

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

## Paper 3H


**Higher Tier**

 Monday 8 January 2018 – Morning  
**Time: 2 hours**

Paper Reference

**4MA0/3H**
**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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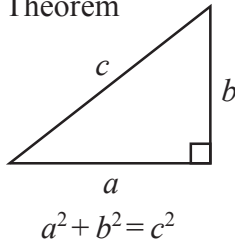
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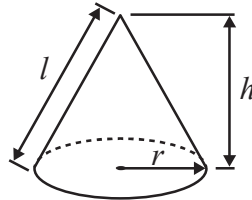
**International GCSE MATHEMATICS  
FORMULAE SHEET – HIGHER TIER**

Pythagoras' Theorem



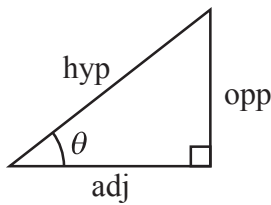
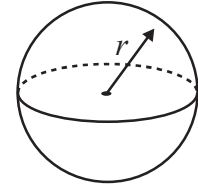
Volume of cone =  $\frac{1}{3}\pi r^2 h$

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



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

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



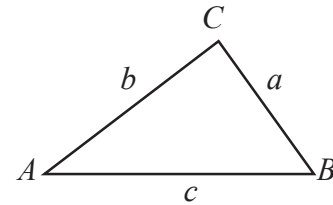
adj = hyp  $\times$  cos  $\theta$   
opp = hyp  $\times$  sin  $\theta$   
opp = adj  $\times$  tan  $\theta$

or  $\sin \theta = \frac{\text{opp}}{\text{hyp}}$

$\cos \theta = \frac{\text{adj}}{\text{hyp}}$

$\tan \theta = \frac{\text{opp}}{\text{adj}}$

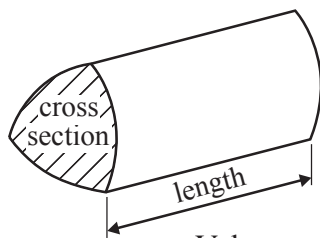
In any triangle ABC



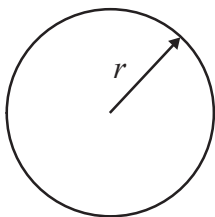
Sine rule:  $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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



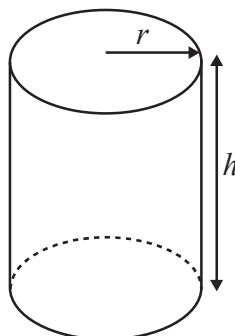
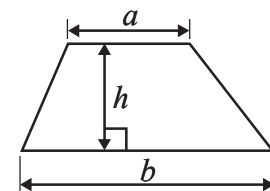
Volume of prism = area of cross section  $\times$  length



Circumference of circle =  $2\pi r$

Area of circle =  $\pi r^2$

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



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

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

The Quadratic Equation

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

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



Answer ALL TWENTY FIVE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1 Pasquale has a map with a scale of 1:125 000  
His house is 14 kilometres from an airport.

(a) Work out the distance on Pasquale's map, in centimetres, from his house to the airport.

..... cm

(2)

Luciana has a map with a scale of 1 :  $n$

Her house is 4.8 kilometres from a station.

On Luciana's map, the distance from her house to the station is 19.2 centimetres.

(b) Work out the value of  $n$ .

$n =$  .....

(2)

(Total for Question 1 is 4 marks)



- 2 (a) Use your calculator to work out the value of

$$\sqrt{\frac{8.9 + 2.345}{0.76 \times 2.9}}$$

Write down all the figures on your calculator display.

.....  
(2)

- (b) Give your answer to part (a) correct to 2 significant figures.

.....  
(1)

**(Total for Question 2 is 3 marks)**

3  $A = p^2 + 7q$

- (a) Work out the value of  $A$  when  $p = -7$  and  $q = 5$

$A =$  .....  
(2)

$A = p^2 + 7q$

- (b) Work out the value of  $q$  for which  $A = 100$  when  $p = 11$

$q =$  .....  
(3)

**(Total for Question 3 is 5 marks)**



- 4 Stephen has a biased 5-sided spinner.  
He spins the spinner 80 times.  
His score each time is the number that the spinner lands on.

The table shows information about his scores.

Number on spinner	Frequency
1	5
2	12
3	16
4	32
5	15

- (a) Find Stephen's median score.

.....  
(2)

- (b) Work out Stephen's mean score.

.....  
(3)

Stephen is going to spin the spinner once more.

- (c) Use the information in the table to find an estimate for the probability that the spinner will land on an even number.

.....  
(2)

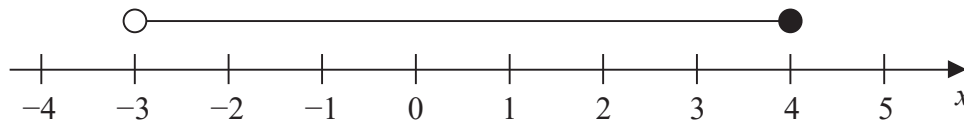
**(Total for Question 4 is 7 marks)**



- 5 (a) Solve the equation  $3(1 - 2y) = 2y - 7$   
Show clear algebraic working.

$$y = \dots\dots\dots (3)$$

- (b) Write down the inequality shown on the number line.



$$\dots\dots\dots (2)$$

- (c) Solve the inequality  $2m + 13 \geq 8$

$$\dots\dots\dots (2)$$

(Total for Question 5 is 7 marks)

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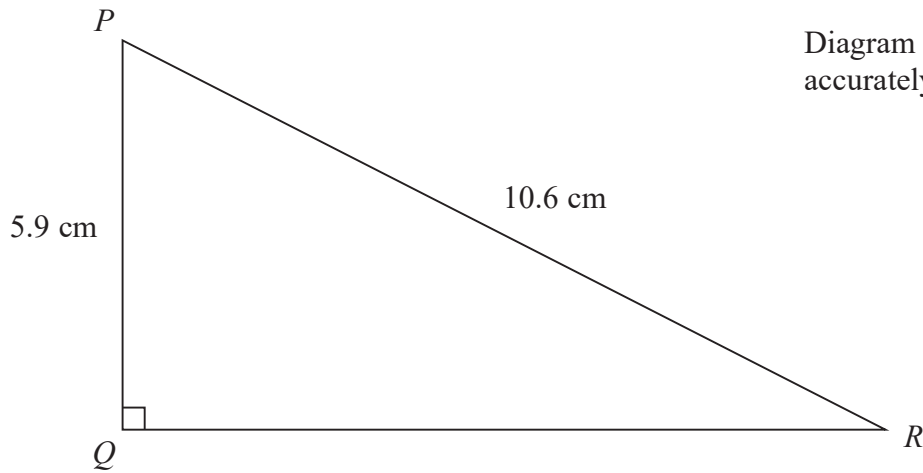


Diagram **NOT**  
accurately drawn

- (a) Work out the length of  $QR$ .  
Give your answer correct to 3 significant figures.

..... cm  
(3)

- (b) Work out the size of angle  $PRQ$ .  
Give your answer correct to 1 decimal place.

..... °  
(3)

The length of a line is 12.4 cm correct to one decimal place.

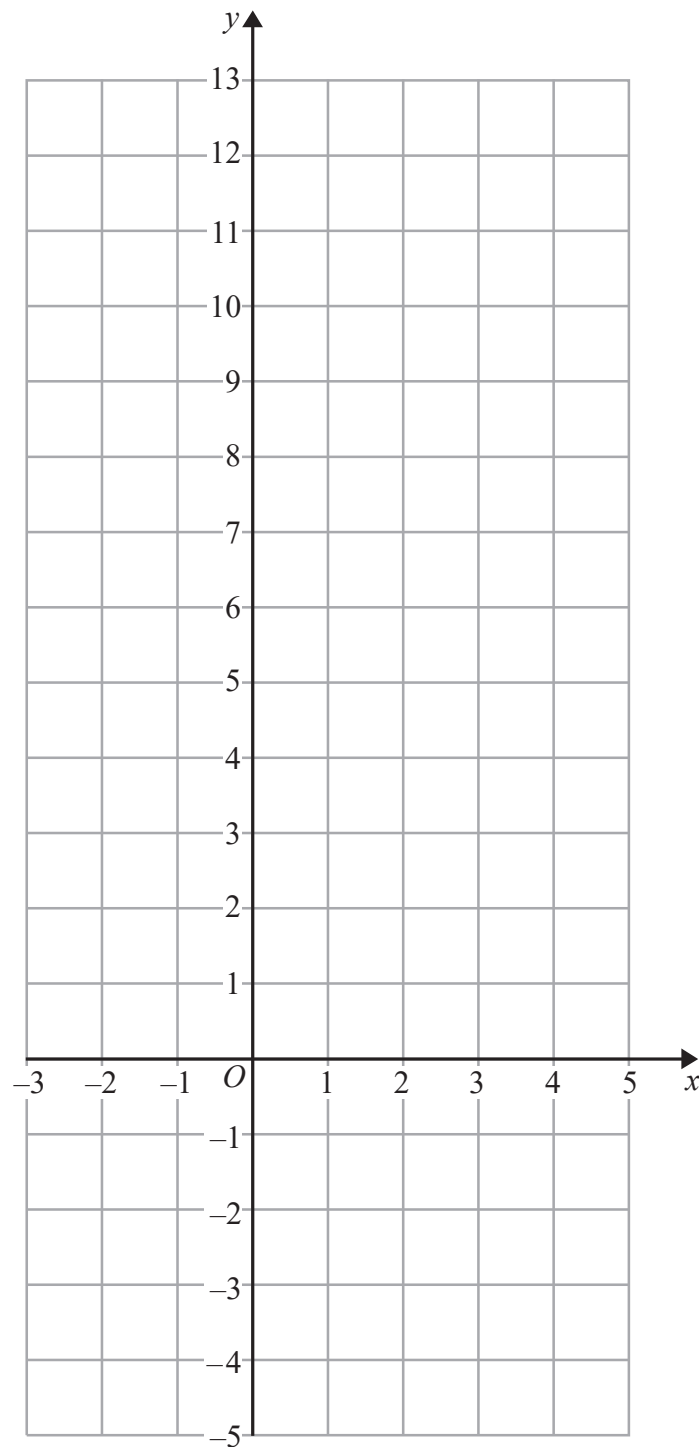
- (c) Write down the upper bound for the length of the line.

..... cm  
(1)

(Total for Question 6 is 7 marks)



7 On the grid, draw the graph of  $y = 5 - 3x$  for values of  $x$  from  $-2$  to  $3$



(Total for Question 7 is 3 marks)

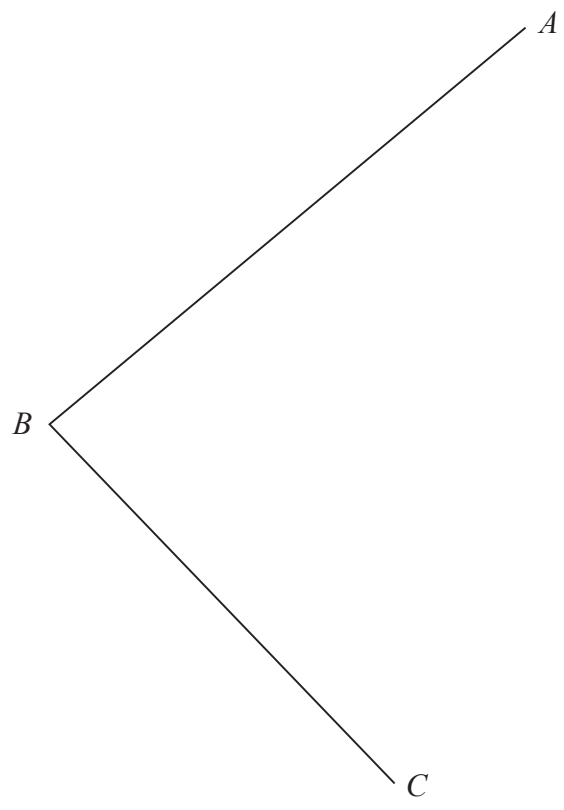


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8 Use ruler and compasses only to construct the bisector of angle  $ABC$ .  
You must show all your construction lines.



(Total for Question 8 is 2 marks)



9

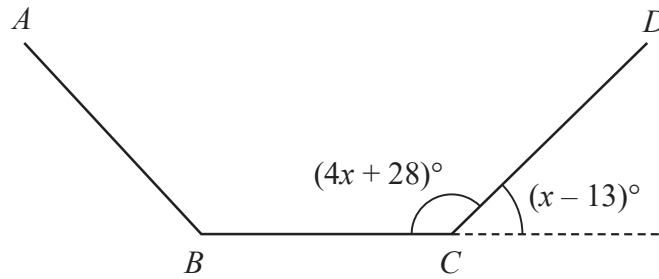


Diagram **NOT**  
accurately drawn

The diagram shows three sides,  $AB$ ,  $BC$  and  $CD$ , of a regular  $n$ -sided polygon.

The size of each interior angle of the polygon is  $(4x + 28)^\circ$

The size of each exterior angle of the polygon is  $(x - 13)^\circ$

Work out the value of  $n$ .

$n = \dots\dots\dots$

**(Total for Question 9 is 4 marks)**

- 10** The straight line  $L$  is parallel to the line with equation  $2y + 8x = 5$   
 $L$  passes through the point with coordinates  $(2, 3)$

Find an equation for  $L$ .

**(Total for Question 10 is 3 marks)**

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- 11 On 1st January 2016 Celyn buys a laptop for \$330  
The value of the laptop decreases by 23% each year.

Work out the value of the laptop on 1st January 2019  
Give your answer correct to the nearest dollar.

\$ .....

(Total for Question 11 is 3 marks)

12 Solve  $\frac{x+4}{3} + \frac{2x+3}{4} = 7$

Show clear algebraic working.

$x =$  .....

(Total for Question 12 is 3 marks)



13 The number of people living in Tokyo is  $3.57 \times 10^7$

(a) Write  $3.57 \times 10^7$  as an ordinary number.

.....  
(1)

The land area of Tokyo is  $1.35 \times 10^4$  square kilometres.

(b) Work out the mean number of people per square kilometre living in Tokyo.  
Give your answer in standard form, correct to 2 significant figures.

.....  
(2)

**(Total for Question 13 is 3 marks)**

14 Fifteen students were asked how many countries they had visited.  
Here is a list of the results.

1 2 3 3 4 5 5 6 6 7 8 11 11 13 15

Find the interquartile range of the number of countries visited.

.....  
**(Total for Question 14 is 2 marks)**

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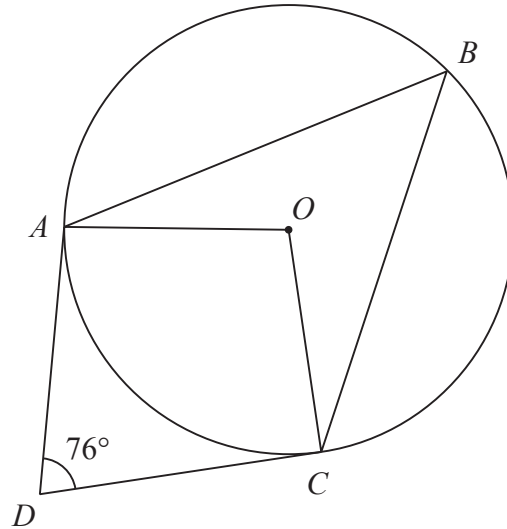
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15

Diagram NOT  
accurately drawn



$A$ ,  $B$  and  $C$  are points on a circle, centre  $O$ .  
 $DA$  and  $DC$  are tangents to the circle.  
 Angle  $ADC = 76^\circ$

Work out the size of angle  $ABC$ .

(Total for Question 15 is 3 marks)



16 Use algebra to show that the recurring decimal  $0.3\dot{4}\dot{5} = \frac{19}{55}$

(Total for Question 16 is 2 marks)

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17 Make  $a$  the subject of  $x = \sqrt{\frac{2b - a}{7 - am}}$

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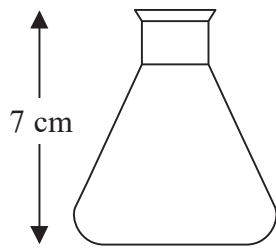
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.....  
(Total for Question 17 is 4 marks)

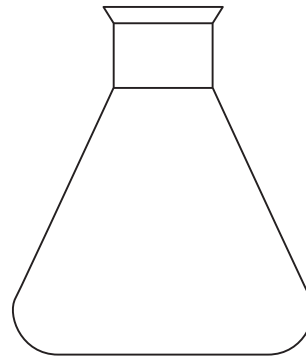


P 5 3 2 9 9 A 0 1 5 2 4

18



Flask A



Flask B

Diagram **NOT** accurately drawn

The diagram shows two mathematically similar flasks, flask **A** and flask **B**.

Flask **A** has a height of 7 cm and a surface area of  $132 \text{ cm}^2$

Flask **B** has a surface area of  $297 \text{ cm}^2$

(a) Work out the height of flask **B**.

.....cm  
(2)

The volume of flask **B** is  $567 \text{ cm}^3$

(b) Work out the volume of flask **A**.

..... $\text{cm}^3$   
(2)

(Total for Question 18 is 4 marks)

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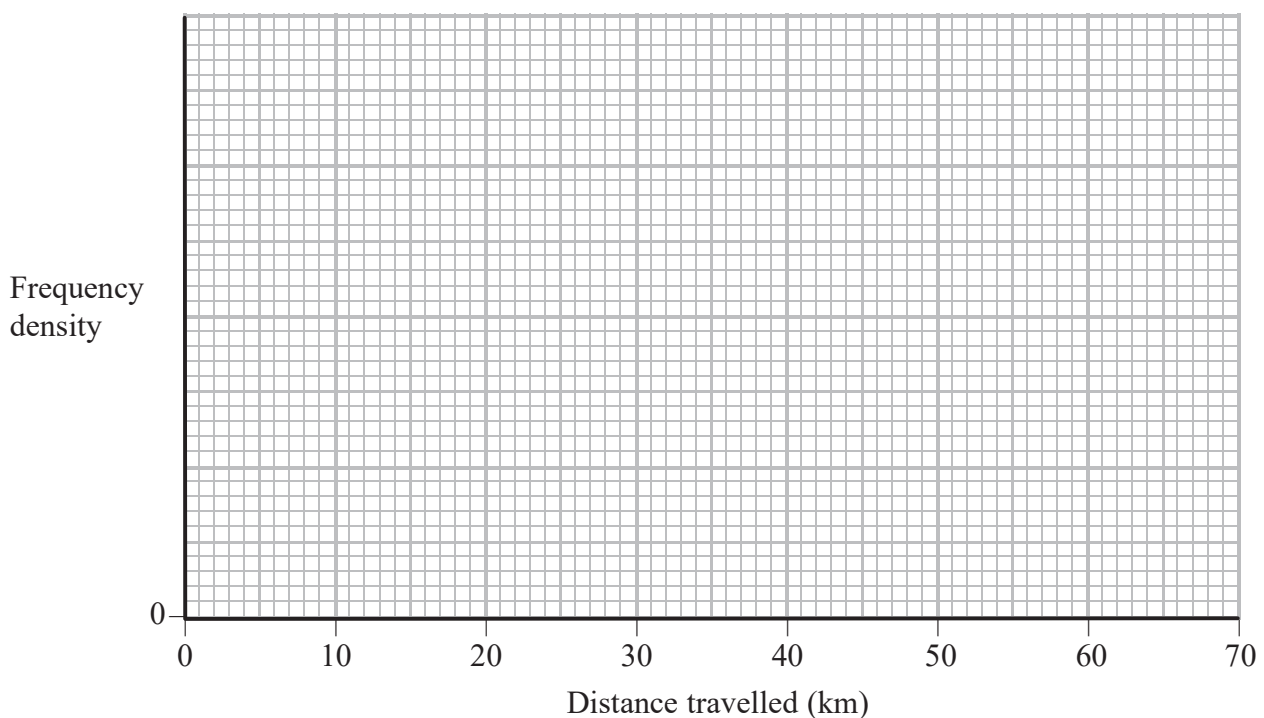


- 19 The table gives information about the distances, in kilometres, travelled by 120 people to get to an airport.

Distance travelled ( $d$ km)	Frequency
$0 < d \leq 10$	33
$10 < d \leq 25$	39
$25 < d \leq 45$	36
$45 < d \leq 60$	12

- (a) On the grid below, draw a histogram for this information.

(3)



One of these people is to be selected at random.

- (b) Find an estimate for the probability that this person travelled more than 30 km to get to the airport.

(2)

(Total for Question 19 is 5 marks)



20 (a)  $\sqrt{50} + \sqrt{128} - \sqrt{200} = n\sqrt{2}$  where  $n$  is an integer.

Find the value of  $n$ .

Show each stage of your working.

$n = \dots\dots\dots$   
(2)

Given that  $a$  is a prime number,

(b) simplify  $\frac{5\sqrt{a} + a}{10\sqrt{a}}$

Give your answer in the form  $x + y\sqrt{a}$ , where  $x$  and  $y$  are fractions.  
Show your working clearly.

$\dots\dots\dots$   
(2)

(Total for Question 20 is 4 marks)

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21 Factorise completely  $(10a - b)^2 - (2a - 5b)^2$

.....  
**(Total for Question 21 is 3 marks)**

22 When a biased coin is thrown 5 times, the probability of getting 5 heads is  $\frac{32}{3125}$

Work out the probability of getting 4 heads and 1 tail when the coin is thrown 5 times.

.....  
**(Total for Question 22 is 3 marks)**



23  $f$  is the function such that  $f(x) = \frac{3x}{x-2}$  where  $x \neq 2$

$g$  is the function such that  $g(x) = \frac{4x}{5}$

(a) Find  $gf(-4)$

.....  
(2)

(b) Express the composite function  $fg$  in the form  $fg(x) = \dots$   
Give your answer as a single fraction in its simplest form.

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

(c) Express the inverse function  $f^{-1}$  in the form  $f^{-1}(x) = \dots$

$f^{-1}(x) = \dots$   
(3)

(Total for Question 23 is 8 marks)

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24

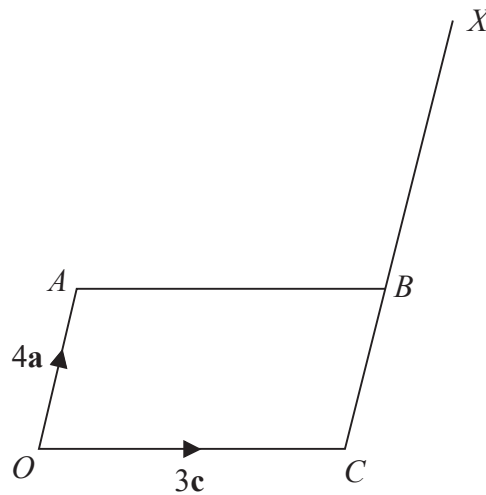


Diagram **NOT**  
accurately drawn

$OABC$  is a parallelogram.

$$\vec{OA} = 4\mathbf{a} \quad \vec{OC} = 3\mathbf{c}$$

The point  $X$  is such that  $CBX$  is a straight line and  $CB : BX = 2 : 3$

The point  $Y$  is such that  $\vec{CY} = 2\vec{AX}$

Find, in terms of  $\mathbf{a}$  and  $\mathbf{c}$ , the vector  $\vec{OY}$   
Give your answer in its simplest form.

(Total for Question 24 is 3 marks)



25

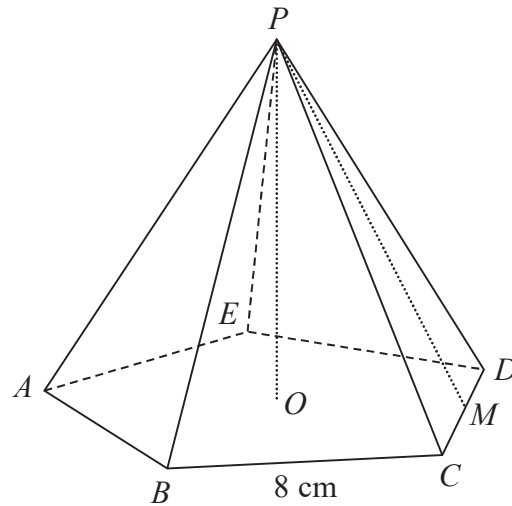


Diagram **NOT**  
accurately drawn

The diagram shows a pyramid with horizontal base  $ABCDE$ .  
 $ABCDE$  is a regular pentagon, centre  $O$  and side 8 cm.

The vertex  $P$  is vertically above  $O$ .  
 $M$  is the midpoint of  $CD$ .  
 $OP = 10$  cm.

Calculate the size of angle  $APM$ .  
Give your answer correct to 1 decimal place.

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.....  
**(Total for Question 25 is 5 marks)**

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**TOTAL FOR PAPER IS 100 MARKS**



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