Write your name here

Surname	Other names

Pearson Edexcel International GCSE

Centre Number | Candidate Number

Mathematics A

Paper 3HR



Higher Tier

Wednesday 14 May 2014 – Morning
Time: 2 hours

Paper Reference
4MA0/3HR

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 ▶

P43074A

©2014 Pearson Education Ltd.

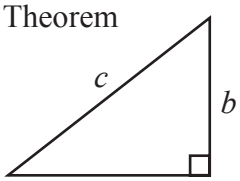
6/1/1/1/1/

P 4 3 0 7 4 A 0 1 2 4

PEARSON

International GCSE MATHEMATICS
FORMULAE SHEET – HIGHER TIER

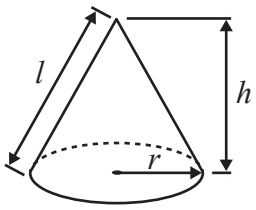
Pythagoras' Theorem



$a^2 + b^2 = c^2$

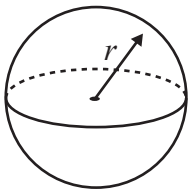
Volume of cone = $\frac{1}{3}\pi r^2 h$

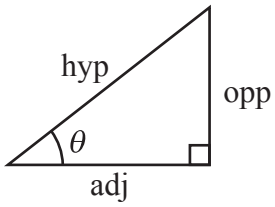
Curved surface area of cone = πrl



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

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





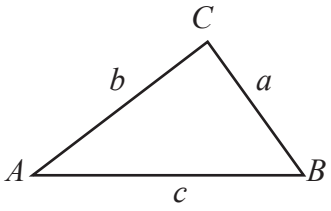
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

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

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

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

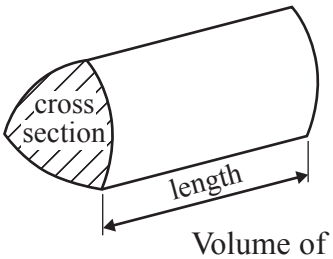
In any triangle ABC



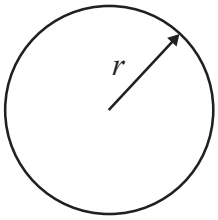
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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



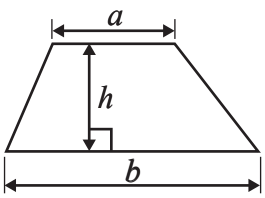
Volume of prism = area of cross section × length

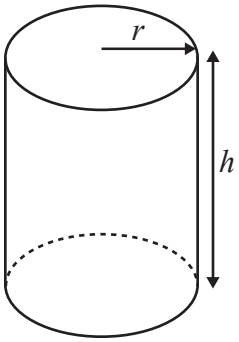


Circumference of circle = $2\pi r$

Area of circle = πr^2

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





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

Curved surface area of cylinder = $2\pi rh$

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 ONE questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 (a) Complete the table to show each number written correct to 1 significant figure.

Number	42.37	58.92	21.04
Number written correct to 1 significant figure			

(2)

(b) Use the approximations in part (a) to work out an estimate for the value of

$$\frac{42.37 + 58.92}{21.04}$$

Show clearly how you obtain your answer.

.....

(2)

(Total for Question 1 is 4 marks)

Do NOT write in this space.

2 $\mathscr{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$
$A = \{1, 3, 5, 7\}$
$B = \{2, 4, 6, 8\}$

(a) Explain why $A \cap B = \varnothing$

.....

.....

(1)

$x \in \mathscr{E}$ and $x \notin A \cup B$

(b) Write down the value of x.

$x =$ .....

(1)

$A \cap C = \{3, 7\}$, $B \cap C = \{8\}$ and $A \cup B \cup C = \mathscr{E}$

(c) List all the members of C.

.....

(2)

(Total for Question 2 is 4 marks)

3 The diagram shows a rectangle $PQRS$.
$PQ = 14$ cm and $QR = 9$ cm.
The point A lies on PS so that $PA = 5$ cm.
The point B lies on SR so that $BR = 8$ cm.

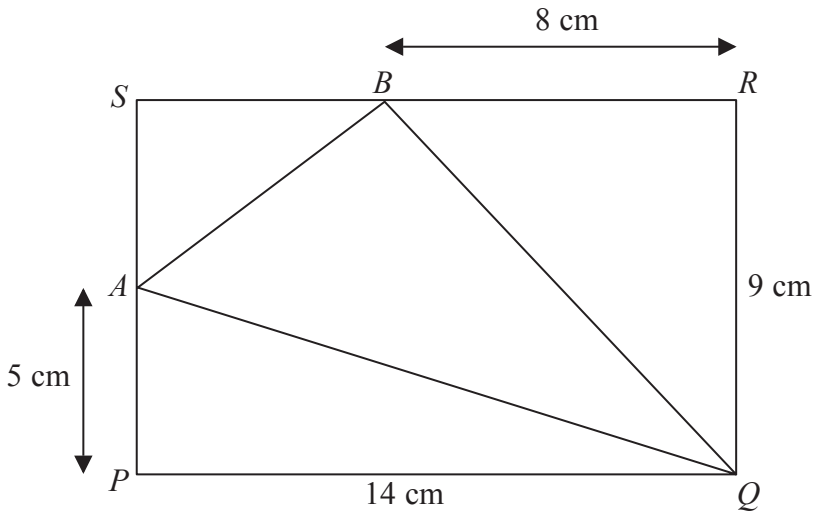


Diagram **NOT** accurately drawn

(a) Work out the area of triangle AQB.

..... cm^2
(4)

(b) Work out the length of AQ.
Give your answer correct to 3 significant figures.

..... cm
(3)

(Total for Question 3 is 7 marks)

4 Freya keeps hens.
The table shows information about the number of boxes of eggs she sold in each of 52 weeks.

Number of boxes sold in a week	Number of weeks
0 to 4	2
5 to 9	6
10 to 14	20
15 to 19	13
20 to 24	8
25 to 29	3

(a) Write down the modal class.

.....

(1)

(b) Work out an estimate for the mean number of boxes of eggs that Freya sold each week.
Give your answer correct to 3 significant figures.

.....

(4)

Dan picks at random one of the 52 weeks.

(c) Find the probability that in this week Freya sold at least 15 boxes of eggs.

.....

(2)

(Total for Question 4 is 7 marks)

5 (a) Factorise $7dg - 9de$

.....

(2)

(b) Expand and simplify $(x + 2)(x + 5)$

.....

(2)

(Total for Question 5 is 4 marks)

6 Solve $3(2z - 5) = 4z + 11$
Show clear algebraic working.

$z =$ .....

(Total for Question 6 is 3 marks)

7 The table gives some information about the average price of a litre of petrol in England.

	January 2007	**January 2012**
Average price of a litre of petrol (pence)	87.3	133.3

(a) Work out the percentage increase in the average price of a litre of petrol in England between January 2007 and January 2012.
Give your answer correct to 3 significant figures.

..... %

(3)

The average price of a litre of petrol in England increased by 20% from January 2010 to January 2012.

(b) Work out the average price of a litre of petrol in England in January 2010.
Give your answer in pence, correct to 1 decimal place.

..... pence
(3)

(Total for Question 7 is 6 marks)

Do NOT write in this space.

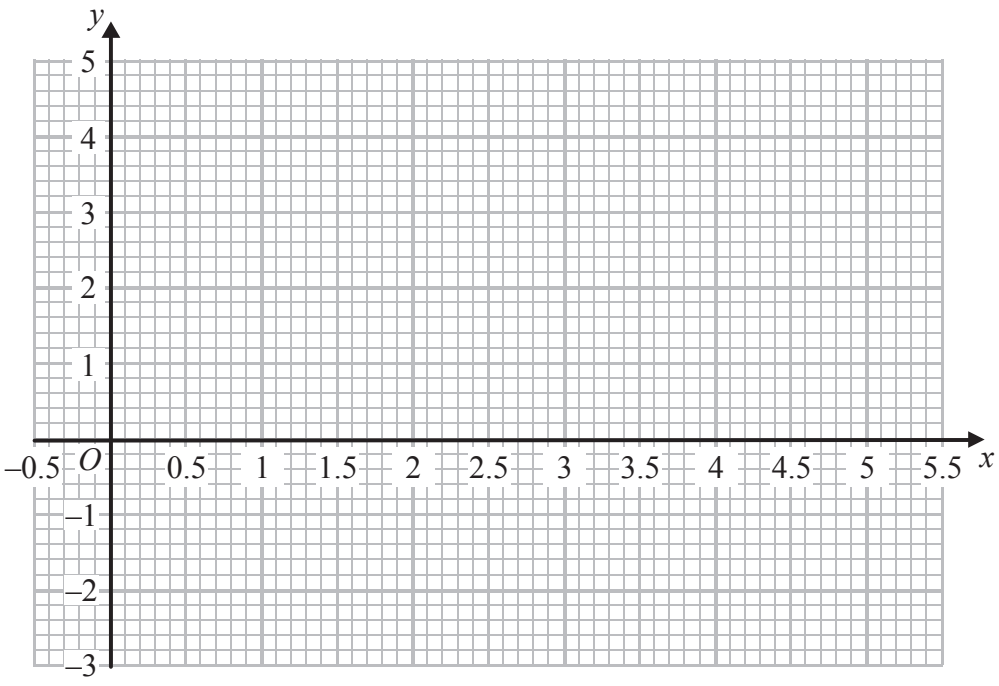
8 (a) Complete the table of values for $y = x^2 - 5x + 4$

x	0	1	2	3	4	5
y			–2			4

(2)

(b) On the grid, draw the graph of $y = x^2 - 5x + 4$ for all values of x from $x = 0$ to $x = 5$

(2)



(Total for Question 8 is 4 marks)

Do NOT write in this space.

9 A cylinder has diameter 12 cm and length 30 cm.

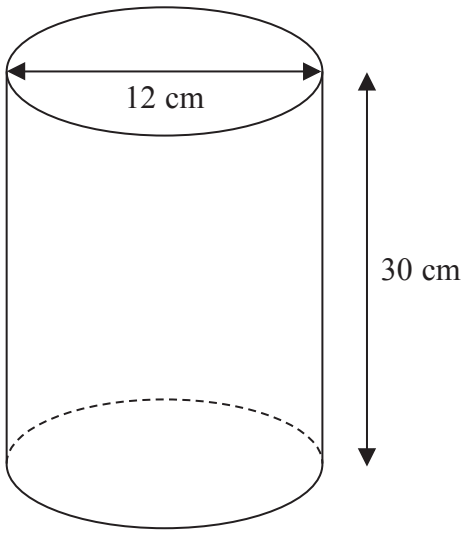


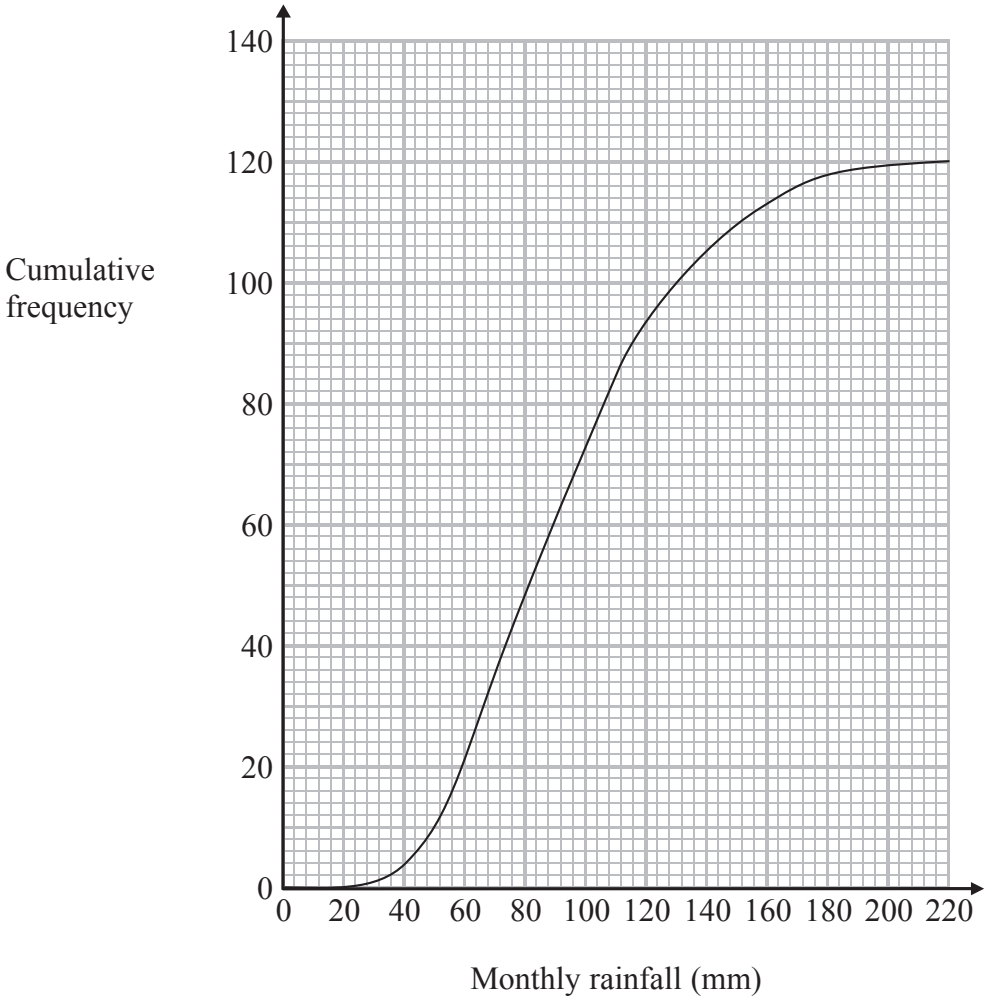
Diagram **NOT** accurately drawn

Work out the curved surface area of the cylinder.
Give your answer correct to 3 significant figures.

..... cm^2

(Total for Question 9 is 3 marks)

10 The cumulative frequency graph gives information about the monthly rainfall, in millimetres, in the United Kingdom during 120 months in the years 2001 to 2010.



(a) Use the graph to estimate the number of months for which rainfall was less than 50 mm.

.....

(1)

(b) Use the graph to find an estimate for the median monthly rainfall.

..... mm

(1)

(c) Use the graph to find an estimate for the interquartile range of the monthly rainfall.

..... mm

(2)

(Total for Question 10 is 4 marks)

11 The functions f and g are defined as

$$f(x) = \frac{1}{2}x + 4$$

$$g(x) = \frac{2x}{x+1}$$

(a) Work out f(6)

.....

(1)

(b) Work out fg(–3)

.....

(2)

(c) $g(a) = -2$

Work out the value of a.

$a =$ .....

(2)

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

$f^{-1}(x) =$ .....

(3)

(Total for Question 11 is 8 marks)

12 In the diagram, *DAPS* and *CBQR* are straight lines.
AB is parallel to *QP* and *DC* is parallel to *RS*.
AD = 11 cm, *BC* = 5 cm, *PS* = 27.5 cm and *RS* = 42.5 cm.

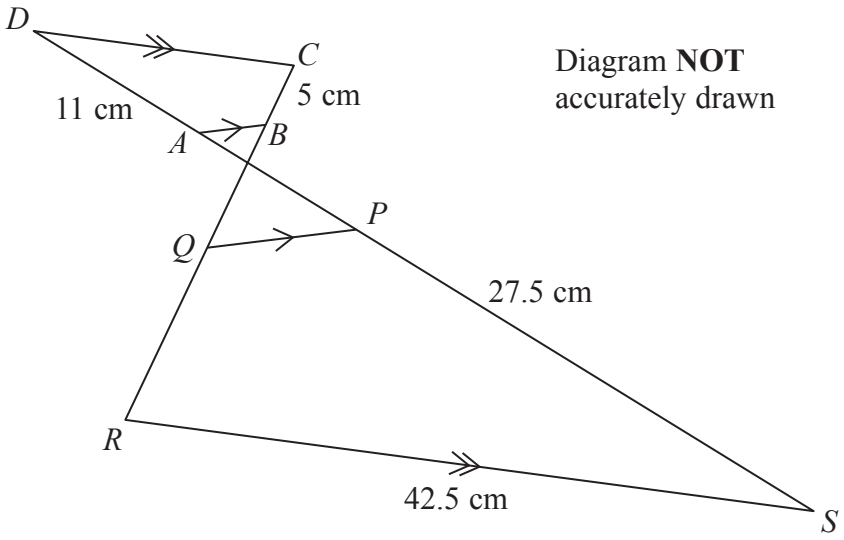


Diagram **NOT** accurately drawn

Quadrilateral *ABCD* is similar to quadrilateral *PQRS*.

(a) Find the ratio of the length of *AB* to the length of *PQ*.
Give your answer in the form 1 : *n*

1 : .....

(2)

(b) Work out the length of *RQ*.

..... cm

(2)

(c) Work out the length of *CD*.

..... cm

(2)

The area of quadrilateral $ABCD$ is 54 cm^2

(d) Work out the area of quadrilateral $PQRS$.

..... cm^2

(2)

(Total for Question 12 is 8 marks)

13 Solve the simultaneous equations

$$3x + 4y = 6$$

$$5x + 6y = 11$$

Show clear algebraic working.

$x =$ .....

$y =$ .....

(Total for Question 13 is 4 marks)

14 (a) $y = 2x^3 + 3x^2 + 2$

Find $\frac{dy}{dx}$

.....

(2)

(b) The point P lies on the curve with equation $y = 2x^3 + 3x^2 + 2$

The gradient of the curve at P is $-\frac{3}{2}$

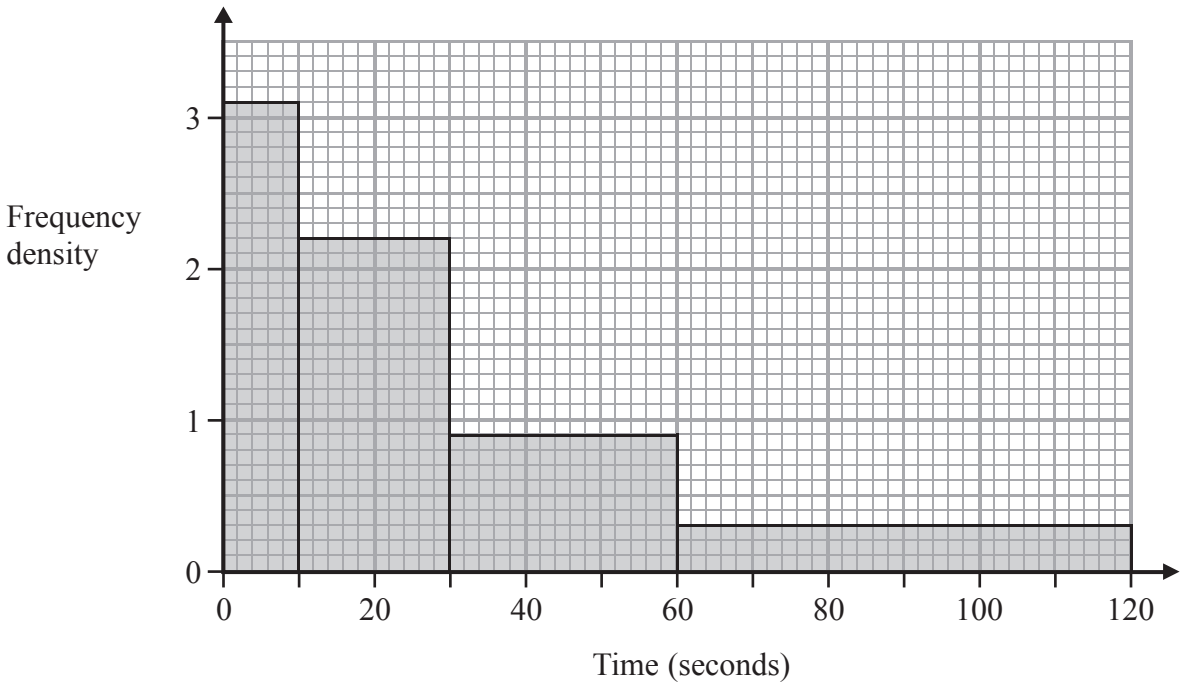
Find the coordinates of P.

(..... , ...)

(5)

(Total for Question 14 is 7 marks)

15 The histogram shows information about the times taken by a telephone call centre to answer incoming calls.



Work out an estimate for the percentage of calls that are answered in less than 40 seconds.

..... %

(Total for Question 15 is 3 marks)

16 (a) Expand $(5 + 3\sqrt{2})^2$

Give your answer in the form $(a + b\sqrt{2})$, where a and b are integers.
Show your working clearly.

.....

(2)

(b) $(5 + 3\sqrt{2})^2 = p + \frac{q}{\sqrt{8}}$, where p and q are integers.

Find the value of q.

$q =$ .....

(3)

(Total for Question 16 is 5 marks)

17 The table shows information about the 40 coins in Karam's money box.

	Bronze coins		**Silver coins**			
Value of coin (pence)	1	2	5	10	20	50
Number of coins	6	8	12	7	3	4

Karam shakes his money box until a coin falls out at random.
He does not replace the coin in the money box.
Karam shakes his money box again until a second coin falls out at random.

(a) Work out the probability that both the coins that fall out are silver coins.

(2)

(b) Work out the probability that the total value of the two coins that fall out is 60 pence or more.

(3)

(Total for Question 17 is 5 marks)

18

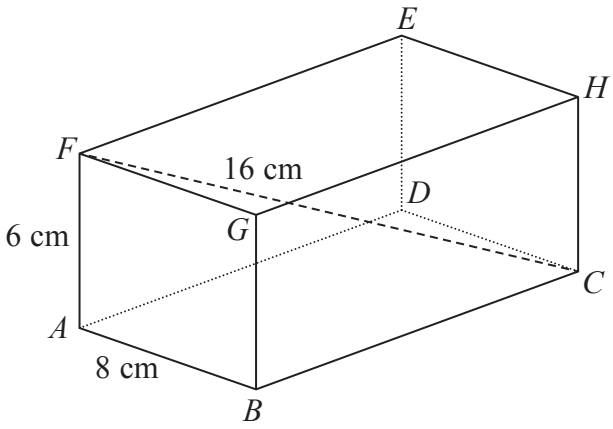


Diagram **NOT** accurately drawn

The diagram shows a cuboid $ABCDEFGH$.
$AB = 8$ cm, $AF = 6$ cm and $FC = 16$ cm.

(a) Find the length of BC.
Give your answer correct to 3 significant figures.

$BC =$ ..... cm

(3)

(b) Find the size of the angle between the line FC and the plane $ABGF$.
Give your answer correct to 1 decimal place.

..... °

(2)

(Total for Question 18 is 5 marks)

19 Solve the inequality $3x^2 + 5 < 53$

(Total for Question 19 is 3 marks)

20 Solve the equation $\dfrac{2^{(n^2)}}{2^n \times 2^6} = 1$

Show clear algebraic working.

(Total for Question 20 is 3 marks)

21

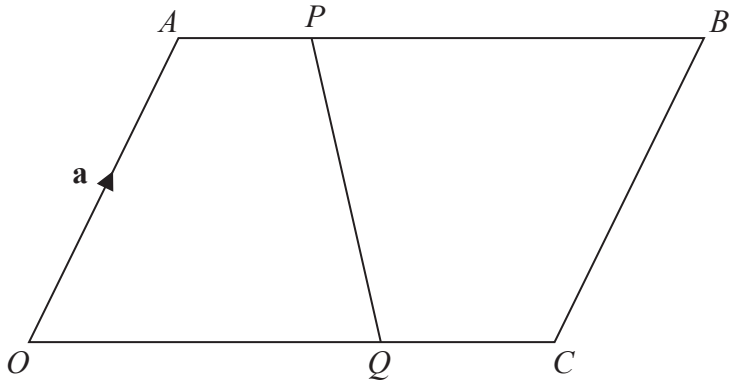


Diagram **NOT** accurately drawn

$OABC$ is a parallelogram.

$\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OC} = \mathbf{c}$

P is the point on AB such that $AP = \frac{1}{4}AB$.

Q is the point on OC such that $OQ = \frac{2}{3}OC$.

Find, in terms of **a** and **c**, $\overrightarrow{PQ}$.
Give your answer in its simplest form.

.....

(Total for Question 21 is 3 marks)

TOTAL FOR PAPER IS 100 MARKS

BLANK PAGE

Do NOT write on this page.

BLANK PAGE

Do NOT write on this page.