

Write your name here

Surname

Other names

**Pearson Edexcel**  
**International GCSE**

Centre Number

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Candidate Number

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# 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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## International GCSE Mathematics

## Formulae sheet – Higher Tier

**Arithmetic series**

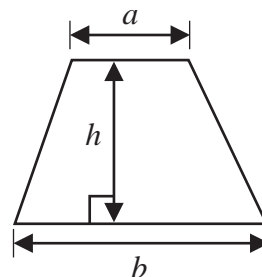
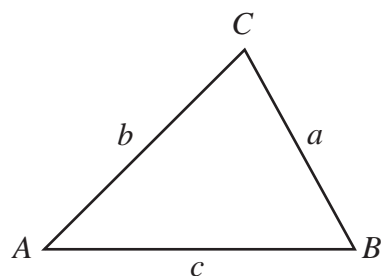
Sum to  $n$  terms,  $S_n = \frac{n}{2} [2a + (n-1)d]$

**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**

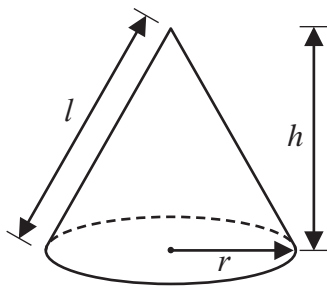
**Sine Rule**  $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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

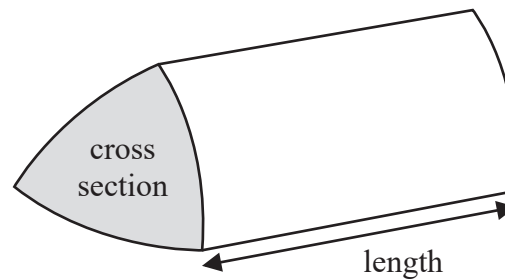
**Volume of cone** =  $\frac{1}{3}\pi r^2 h$

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



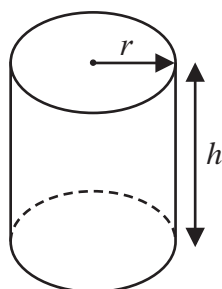
**Volume of prism**

= area of cross section  $\times$  length



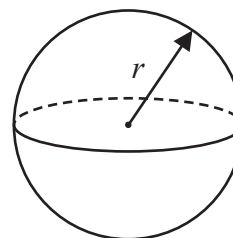
**Volume of cylinder** =  $\pi r^2 h$

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



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

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



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**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  $y$ .

$x = \dots\dots\dots$

$y = \dots\dots\dots$

**(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<sup>2</sup>

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

$\dots\dots\dots$  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)

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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)**

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- 5 Abelle 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)**

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

.....  
(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)**

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9

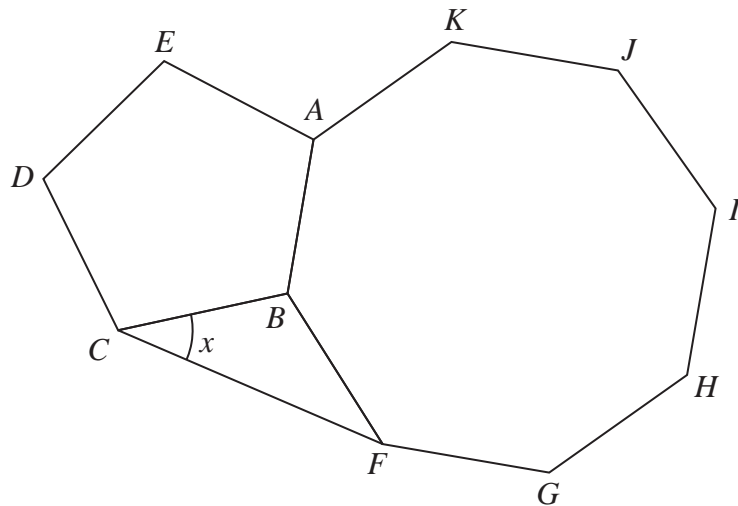


Diagram **NOT**  
accurately drawn

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

Work out the size of angle  $x$ .

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(Total for Question 9 is 4 marks)

8



10  $ABCD$  is a trapezium.

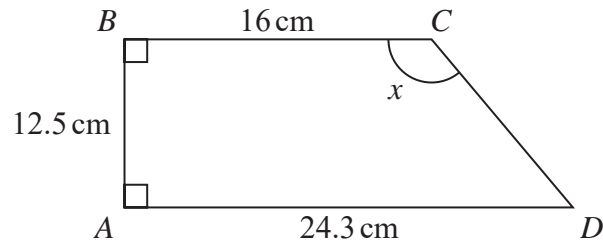


Diagram **NOT**  
accurately drawn

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
$0 < m \leq 100$	10
$100 < m \leq 200$	36
$200 < m \leq 300$	34
$300 < m \leq 400$	20
$400 < m \leq 500$	15
$500 < m \leq 600$	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
$0 < m \leq 100$	
$0 < m \leq 200$	
$0 < m \leq 300$	
$0 < m \leq 400$	
$0 < m \leq 500$	
$0 < m \leq 600$	

(1)

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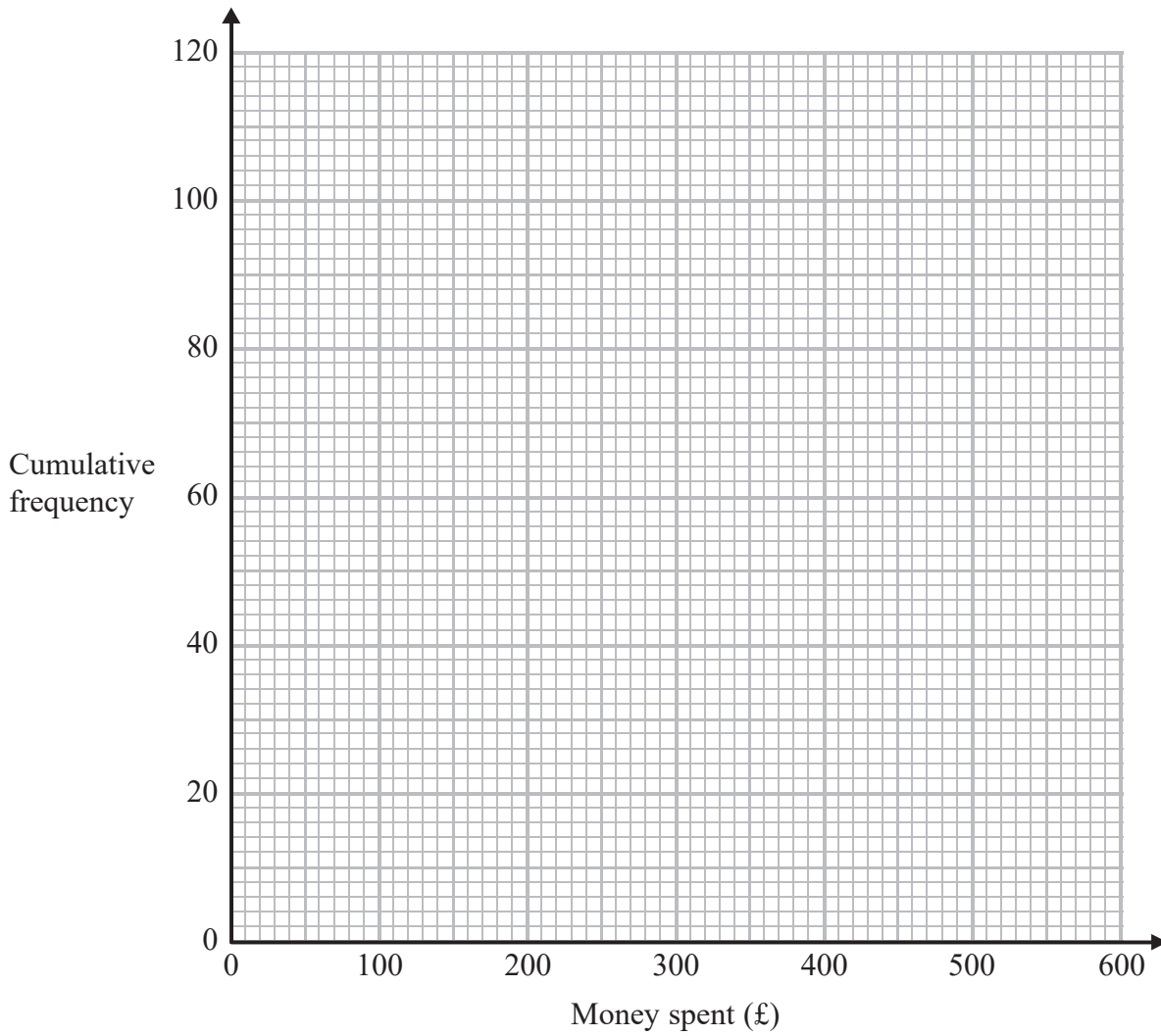
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(c) On the grid, draw a cumulative frequency graph for your table.

(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

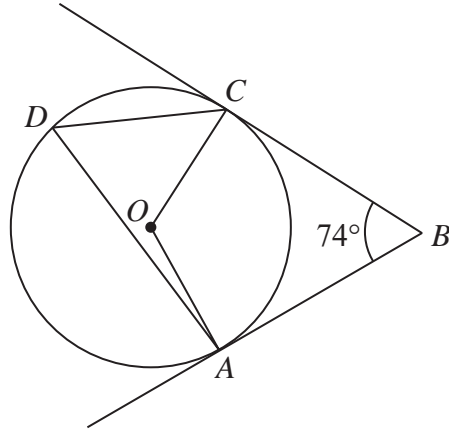


Diagram **NOT**  
accurately drawn

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

Angle  $ABC = 74^\circ$

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

(Total for Question 12 is 3 marks)

12



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- 13 The straight line  $L_1$  has equation  $y = 6 - 2x$   
 The straight line  $L_2$  is perpendicular to  $L_1$  and passes through the point  $(4, 7)$   
 Find the coordinates of the point where the line  $L_2$  crosses the  $x$ -axis.

(....., .....)

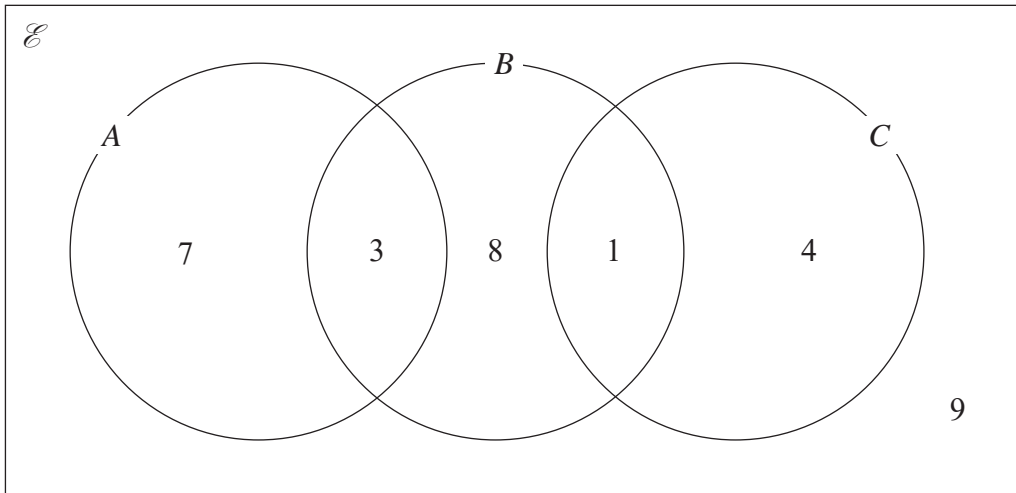
**(Total for Question 13 is 4 marks)**

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

Work out the value of  $x$ .

 $x = \dots\dots\dots$ **(Total for Question 14 is 3 marks)**

15 The Venn diagram shows a universal set,  $\mathcal{E}$ , 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)

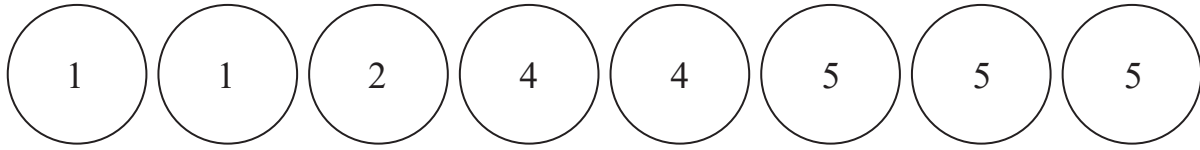
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- 16 There are 8 counters in a bag.  
There is a number on each counter.



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  $0.4\dot{3}\dot{6} = \frac{24}{55}$

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(b) Show that  $\frac{\sqrt{20} + \sqrt{80}}{\sqrt{3}}$  can be expressed in the form  $\sqrt{a}$  where  $a$  is an integer. (2)

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.

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.....  
(Total for Question 18 is 5 marks)



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

$p = 8.4$  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.

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.....  
(Total for Question 19 is 3 marks)



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

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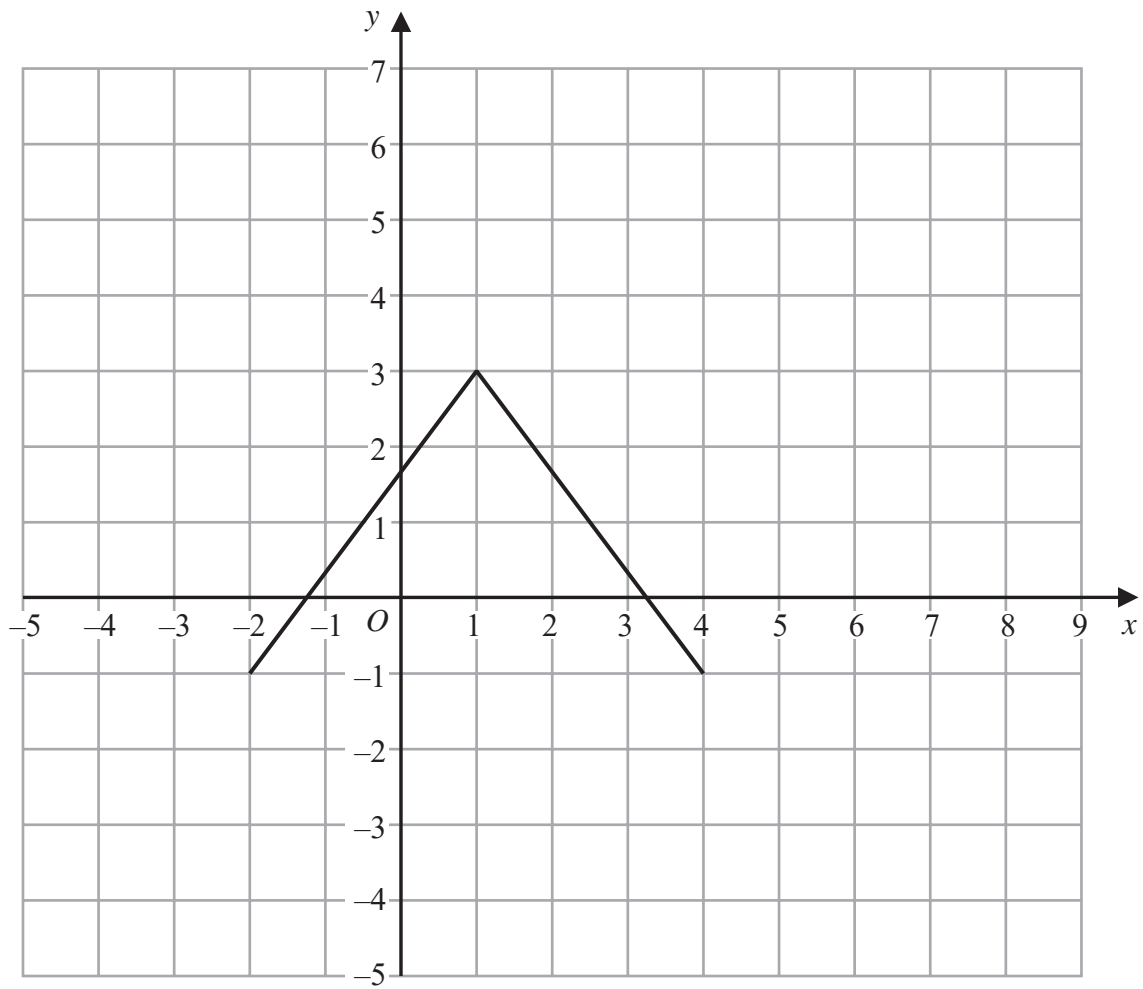
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(Total for Question 20 is 4 marks)



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



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

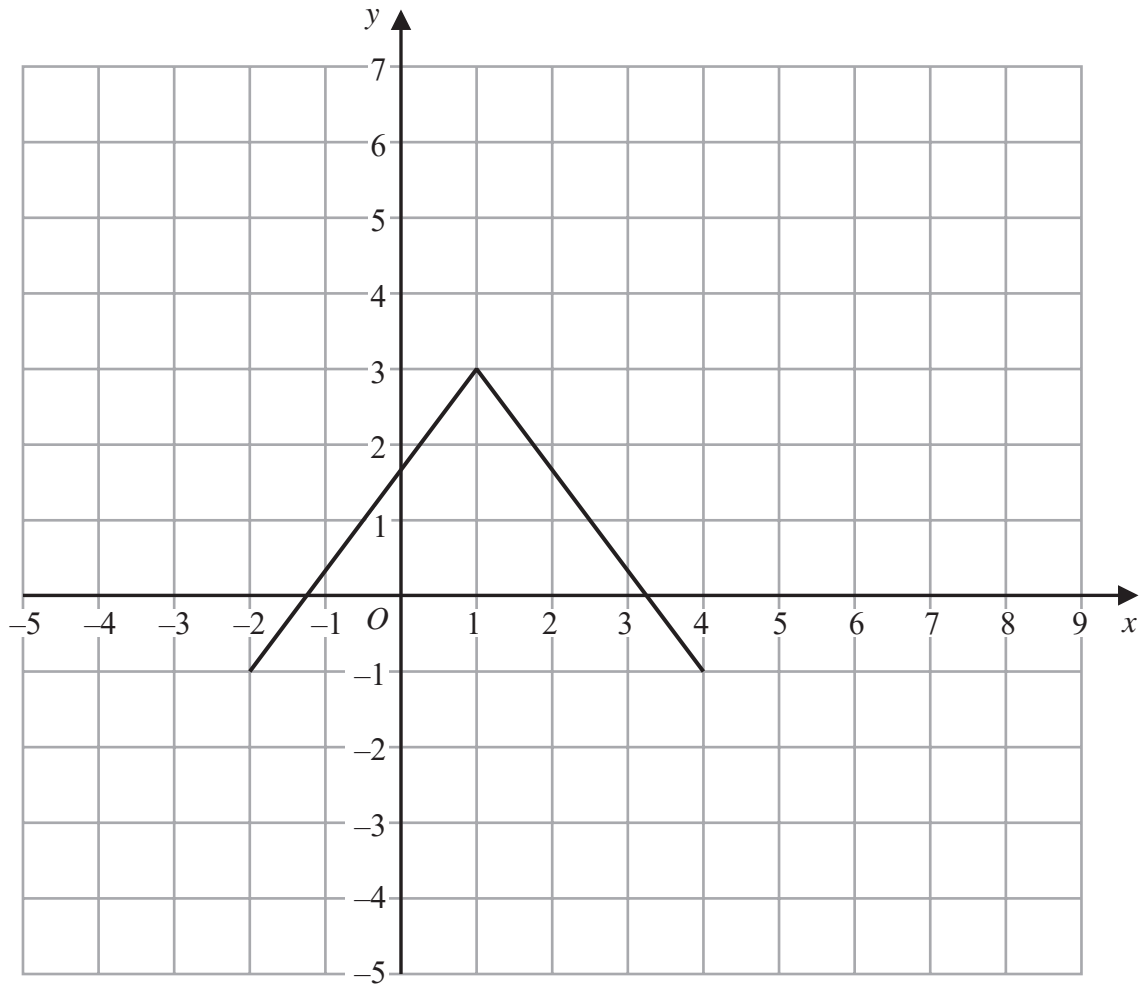
(2)

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

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.....  
(Total for Question 22 is 4 marks)



23  $OAB$  is a triangle.

$$\vec{OA} = \mathbf{a} \quad \vec{OB} = \mathbf{b}$$

$C$  is the midpoint of  $OA$ .

$D$  is the point on  $AB$  such that  $AD:DB = 3:1$

$E$  is the point such that  $\vec{OE} = 2\vec{BE}$

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

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