THE ENGLISH SCHOOL

MID PROGRAM ENTRY INTO YEAR 4

MATHEMATICS **SATURDAY 5th June 2021**

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 26 questions.
There are 18 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.

Total Marks:
……%

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1. On a farm there are chickens, ducks and pigs.
The ratio of the number of chickens to the number of ducks is 7:2
The ratio of the number of ducks to the number of pigs is 5: 9
There are 36 pigs on the farm. Work out the number of chickens on the farm.

…..... chickens

(3)

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2. (a) Given that $4500 = 2^a \times 3^2 \times 5^b$
work out the values of a and b.

a = ... b = ...

(3)

(b) Hence, write down the lowest value by which 4500 needs to be multiplied to make a **cube** number.

……

(2)

Leave blank

3. The table shows the populations of five countries.

Country	Population
China	1.4×10^9
Germany	8.2×10^7
Sweden	9.9×10^6
Fiji	9.1×10^5
Malta	4.3×10^5

(a) Work out the difference between the population of China and the population of Germany. Give your answer in standard form.

.....

(2)

Given that

$$\text{population of Fiji} = \frac{1}{k} \times \text{population of Sweden}$$

(b) work out the value of k. Give your answer correct to the nearest whole number.

.....

(2)

4. The test scores for 10 boys in a class are

7 8 5 8 7 9 4 5 3 9

The mean test score for the 5 girls in the class is 8
Calculate the mean for this class.

.....

(3)

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5. Chengbo sold a house for 180 000 yuan.
The amount for which he sold the house is 24% more than the amount he paid for the house.

(a) Work out how much Chengbo paid for the house.
Give your answer correct to 3 significant figures.

..... yuan
(2)

Zhi bought a house on 1st January 2017.
When she bought the house, its value was 120 000 yuan.
The value of the house increased by 1.8% per year.

(b) Work out the value of Zhi's house on 1st January 2020
Give your answer correct to 3 significant figures.

..... yuan
(3)

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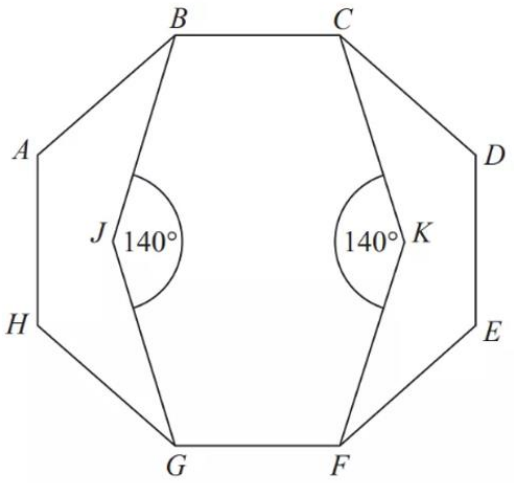
6. *ABCDEFGH* is a regular octagon.
BCKFGJ is a hexagon.
JK is a line of symmetry of the hexagon.
Angle *BJG* = angle *CKF* =140°

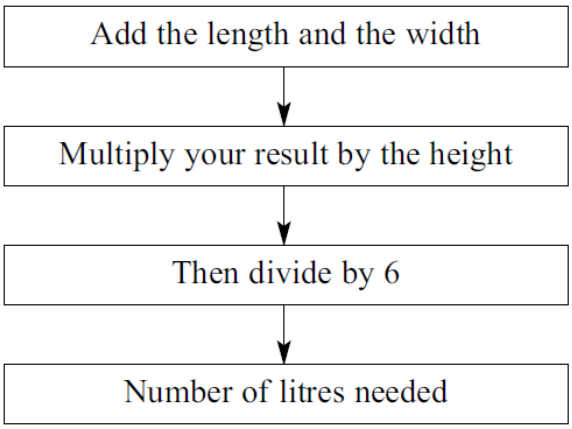
Work out the size of angle *KFE*.
You must show all your working.



…..... °
(6)

Leave blank

7. This rule can be used to work out the number of litres of paint needed to cover the walls of a room, using the length, width and height, in metres, of the room.
A room has length L metres, width W metres and height H metres.
N litres of paint are needed to cover the walls of the room.



Find a formula for N in terms of L, W and H.

.....
(2)

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8. (a) Fully factorise the following expressions, giving your answer in its simplest form:

i. $5b^3 - 80b$

.....
(3)

ii. $25a^4c^7d + 45a^9c^3h$

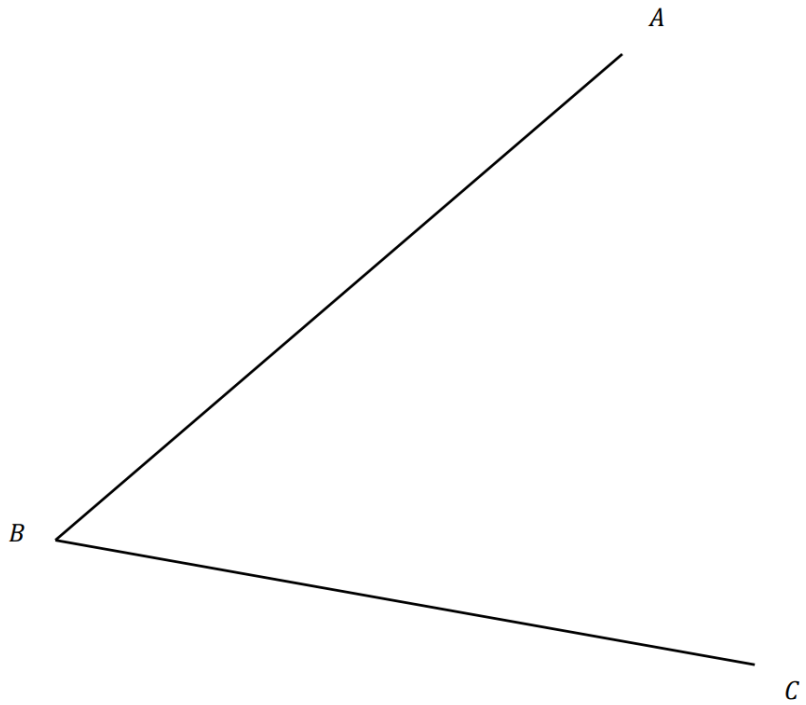
.....
(2)

(b) Expand and simplify $(2x+1)(x+2)(x-2)$

.....
(3)

Leave blank

9. Use ruler and compass to bisect the angle $\angle ABC$, shown below.



(2)

10. (a) $-4 \leq 2y < 6$

y is an integer.

Write down all the possible values of y.

.....

(3)

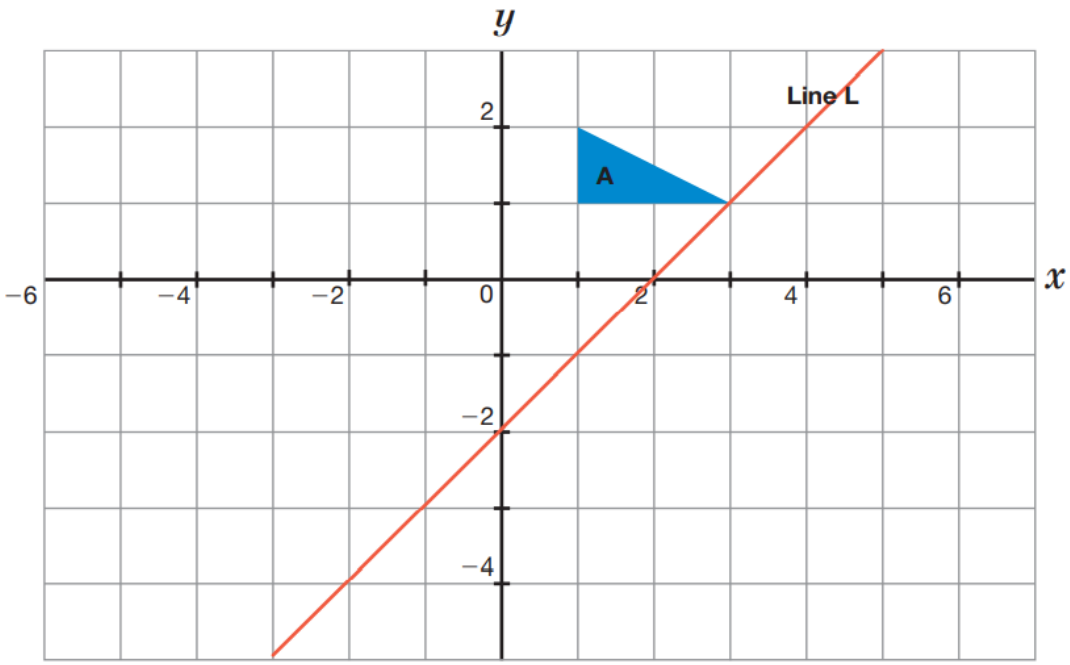
(b) Solve the inequality $2x + 31 \geq 7x - 3$

.....

(2)

Leave blank

11.



Triangle **B** is the image of triangle **A** after it has been reflected in the line **L**.
Triangle **C** is the image of triangle **A** after it has been translated 3 units left and 4 units down.
Triangle **D** is the image of triangle **C** after it has gone through an enlargement of scale factor $\frac{1}{2}$ with centre O.

Describe fully the **single** transformation that maps triangle **D** onto triangle **A**.

.....

.....

(6)

12. A 36 m long rod is cut into two pieces so that one piece is 3 m longer than half the other piece.
Write down an equation and solve it to find the length of the shortest piece.

…..... m

(4)

Leave blank

13. Adam needs to know the weight of his filled suitcase. He weighs himself on the scales. The reading is 76kg to the nearest kg. He then weighs himself holding the filled suitcase. The reading is 104kg to the nearest kg. Find the minimum possible weight of the filled suitcase.

…..... kg

(3)

14. On 1st January 2017, Samantha and Dyfan invested money into different savings accounts. They did not make any further payments into their accounts or withdraw any money from their accounts.

(a) Samantha invested £2000 in a savings account that paid interest at a rate of 0.95% every 3 months.
Show that Samantha would have £2038.18 in the account after 6 months.

£ …..

(2)

(b) Dyfan invested £3000 in a savings account that paid interest at a rate of 1.02% every 3 months. Interest is paid on the last day of each 3-month period.
Calculate the date when Dyfan will first have over £3600 in his account.

…..

(3)

Leave blank

15. Solve the following simultaneous equations using an algebraic (not graphical) method.

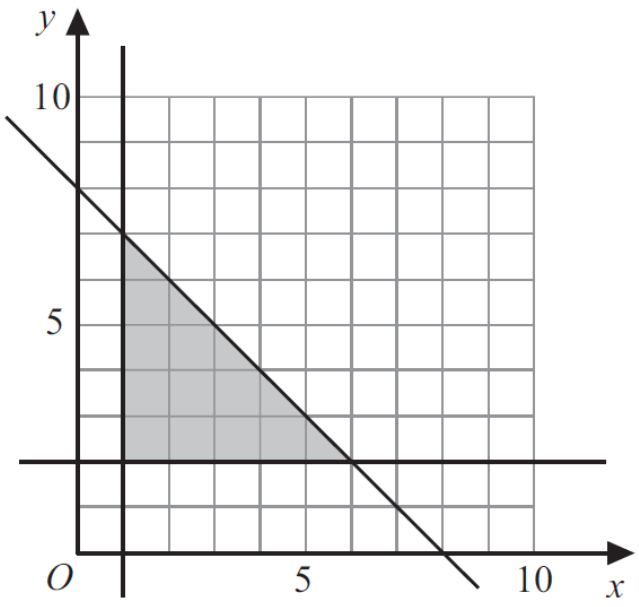
$$5x + 3y = 11$$
$$2x - 7y = 29$$

x = ...

y = ...

(4)

16. Write down three inequalities that define the shaded region.



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(4)

Leave blank

17. Solve the following equations:

(a) $\frac{x+3}{2} = \frac{5x}{6}$

.....

(2)

(b) $5-2(x-3) = 4-(x-2)$

.....

(3)

(c) $\frac{\sqrt{x-1}}{2} + 3 = 5$

.....

(3)

(d) $2(3-x)^2 + 1 = 129$

.....

(3)

Leave blank

18. P is (1, -2) and Q is (3, 6).

(a) Find the length of PQ, giving your answer to 3 significant figures.

…….....

(2)

(b) Find the mid-point of PQ.

…….....

(1)

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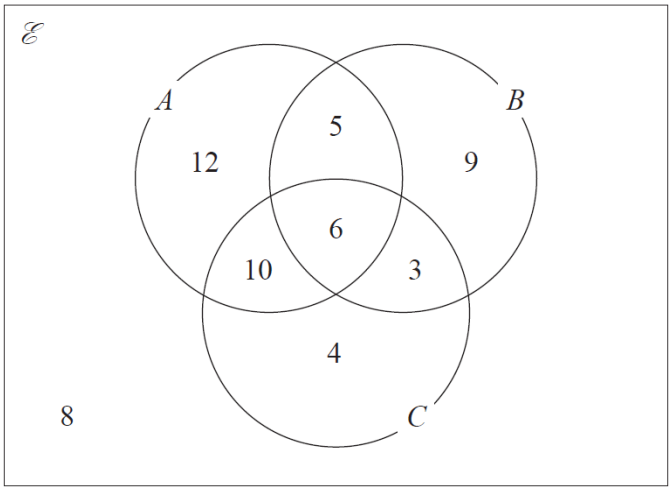
19. The Venn diagram shows a universal set, $\mathscr{E}$ and sets A, B and C.



(a) List

(i) $(A \cup B)$

.....

(2)

(ii) B'

.....

(1)

(b) Find $n[(A \cap B) \cup C]$

.....

(2)

Leave blank

20. *ABCD* is a cyclic quadrilateral in a circle with centre *O*.
$A\hat{B}C = 126°$.

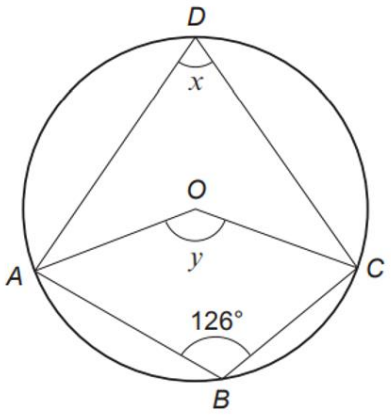


Diagram not drawn to scale

Write down the size of each of the angles *x* and *y*.
You must give a reason for each of your answers.

x = ... °
(1)

Reason:

……..

……
(1)

y = ... °
(1)

Reason:

……..

……
(1)

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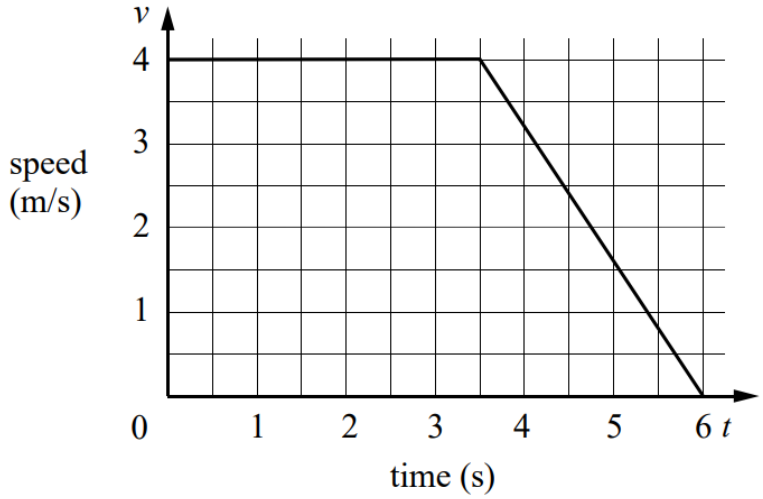
21. Simplify as far as possible $\frac{9x^2y^5}{2x^3y} \div \frac{(3y)^2}{5x^{1.5}}$

.....
(4)

Leave blank

22. Ameni is cycling at 4 metres per second. After 3.5 seconds she starts to decelerate and after a further 2.5 seconds she stops. The diagram shows the speed-time graph for Ameni.



Calculate

(a) the constant deceleration

..... m/s^2

(2)

(b) Ameni's average speed for the whole journey.

..... m/s

(3)

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23. Iron has a density of 7.8 g/cm^3

Calculate the mass of a 3 cm^3 lump of iron.

..... g

(2)

Leave blank

24. The frequency table gives information about the distance, in kilometres, that each of 80 workers travel from home to work at Office *A*.

Distance travelled (d km)	**Frequency**
$0 < d \leq 5$	17
$5 < d \leq 10$	15
$10 < d \leq 15$	25
$15 < d \leq 20$	13
$20 < d \leq 25$	6
$25 < d \leq 30$	4

(a) Which class interval contains the median distance?

.....

(1)

(b) Find an estimate of the mean distance.

..... km

(3)

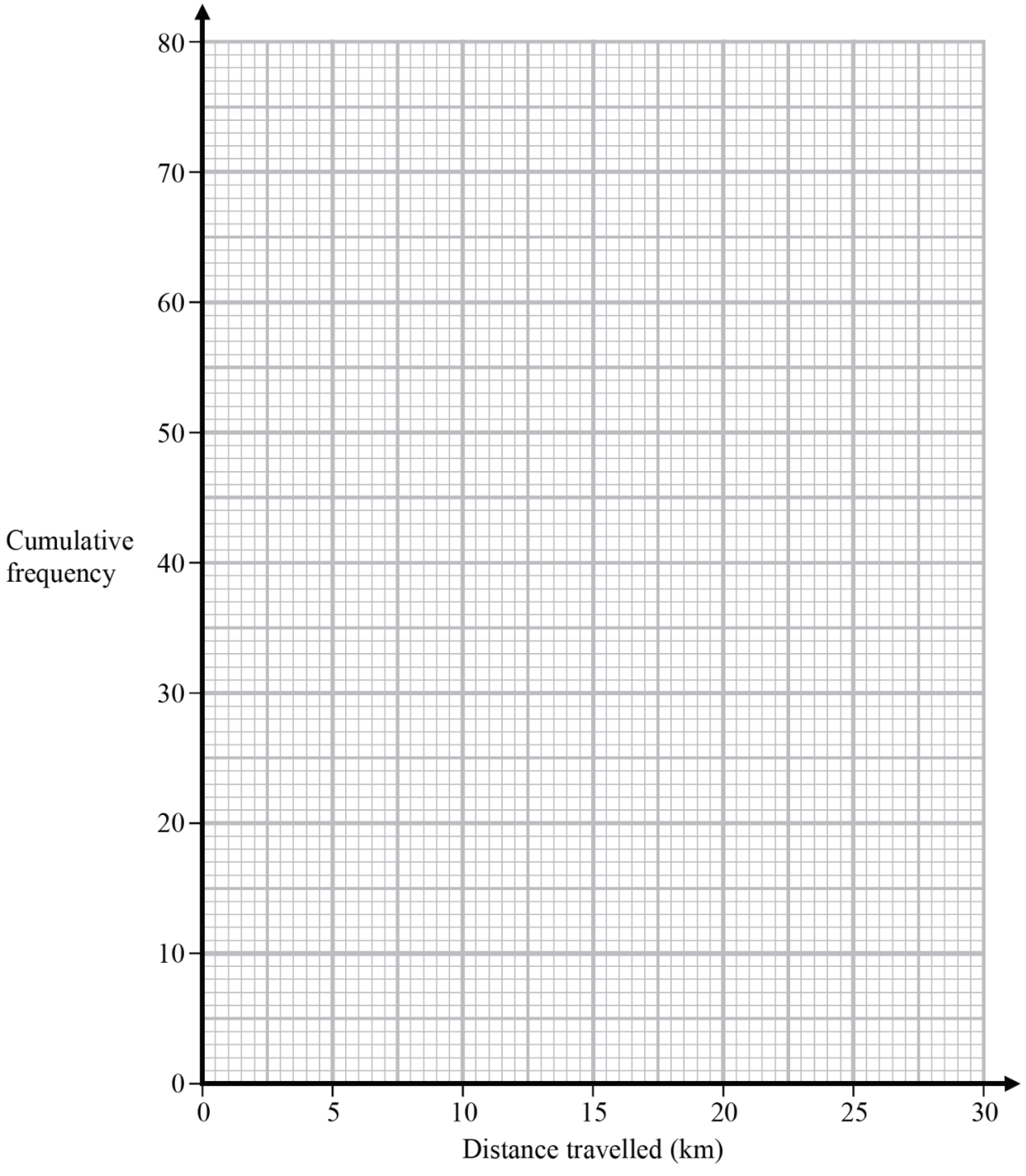
Leave blank

(c) Complete the cumulative frequency table below.

Distance travelled (d km)	Cumulative Frequency
$0 < d \leq 5$	
$0 < d \leq 10$	
$0 < d \leq 15$	
$0 < d \leq 20$	
$0 < d \leq 25$	
$0 < d \leq 30$	

(1)

(d) On the grid below, draw a cumulative frequency graph for the information in the table.



(1)

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(e) Use your graph to find an estimate for the interquartile range of the distances travelled.

..... km
(3)

25. Linos walks to the summit of Snowdon, passing the Lake called Llyn Glaslyn.
Her height above sea level increases by 485 m from Llyn Glaslyn to the summit.

From the summit, she sees two small boats on the Llyn Glasslyn.
Both boats are in the same direction from the summit.
The angles of depression of the two boats are 41° and 27°, as shown in the diagram.

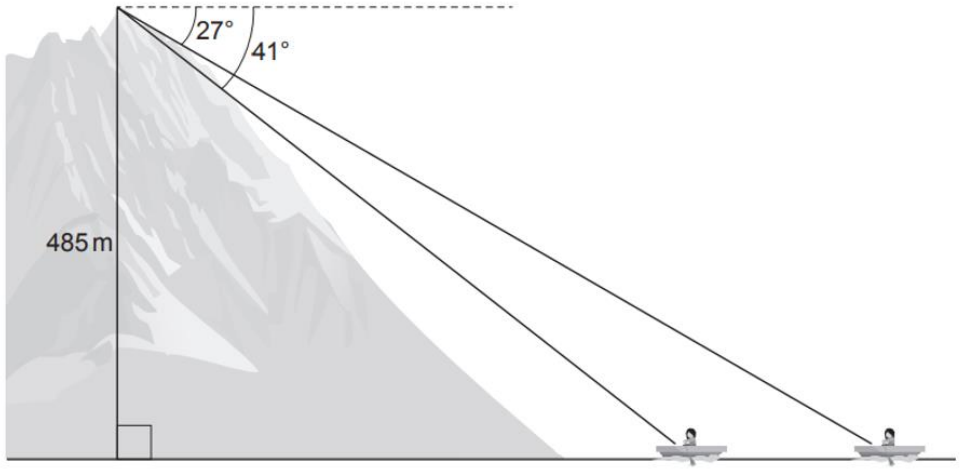

Diagram not drawn to scale

Calculate the distance between the boats. Give your answer to the nearest metre.

..... m
(5)

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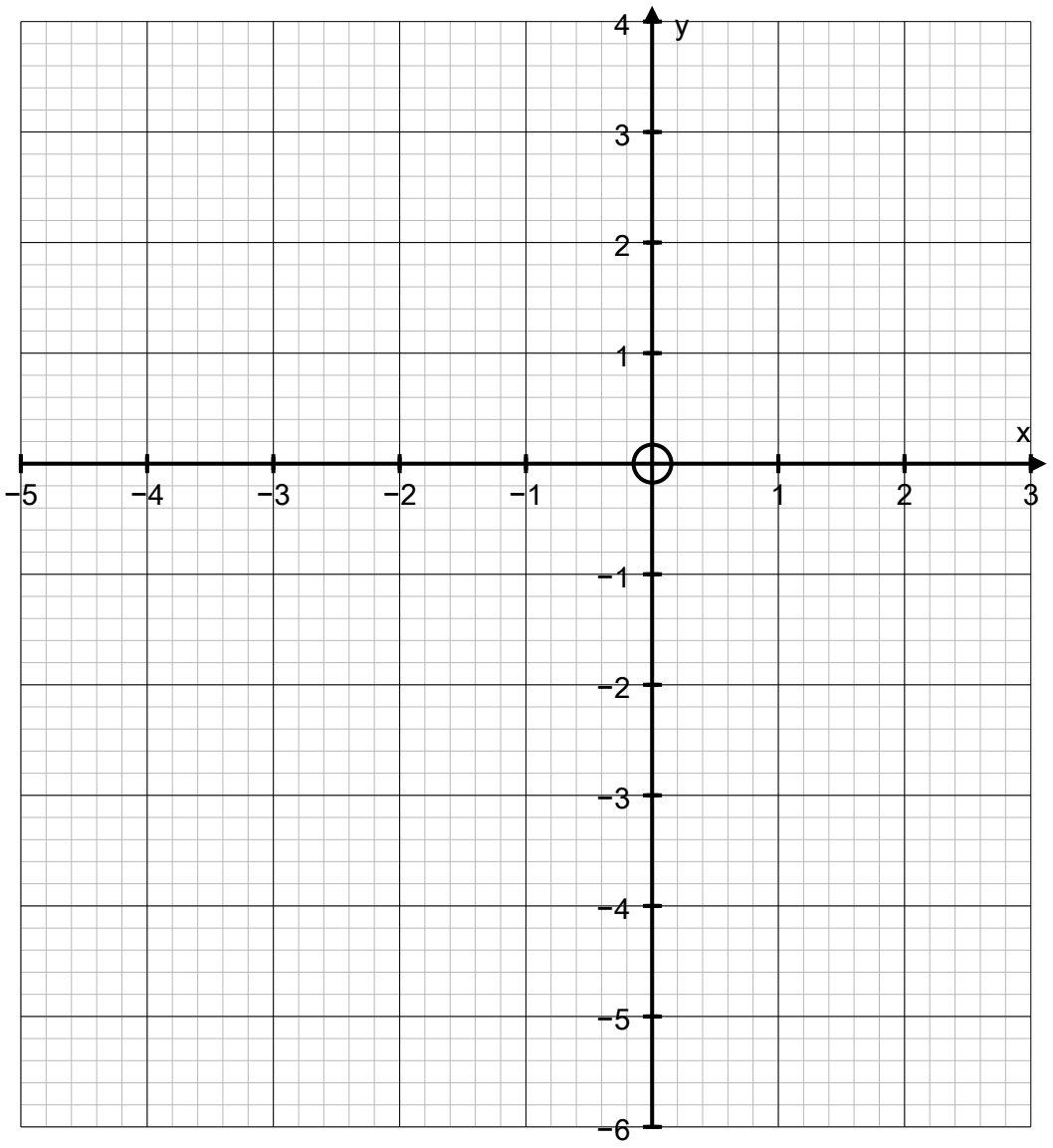
26. (a) Complete the table of values for $y = 2 - 2x - x^2$

x	-4	-3	-2	-1	0	1	2
y	-6	-1	2		2	-1	

(1)

(b) Draw the graph of $y = 2 - 2x - x^2$ on the grid below.

(1)



(c) Use your graph to solve the equation $2 - 2x - x^2 = 0$

…….....

(1)

TOTAL FOR PAPER IS 120 MARKS

END OF PAPER

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