …………………………………………………………………………………………

(2)

c) Find the size of angle *FDB*.
Give a reason for your answer.

Answer……………………..

Reason …………………………………………………………………………………………

(2)

TURN OVER

18. The average fuel consumption (c) of a car, in kilometres per litre, is given by the formula

$$c = \frac{d}{f}$$

where d is the distance travelled, in kilometres, and f is the fuel used, in litres.

$d = 163$ correct to 3 significant figures.
$f = 45.3$ correct to 3 significant figures.

Work out the upper value of c. Give your answer to 3 significant figures.

Answer…………………….. **(3)**

_____

19.   Elizabeth has a bunch of red, yellow and white roses. She chooses a rose at random. The probability that she chooses a yellow rose is 0.1. The probability that she chooses a white rose is 0.2.

a) What is the probability that Elizabeth chooses a rose that is either yellow or white?

Answer…………………….. **(1)**

b) What is the probability that Elizabeth chooses a red rose?

Answer…………………….. **(2)**

c) There were ten roses in the bunch originally. How many roses were red?

Answer…………………….. **(1)**

20. A toy car is placed on the floor of a sports hall. It moves in a straight line starting from rest. It travels with constant acceleration for 4 seconds reaching a speed of 5 m/s. It then slows down until it comes to a stop for 2 seconds.

a) Draw a speed-time graph for the toy car.

speed (m/s)
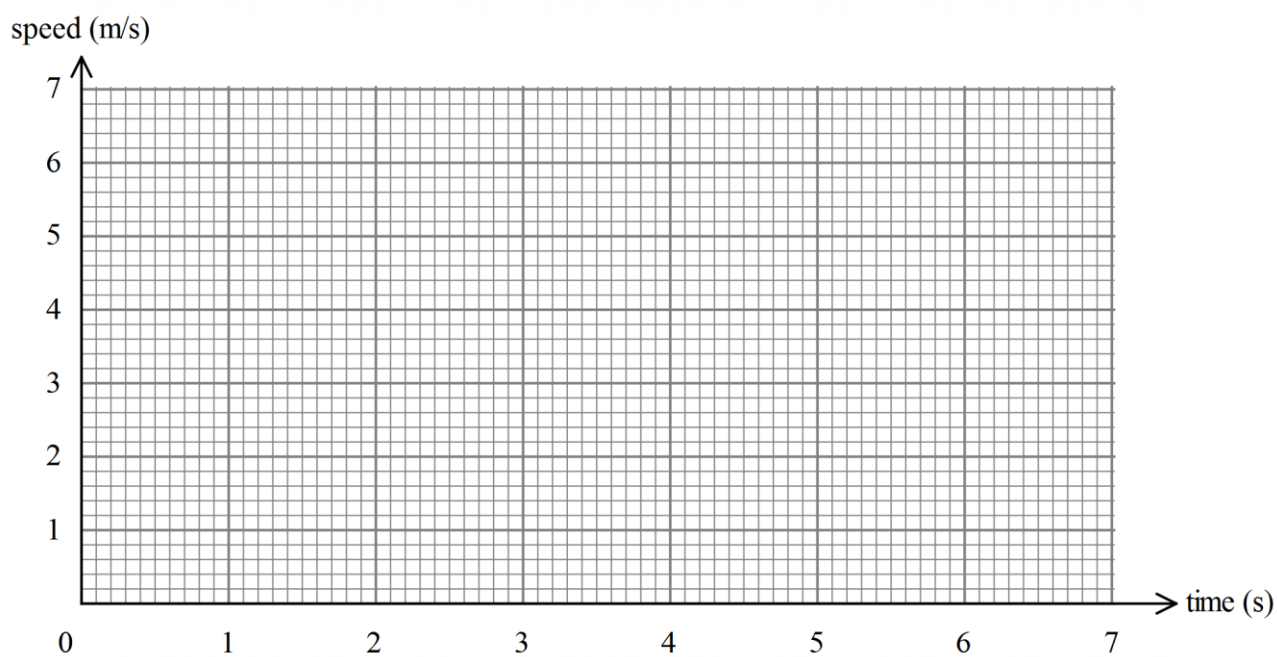
(3)

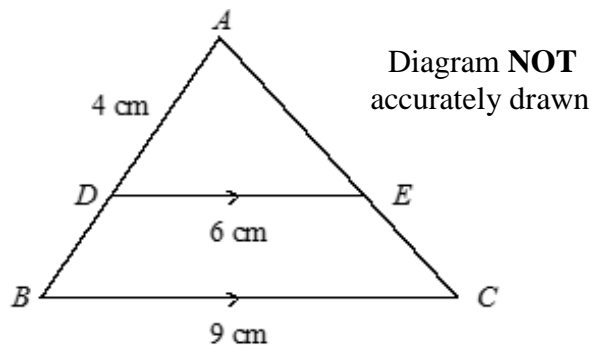b) Work out the total distance travelled by the toy car.

Answer……………………..   **(2)**

c) The average speed for the whole journey in *km/h*.

Answer……………………..   **(3)**

13   *TURN OVER*

21. Triangles *ADE* and *ABC* are similar.
    DE is parallel to *BC*.

    AD = 4 cm, *DE* = 6 cm and *BC* = 9 cm.
    Calculate the length of *BD*.

Diagram **NOT**
accurately drawn

Answer…………………….. **(3)**

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22. Work out the bearing of B from A.
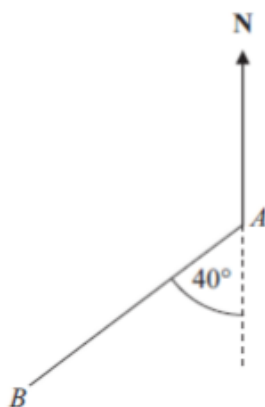
Diagram **NOT**
accurately drawn

Answer…………………….. **(2)**

TURN OVER

23. The diagram shows a quadrilateral *ACDE.*
   $AC = 8$ cm , $DE = 19$ cm , Angle ABC = Angle CBD = Angle $BDE = 90°$.
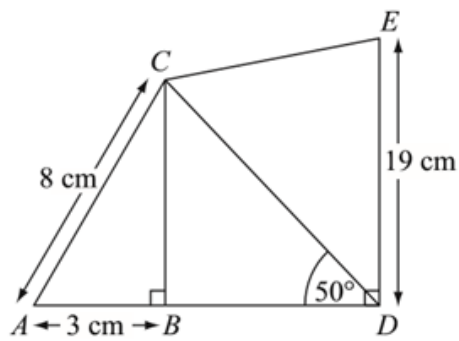

Diagram **NOT** accurately drawn

a)   Calculate the length of CD. Give your answer correct to 3 significant figures.

Answer……………………..

(4)

b)   Calculate the area of trapezium *BCED*. Give your answer correct to 3 significant figures.

Answer……………………..

(4)

24. The plan below shows a large rectangle of length $(2x+6)$ m and width x m.
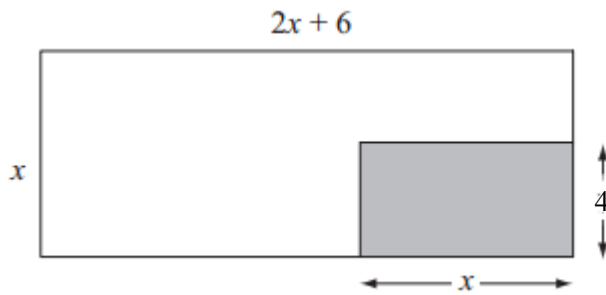A smaller rectangle of length x m and width 4 m is cut out and removed.

2x + 6

x

4

x

Diagram **NOT** accurately drawn

The area of the shape that is left is 180 m^2

a) Show that $x^2 + x - 90 = 0$

(3)

b) Calculate the perimeter of the smaller rectangle.

Answer…………………..

(4)

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TOTAL FOR PAPER=120 MARKS

END

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TURN OVER