Write your name here

Surname	Other names

Pearson Edexcel
International GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Mathematics A

Level 1/2
Paper 2HR

Higher Tier

Thursday 7 June 2018 – Morning
Time: 2 hours

Paper Reference
4MA1/2HR

You must have:
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
  – there may be more space than you need.
- **Calculators may be used.**
- You must **NOT** write anything on the formulae page.
  Anything you write on the formulae page will gain NO credit.

Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets
  – use this as a guide as to how much time to spend on each question.

Advice

- Read each question carefully before you start to answer it.
- Check your answers if you have time at the end.

Turn over ▶

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P 5 9 0 1 4 A 0 1 2 4

Pearson

International GCSE Mathematics

Formulae sheet – Higher Tier

Arithmetic series

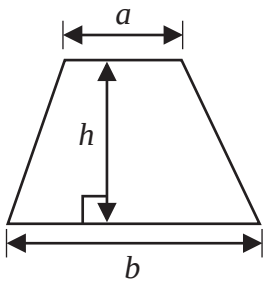
Sum to n terms, $S_n = \frac{n}{2}[2a + (n-1)d]$

The quadratic equation

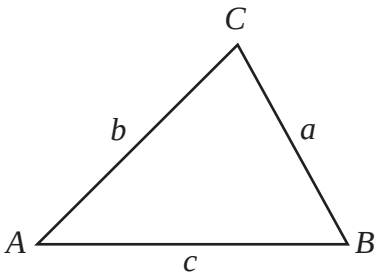
The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$ are given by:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Area of trapezium $= \frac{1}{2}(a+b)h$



Trigonometry



In any triangle *ABC*

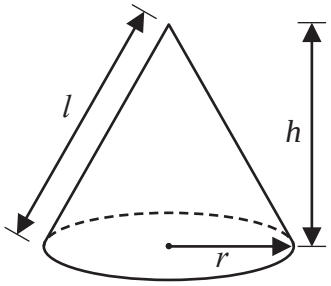
Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc\cos A$

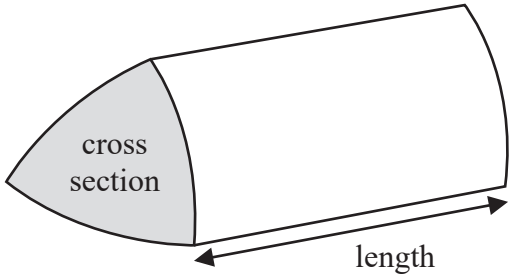
Area of triangle $= \frac{1}{2}ab\sin C$

Volume of cone $= \frac{1}{3}\pi r^2 h$

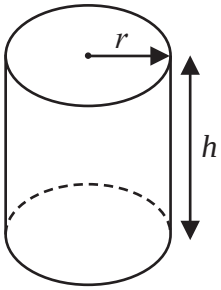
Curved surface area of cone $= \pi r l$



Volume of prism
= area of cross section × length

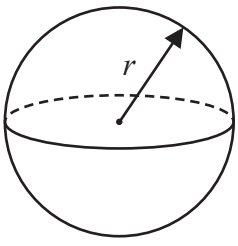


Volume of cylinder $= \pi r^2 h$
Curved surface area of cylinder $= 2\pi r h$



Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$



Answer ALL TWENTY FOUR questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 x, 10 and y are three integers written in order of size, starting with the smallest integer.

The mean of x, 10 and y is 11
The range of x, 10 and y is 7

Work out the value of x and the value of y.

$x =$ .....

$y =$ .....

(Total for Question 1 is 2 marks)

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

2 A box is put on a table.

The face of the box in contact with the table is in the shape of a rectangle, 2 m by 1.25 m.
The pressure on the table due to the box is 42 newtons/m^2

Work out the force exerted by the box on the table.

..... newtons

(Total for Question 2 is 3 marks)

3 Behnaz makes candles.

She has 6.3 kilograms of wax and uses it all to make candles.
Each candle Behnaz makes uses 210 grams of wax.

Behnaz sells $\frac{2}{5}$ of the candles for \$13 each.

She then reduces this price by 20% and sells the rest of the candles.

Work out the total amount of money Behnaz gets by selling all the candles she made.

\$.....

(Total for Question 3 is 4 marks)

4 (a) Expand and simplify $3(c - 7) + 2(3c + 4)$

.....

(2)

(b) Expand and simplify $(x + 7)(x - 2)$

.....

(2)

(c) Factorise fully $28y^2 - 21y$

.....

(2)

(d) Solve $\frac{7x - 2}{4} = 3x + 1$

Show clear algebraic working.

$x =$.....

(3)

(Total for Question 4 is 9 marks)

5 Abelie flew by plane from Dubai to Rome.

The flight time was 6 hours 42 minutes.
The average speed of the plane was 650 kilometres per hour.

Work out the distance the plane flew.

.....kilometres

(Total for Question 5 is 3 marks)

6 Hiran invests 20 000 rupees in an account for 3 years at 1.5% per year compound interest.

Work out the total amount of money in the account at the end of 3 years.
Give your answer to the nearest rupee.

.....rupees

(Total for Question 6 is 3 marks)

7 (a) Simplify fully $\dfrac{20x^2y^6}{4x^2y^2}$

.....

(2)

(b) Make e the subject of the formula $h = 3e + f$

.....

(2)

(Total for Question 7 is 4 marks)

8 From point A, Stanley walks 200 m due east to point B.
From B, he then walks 160 m due south to point C.

Work out the length of AC.
Give your answer correct to 3 significant figures.

.....metres

(Total for Question 8 is 3 marks)

9

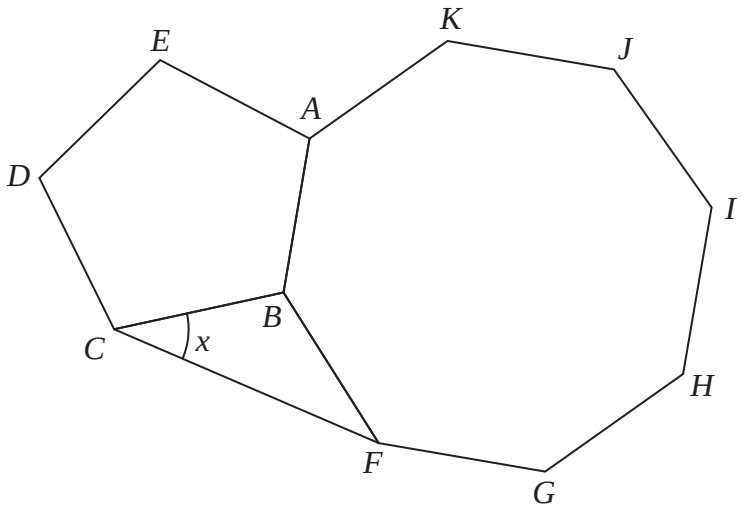


Diagram **NOT** accurately drawn

The diagram shows a regular pentagon, *ABCDE*, a regular octagon, *ABFGHIJK*, and an isosceles triangle, *BCF*.

Work out the size of angle *x*.

.....°

(Total for Question 9 is 4 marks)

10 *ABCD* is a trapezium.

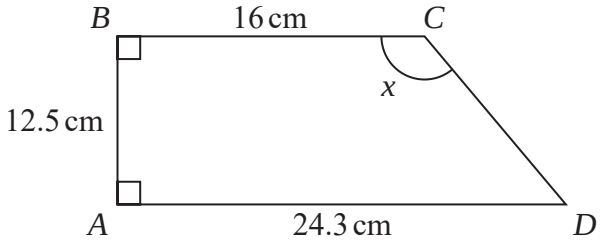


Diagram **NOT** accurately drawn

Work out the size of angle *x*.
Give your answer correct to 1 decimal place.

.....°

(Total for Question 10 is 4 marks)

11 The table shows information about the amount of money spent on holiday by each of 120 families.

Money spent (£m)	Frequency
$0 < m \leqslant 100$	10
$100 < m \leqslant 200$	36
$200 < m \leqslant 300$	34
$300 < m \leqslant 400$	20
$400 < m \leqslant 500$	15
$500 < m \leqslant 600$	5

(a) Write down the modal class.

.....

(1)

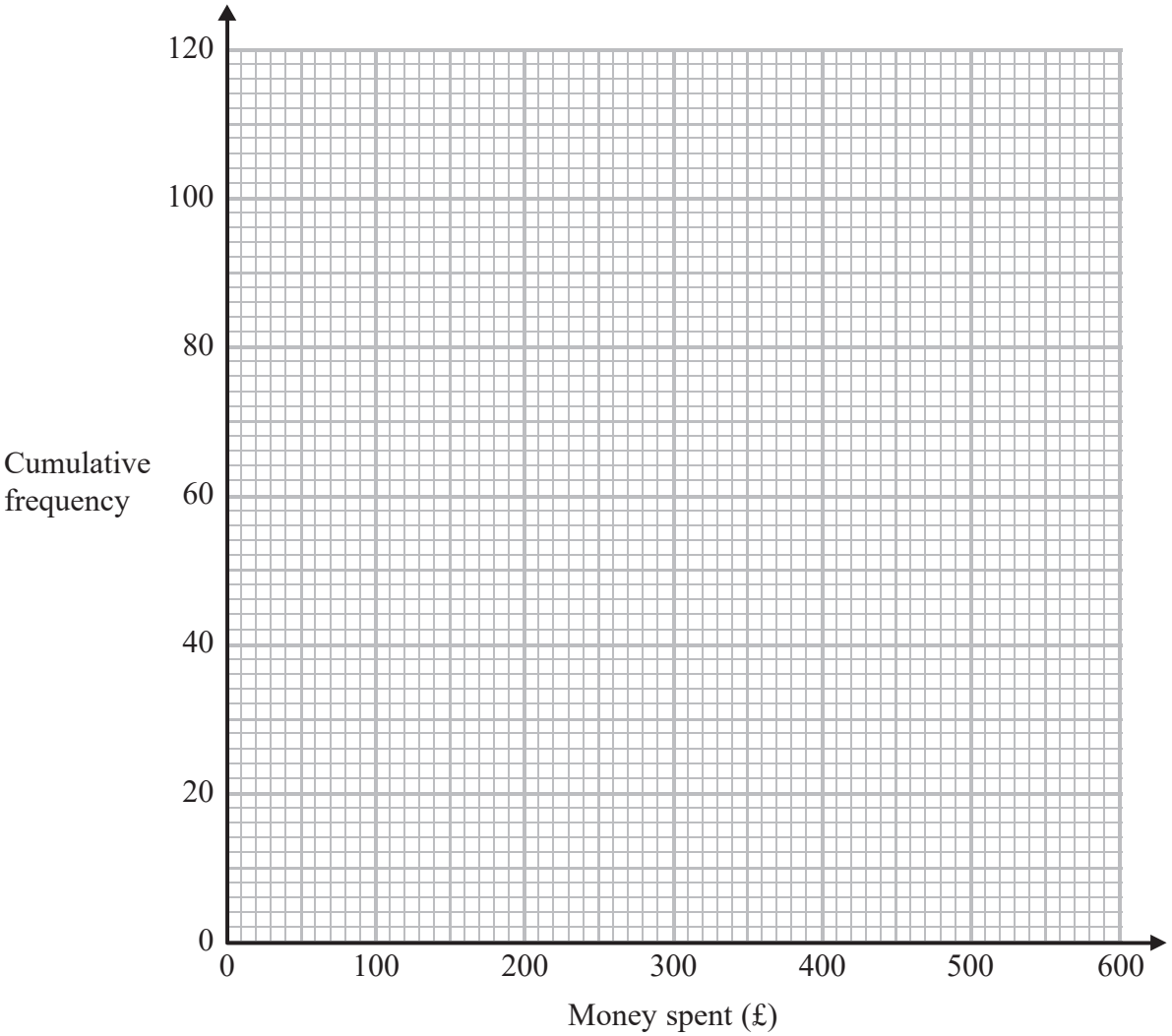
(b) Complete the cumulative frequency table for the information in the table.

Money spent (£m)	Cumulative frequency
$0 < m \leqslant 100$	
$0 < m \leqslant 200$	
$0 < m \leqslant 300$	
$0 < m \leqslant 400$	
$0 < m \leqslant 500$	
$0 < m \leqslant 600$	

(1)

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

(2)



(d) Use your graph to find an estimate for the interquartile range.

£.....

(2)

(e) Use your graph to find an estimate for the number of families that spent more than £450 on holiday.

.....

(2)

(Total for Question 11 is 8 marks)

12

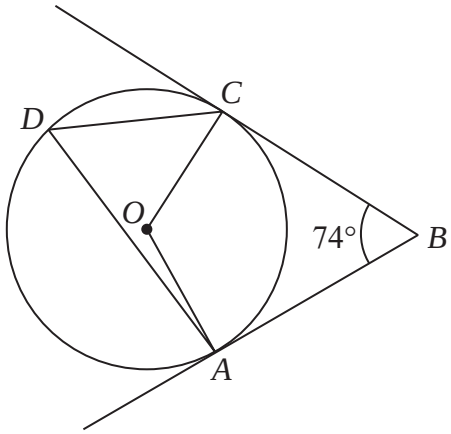


Diagram **NOT** accurately drawn

A, *C* and *D* are points on a circle, centre *O*.
AB and *CB* are tangents to the circle.

Angle *ABC* = 74°

Work out the size of angle *ADC*.
Show your working clearly.

.....°

(Total for Question 12 is 3 marks)

13 The straight line $\mathbf{L}_1$ has equation $y = 6 - 2x$
The straight line $\mathbf{L}_2$ is perpendicular to $\mathbf{L}_1$ and passes through the point (4, 7)

Find the coordinates of the point where the line $\mathbf{L}_2$ crosses the x-axis.

(..... , ...)

(Total for Question 13 is 4 marks)

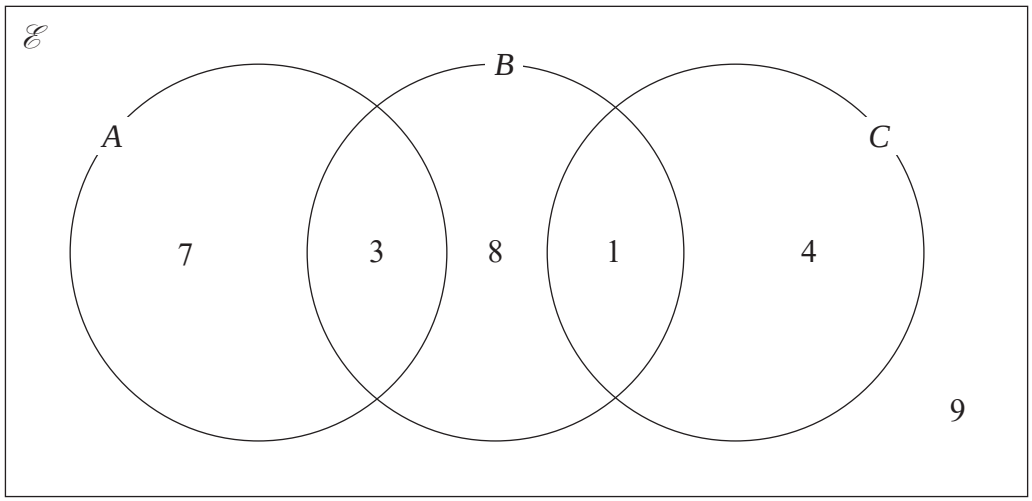
14 $128 = 4^{2x} \times 2^x$

Work out the value of x.

$x =$ .....

(Total for Question 14 is 3 marks)

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



7, 3, 8, 1, 4 and 9 represent the **numbers** of elements.

Find

(i) $n(A \cup B)$

.....

(ii) $n(A' \cap C)$

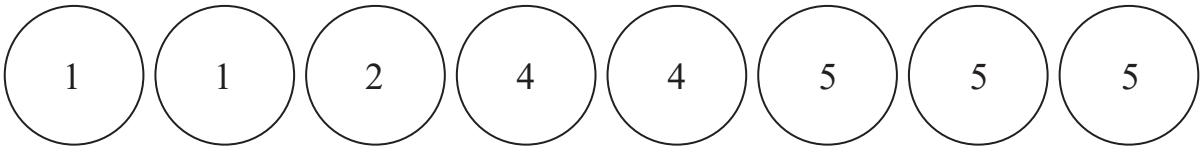
.....

(iii) $n(A' \cup B')$

.....

(Total for Question 15 is 3 marks)

16 There are 8 counters in a bag.
There is a number on each counter.



Fiona takes at random **three** of the counters.
She adds the numbers on the **three** counters to get her total.

Work out the probability that her total is an odd number.

.....

(Total for Question 16 is 4 marks)

17 (a) Use algebra to show that $0.4\dot{3}\dot{6} = \frac{24}{55}$

(2)

(b) Show that $\frac{\sqrt{20} + \sqrt{80}}{\sqrt{3}}$ can be expressed in the form $\sqrt{a}$ where a is an integer.

Show your working clearly.

(3)

(Total for Question 17 is 5 marks)

18 Solve the simultaneous equations

$$2x^2 + 3y^2 = 14$$

$$x = 2y - 3$$

Show clear algebraic working.

.....

(Total for Question 18 is 5 marks)

19 $a = \dfrac{p - q}{t}$

$p = 8.4$ correct to 2 significant figures.
$q = 6.3$ correct to 2 significant figures.
$t = 0.27$ correct to 2 significant figures.

Work out the upper bound for the value of a.
Show your working clearly.
Give your answer correct to 1 decimal place.

.....

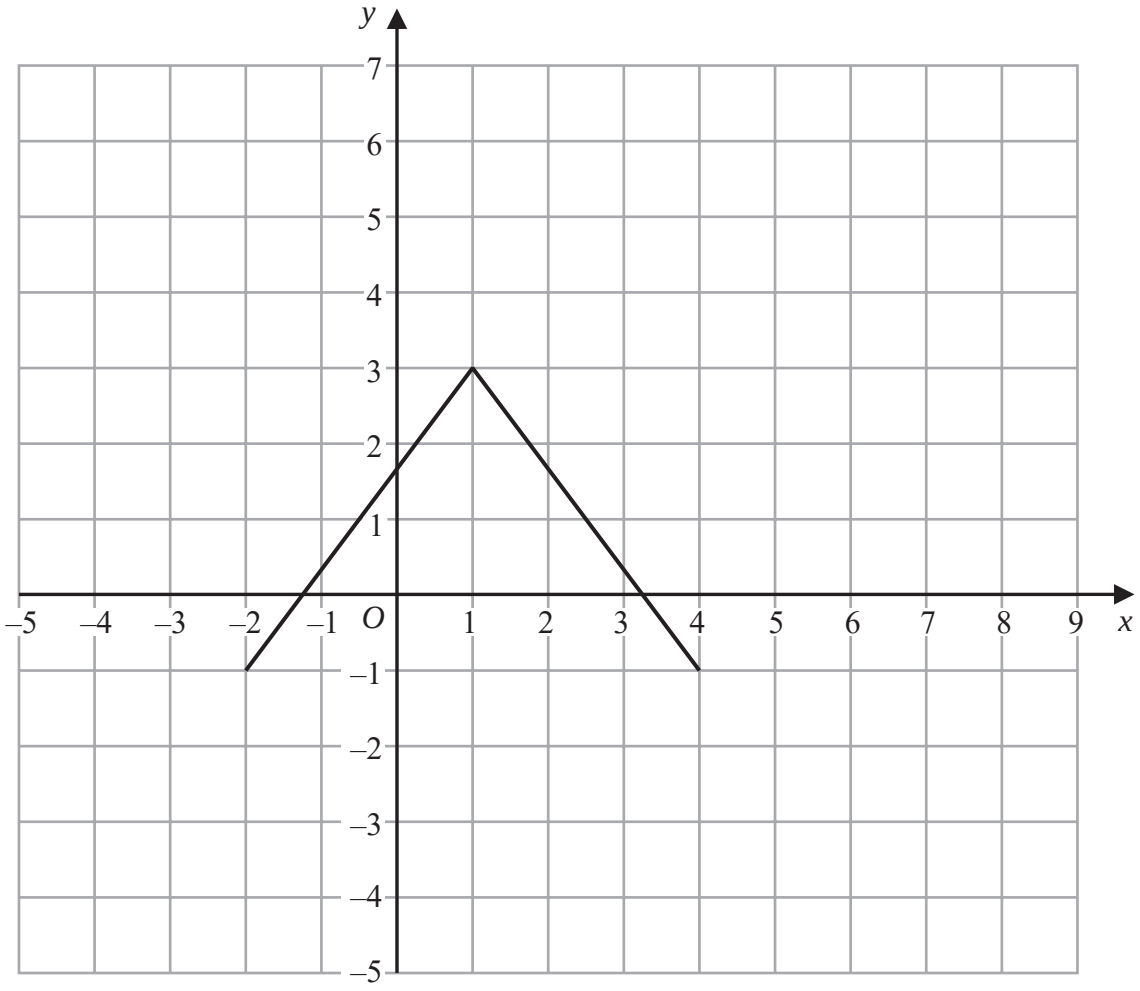
(Total for Question 19 is 3 marks)

20 Solve the inequality $4x^2 - 5x - 6 > 0$

.....

(Total for Question 20 is 4 marks)

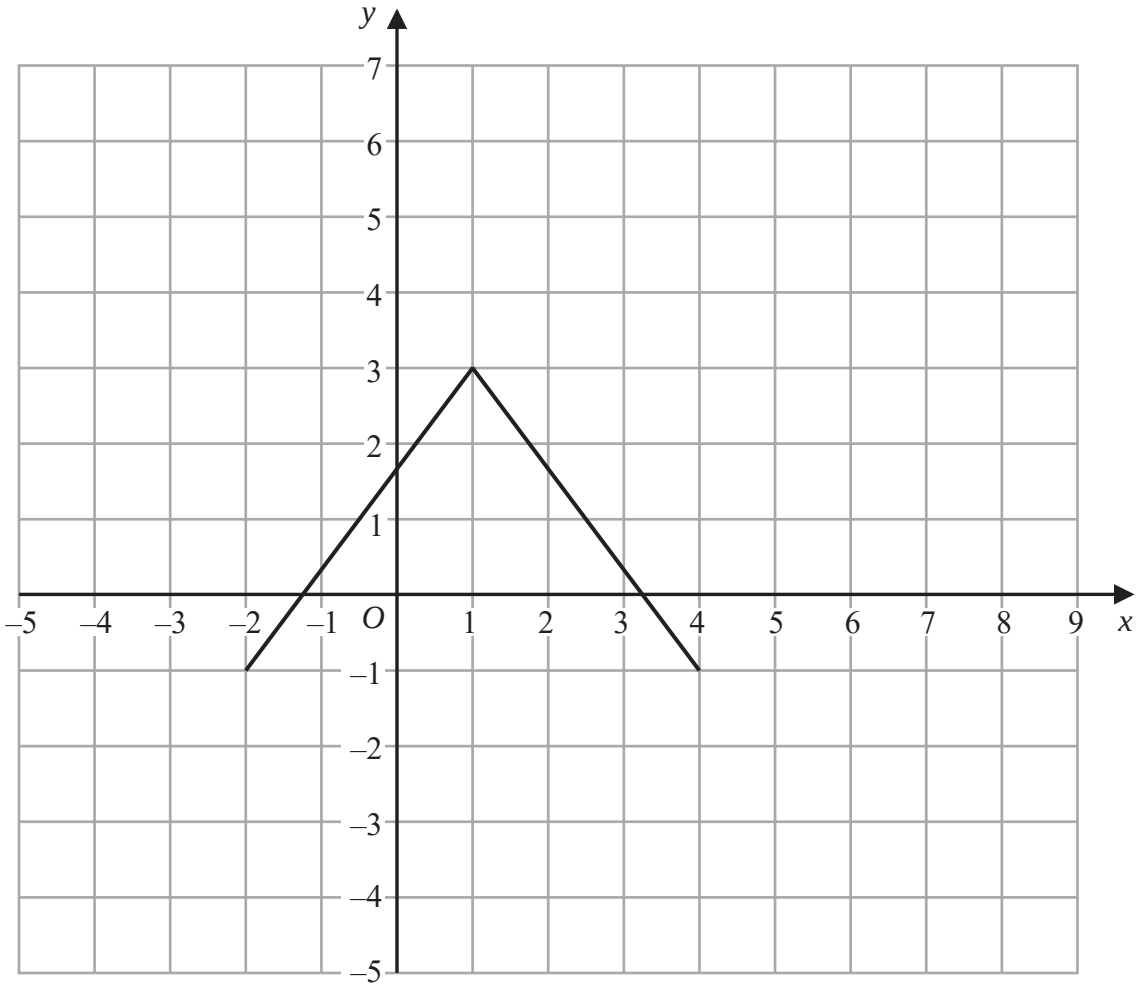
21 Here is the graph of $y = f(x)$



(a) On the grid above, draw the graph of $y = 2f(x)$

(2)

Here is the graph of $y = f(x)$



(b) On the grid above, draw the graph of $y = f(-x)$

(2)

(Total for Question 21 is 4 marks)

22 Express $\dfrac{4x^2 - 25}{5x^2 + 2x - 7} \times \left(\dfrac{2}{x - 3} - \dfrac{3}{2x - 5} \right)$ as a single fraction in its simplest form.

.....

(Total for Question 22 is 4 marks)

23 OAB is a triangle.

$\overrightarrow{OA} = \mathbf{a}$ $\overrightarrow{OB} = \mathbf{b}$

C is the midpoint of OA.
D is the point on AB such that $AD : DB = 3 : 1$
E is the point such that $\overrightarrow{OB} = 2\overrightarrow{BE}$

Using a vector method, prove that the points C, D and E lie on the same straight line.

(Total for Question 23 is 5 marks)

24 (a) Express $7 - 4x - x^2$ in the form $p - (x + q)^2$ where p and q are constants.

.....

(2)

(b) Use your answer to part (a) to solve the equation $7 - 4(y + 3) - (y + 3)^2 = 0$

Give your solutions in the form $e \pm \sqrt{f}$ where e and f are integers.

.....

(3)

The curve **C** has equation $y = 3 - 5(x + 1)^2$
The point A is the maximum point on **C**.

(c) Write down the coordinates of A.

(..... , ...)

(1)

(Total for Question 24 is 6 marks)

TOTAL FOR PAPER IS 100 MARKS