Write your name here

Surname	Other names

Pearson Edexcel Certificate
Pearson Edexcel
International GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Mathematics A

Paper 3H

Higher Tier

Thursday 25 May 2017 – Morning
Time: 2 hours

Paper Reference
4MA0/3H
KMA0/3H

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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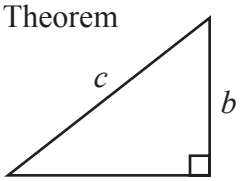
Pearson

International GCSE MATHEMATICS
FORMULAE SHEET – HIGHER TIER

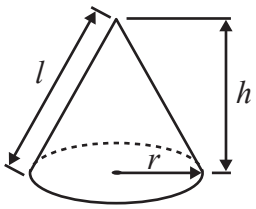
Pythagoras' Theorem



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

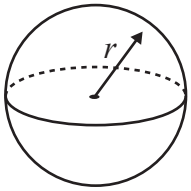
Volume of cone = $\frac{1}{3}\pi r^2 h$

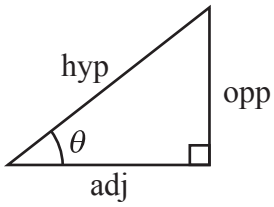
Curved surface area of cone = $\pi r l$



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

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





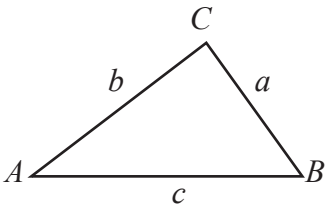
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

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

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

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

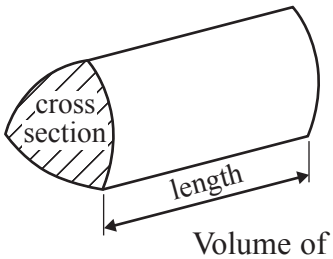
In any triangle ABC



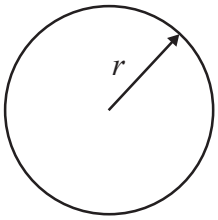
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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



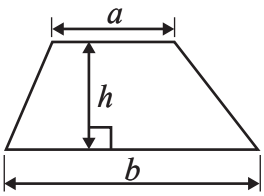
Volume of prism = area of cross section × length

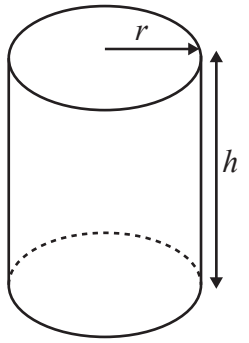


Circumference of circle = $2\pi r$

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 TWO questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 (a) Factorise $10a + 25$

.....

(1)

(b) Factorise $7w^2 - 4w$

.....

(1)

(c) Expand $p^2(p - 5)$

.....

(2)

(d) Expand and simplify $(x - 3)(x + 7)$

.....

(2)

$G = f^3 - 7f$

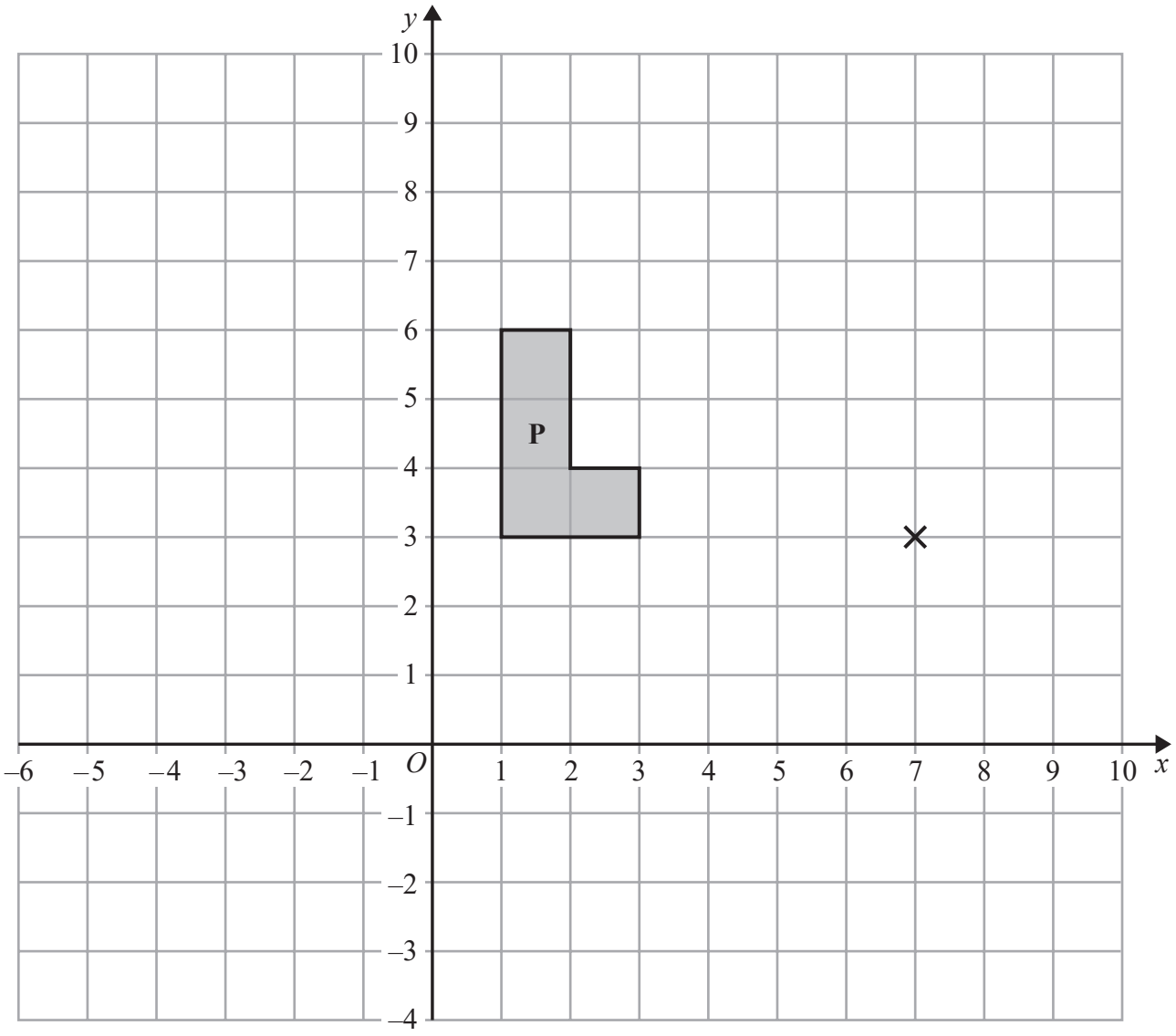
(e) Work out the value of G when $f = 2$

$G =$ .....

(2)

(Total for Question 1 is 8 marks)

2



(a) On the grid, enlarge shape **P** with scale factor 2 and centre (7, 3)
Label the new shape **Q**.

(2)

(b) On the grid, rotate shape **P** through 90° anticlockwise about the point (7, 3)
Label the new shape **R**.

(2)

(Total for Question 2 is 4 marks)

3 Here is a list of ingredients needed to make apple and blackberry crumble for 4 people.

Apple and Blackberry Crumble
Ingredients for 4 people

120 grams	flour
80 grams	sugar
90 grams	butter
300 grams	apples
115 grams	blackberries

Rufus wants to make apple and blackberry crumble for 10 people.

(a) Work out the amount of apples he needs.

..... grams

(2)

Roland makes apple and blackberry crumble for a group of people.
He uses 920 grams of blackberries.

(b) Work out the number of people in the group.

.....

(2)

(Total for Question 3 is 4 marks)

4 The table shows information about the lengths, in cm, of 40 leaves.

Length (L cm)	Frequency
$0 < L \leqslant 1$	4
$1 < L \leqslant 2$	5
$2 < L \leqslant 3$	11
$3 < L \leqslant 4$	14
$4 < L \leqslant 5$	6

(a) Write down the modal class.

.....

(1)

(b) Work out an estimate for the mean length of the 40 leaves.
Give your answer correct to 1 decimal place.

..... cm

(4)

(Total for Question 4 is 5 marks)

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

$$\frac{7.3 + 2.1}{6.4} + 2.2^2$$

Give your answer as a decimal.
Write down all the figures on your calculator display.

.....

(2)

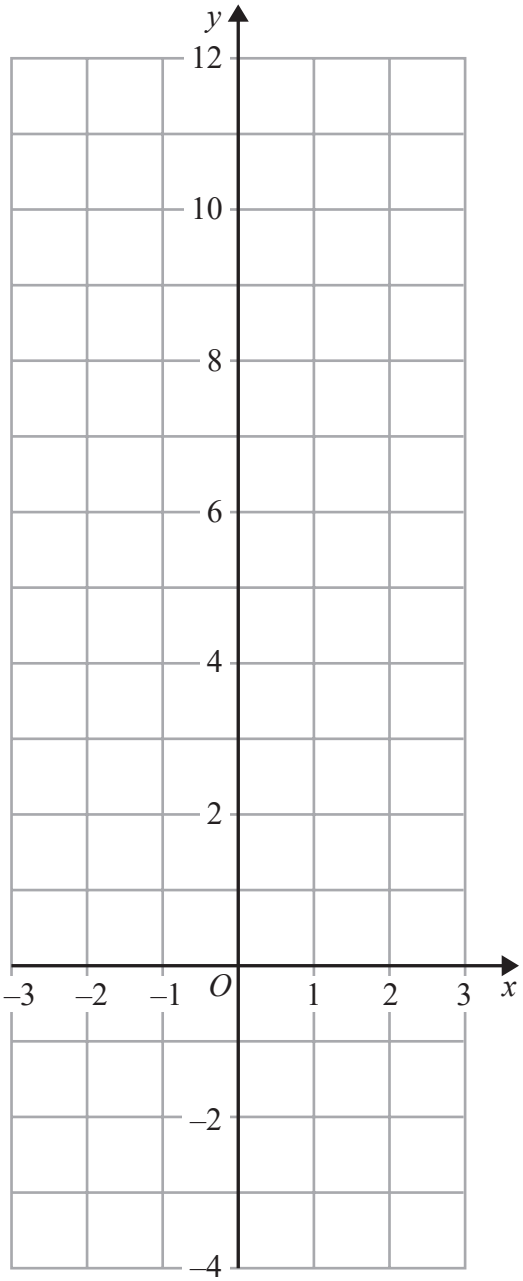
(b) Give your answer to part (a) correct to 3 significant figures.

.....

(1)

(Total for Question 5 is 3 marks)

6 On the grid, draw the graph of $y = 2x + 4$ for values of x from -3 to 3



(Total for Question 6 is 3 marks)

7

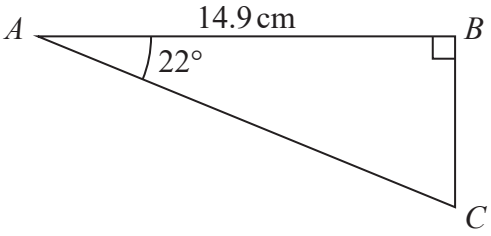


Diagram **NOT** accurately drawn

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

..... cm

(Total for Question 7 is 3 marks)

8 In 2014, Donald's weekly pay was \$640
In 2015, Donald's weekly pay was \$668.80

(a) Work out the percentage increase in Donald's pay between 2014 and 2015

..... %

(3)

In 2015, Donald's weekly pay was 95% of his weekly pay in 2016

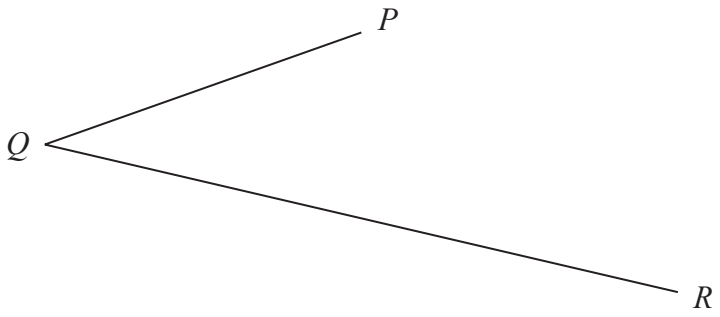
(b) Work out Donald's weekly pay in 2016

\$ .....

(3)

(Total for Question 8 is 6 marks)

9 Use ruler and compasses to construct the bisector of angle PQR.
You must show all your construction lines.



(Total for Question 9 is 2 marks)

10 Solve the simultaneous equations

$$2x + 7y = 31$$
$$5x - 3y = 16$$

Show clear algebraic working.

$x =$ .....

$y =$ .....

(Total for Question 10 is 4 marks)

11 The table gives information about the ages of all the 90 adults in a supermarket.

Age (t years)	Frequency
$20 < t \leqslant 30$	4
$30 < t \leqslant 40$	28
$40 < t \leqslant 50$	30
$50 < t \leqslant 60$	16
$60 < t \leqslant 70$	8
$70 < t \leqslant 80$	4

One of these 90 adults is picked at random.

(a) Find the probability that this adult's age is more than 50 years.

.....

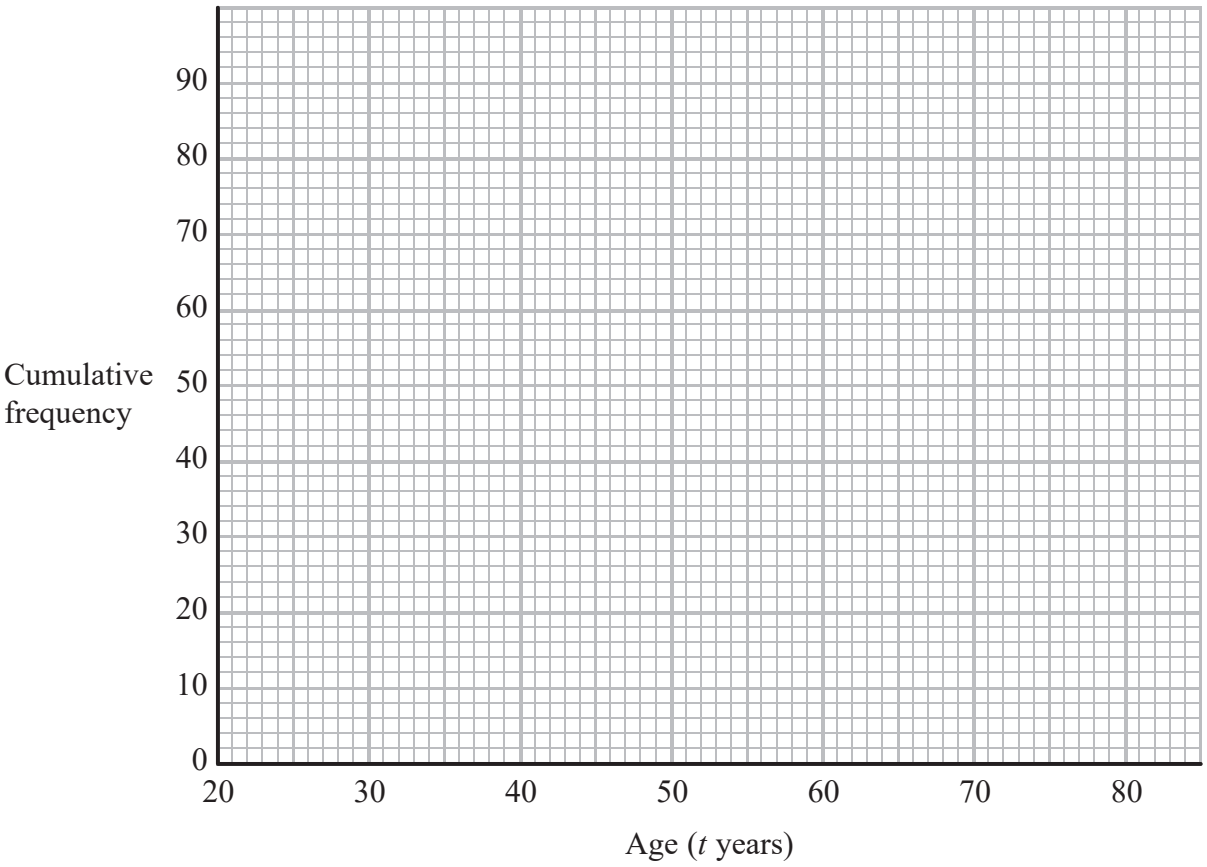
(2)

(b) Complete the cumulative frequency table for these 90 adults.

Age (t years)	Cumulative frequency
$20 < t \leqslant 30$	
$20 < t \leqslant 40$	
$20 < t \leqslant 50$	
$20 < t \leqslant 60$	
$20 < t \leqslant 70$	
$20 < t \leqslant 80$	

(1)

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



(2)

All of these adults with an age greater than 65 years receive a discount on their shopping bill.

(d) Use your graph to find an estimate for the number of these adults who receive a discount.

.....

(2)

(Total for Question 11 is 7 marks)

12 (a) Write 0.000 451 in standard form.

.....

(1)

(b) Work out $\dfrac{7.8 \times 10^5}{2.4 \times 10^{-4}}$

Give your answer in standard form.

.....

(2)

(Total for Question 12 is 3 marks)

13 Here are two mathematically similar cups, **A** and **B**.

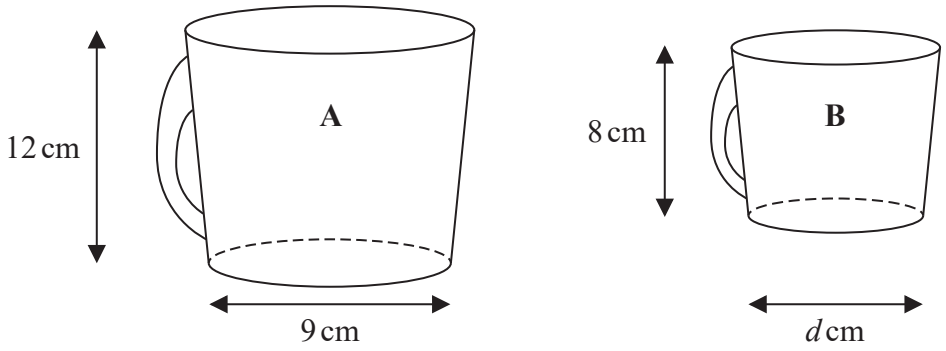


Diagram **NOT** accurately drawn

A has height 12 cm and base diameter 9 cm.
B has height 8 cm and base diameter d cm.

(a) Work out the value of d.

.....

(2)

The volume of **B** is 160 millilitres.

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

..... millilitres

(2)

Two solid plates, **P** and **Q**, are mathematically similar and made of the same material.

The surface area of **P** is p cm^2
The surface area of **Q** is q cm^2
The weight of **P** is w grams.

(c) Find an expression for the weight of **Q**.
Give your answer in terms of p, q and w.

..... grams

(2)

(Total for Question 13 is 6 marks)

14 (a) Simplify $\left(\sqrt{x}\right)^8$

.....

(1)

(b) Solve $\frac{6 + 4y}{3} = 5 - 2y$

Show clear algebraic working.

$y =$ .....

(4)

(c) Make g the subject of $g - 1 = gh + 3h$

.....

(3)

(Total for Question 14 is 8 marks)

15 P is directly proportional to r^3
$P = 343$ when $r = 3.5$

Find a formula for P in terms of r.

.....

(Total for Question 15 is 3 marks)

16 $\left(5\sqrt{2} - e\right)\left(3\sqrt{2} + e\right) = f\sqrt{2} - 6$

Given that e and f are positive integers,

find the value of e and the value of f.

$e =$ .....

$f =$ .....

(Total for Question 16 is 3 marks)

17

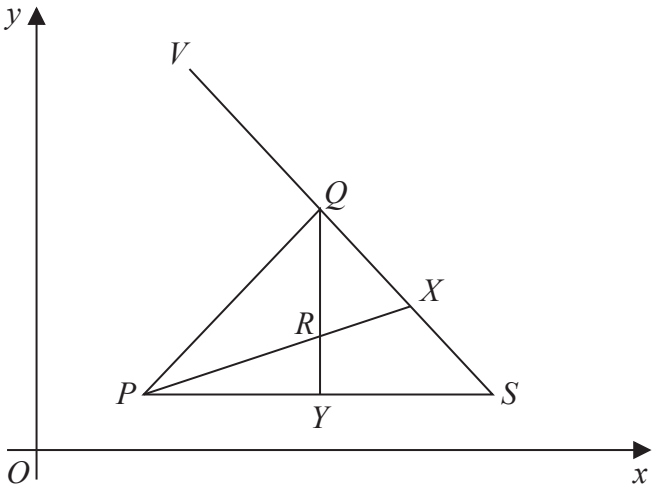


Diagram **NOT** accurately drawn

PQS is a triangle.
X is the midpoint of *QS* and *Y* is the midpoint of *PS*.

R is the point of intersection of *PX* and *QY*.
V is a point so that *VQXS* is a straight line.

$\overrightarrow{PQ} = \mathbf{a}$ $\overrightarrow{PS} = \mathbf{b}$

(a) Find, in terms of **a** and **b**,

(i) $\overrightarrow{QS}$

.....

(ii) $\overrightarrow{QY}$

.....

(iii) $\overrightarrow{PX}$

.....

(3)

P has coordinates (3, 1) and $\overrightarrow{PR} = \frac{2}{3}\overrightarrow{PX}$

$\overrightarrow{PR} = \begin{pmatrix} 4 \\ 2 \end{pmatrix}$ and $\overrightarrow{XV} = \begin{pmatrix} -5 \\ 4 \end{pmatrix}$

(b) Work out the coordinates of *V*.

(..... , ...)

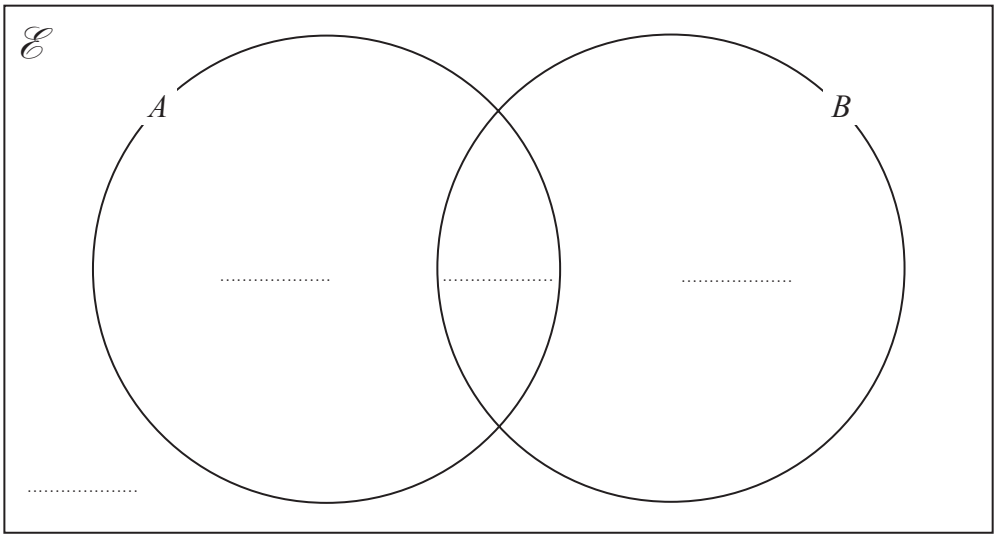
(3)

(Total for Question 17 is 6 marks)

18 A and B are two sets.

$$n(\mathscr{E}) = 50$$
$$n(A \cap B) = 4$$
$$n(A) = 5$$
$$n(B) = 9$$

(a) Complete the Venn diagram to show the numbers of elements.



(2)

(b) Find

(i) $n(A \cap B')$

.....

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

.....

(2)

(Total for Question 18 is 4 marks)

19 $f(x) = \dfrac{4}{x-3}$

$g(x) = \dfrac{x-2}{x}$

(a) Express the inverse function f^{-1} in the form $f^{-1}(x) = ...$

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

(3)

(b) Solve $fg(a) = 1$
Show clear algebraic working.

$a =$ .....

(3)

(Total for Question 19 is 6 marks)

20 A bag contains 12 marbles.
6 of the marbles are red, 4 of the marbles are blue and 2 of the marbles are green.

Raj takes at random 3 marbles from the bag.

Find the probability that exactly 2 of these marbles are blue.

.....

(Total for Question 20 is 3 marks)

21 The diagram shows a triangular prism with a horizontal base $ABCD$.

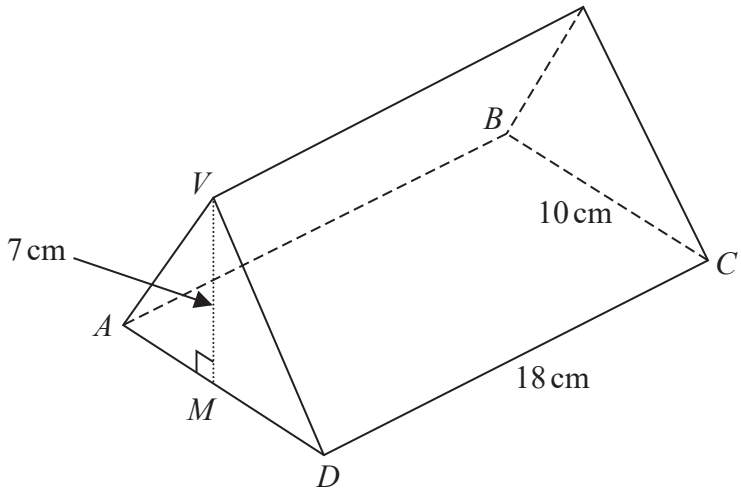


Diagram **NOT** accurately drawn

M is the midpoint of AD.
The vertex V is vertically above M.

$DC = 18$ cm, $BC = 10$ cm, $MV = 7$ cm.

Calculate the size of the angle between VC and the plane $ABCD$.
Give your answer correct to 3 significant figures.

.....°

(Total for Question 21 is 4 marks)

22 Simplify fully $\dfrac{3}{2x+12} - \dfrac{x-15}{x^2-2x-48}$

Show clear algebraic working.

.....

(Total for Question 22 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS

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