Write your name here

Surname		Other names

Edexcel Certificate

Edexcel International GCSE

Centre Number

Candidate Number

Mathematics A
Paper 4H

Higher Tier

Tuesday 21 May 2013 – Morning
Time: 2 hours

Paper Reference
4MA0/4H
KMA0/4H

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.
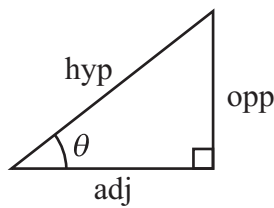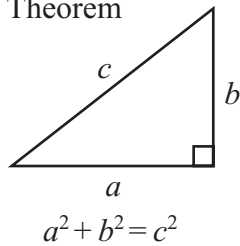- Check your answers if you have time at the end.

Turn over

P 4 2 0 7 1 A 0 1 2 0

PEARSON

PAPACAMBRIDGE

International GCSE MATHEMATICS
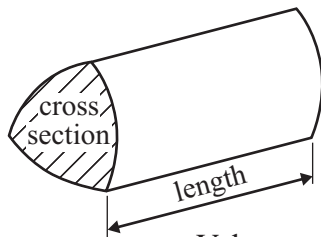## FORMULAE SHEET – HIGHER TIER

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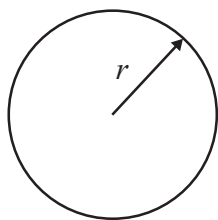opp = hyp $\times$ sin θ
opp = adj $\times$ tan θ

or

$\sin\theta = \dfrac{\text{opp}}{\text{hyp}}$

$\cos\theta = \dfrac{\text{adj}}{\text{hyp}}$
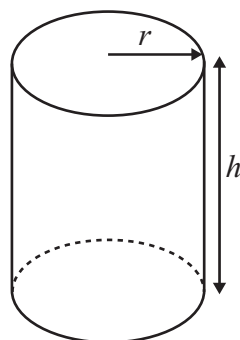
$\tan\theta = \dfrac{\text{opp}}{\text{adj}}$

In any triangle ABC

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

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 = πr^2

Area of a trapezium = $\frac{1}{2}(a + b)h$
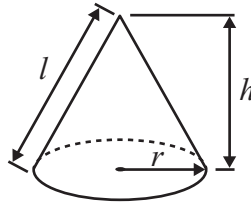
Volume of cylinder = $\pi r^2 h$

Curved surface area
of cylinder = $2\pi rh$
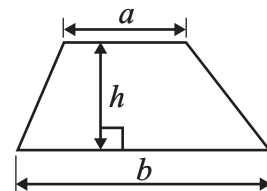
The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$,
where $a \neq 0$, are given by

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

Answer ALL TWENTY THREE questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 A box contains four different kinds of chocolates.
   Debbie takes at random a chocolate from the box.
   The table shows the probability of Debbie taking an Orange or a Coffee or a Caramel chocolate.

Chocolate	Probability
Orange	0.15
Coffee	0.40
Caramel	0.35
Strawberry	

(a) Work out the probability that Debbie takes a Strawberry chocolate.

....
   (2)

(b) Work out the probability that Debbie takes an Orange chocolate or a Coffee chocolate.

....
   (2)

(Total for Question 1 is 4 marks)

2 Green paint can be made by mixing yellow paint and blue paint in the ratio 2 : 3
   Wendy makes 15 litres of green paint.

   Work out how many litres of blue paint Wendy uses.

.... litres

(Total for Question 2 is 2 marks)

3 Yoko flew on a plane from Tokyo to Sydney.
The plane flew a distance of 7800 km.
The flight time was 9 hours 45 minutes.

Work out the average speed of the plane in kilometres per hour.

.... km/h

(Total for Question 3 is 3 marks)

4
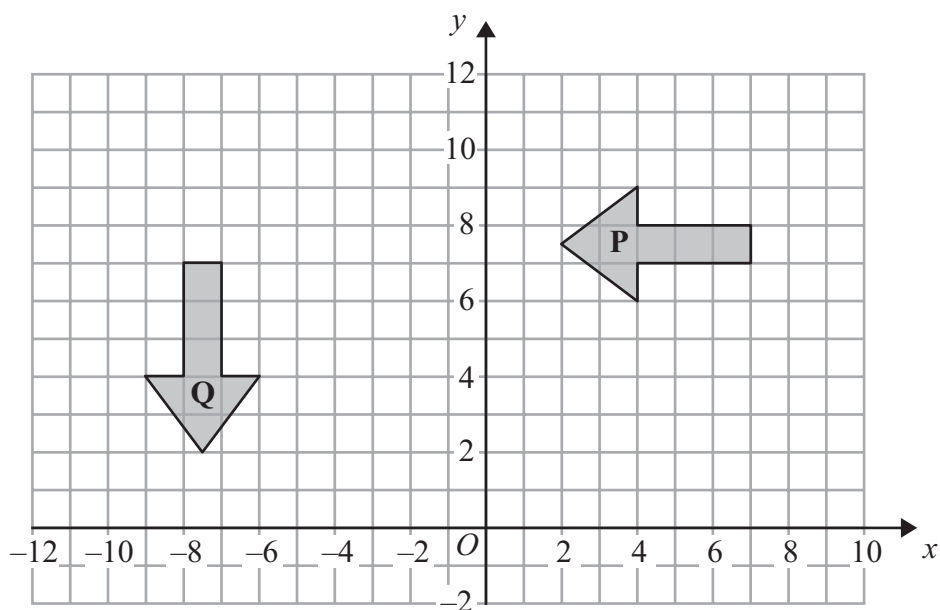
(a) Describe fully the single transformation that maps shape **P** onto shape **Q**.

....

....

(3)

(b) On the grid, translate shape **P** by the vector $\begin{pmatrix} -6 \\ 2 \end{pmatrix}$
Label the new shape **R**.

(2)

(Total for Question 4 is 5 marks)

5 (a) Show that $\dfrac{7}{8} - \dfrac{5}{6} = \dfrac{1}{24}$

(2)

(b) Show that $\dfrac{5}{8} \div \dfrac{7}{12} = 1\dfrac{1}{14}$

(2)

(Total for Question 5 is 4 marks)

6 Solve $\quad 7y - 6 = 2y + 8$

Show clear algebraic working.

$y = $ ....

(Total for Question 6 is 3 marks)

PAPACAMBRIDGE

7 Two points, *A* and *B*, are plotted on a centimetre grid.
A has coordinates (1, 4) and *B* has coordinates (8, 2).
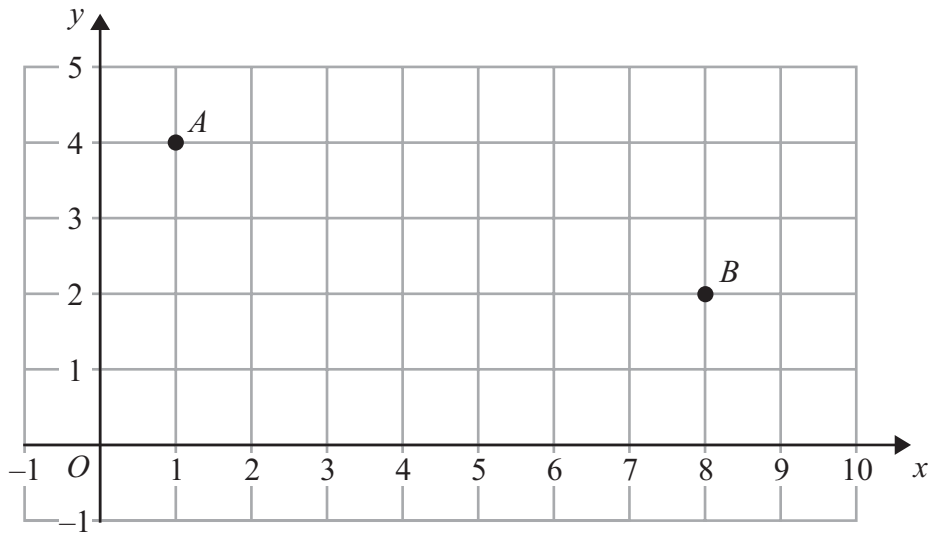
(a) Work out the coordinates of the midpoint of *AB*.

(........................ , ...)
(2)

(b) Use Pythagoras' Theorem to work out the length of *AB*.
Give your answer correct to 3 significant figures.

.... cm
(4)

(Total for Question 7 is 6 marks)

8 Express 204 as a product of its prime factors.

....

(Total for Question 8 is 3 marks)

9 (a) Solve the inequalities $-6 \leqslant 3x < 9$

....

(2)

(b) n is an integer.

Write down all the values of n which satisfy $-6 \leqslant 3n < 9$

....

(2)

(Total for Question 9 is 4 marks)

10 The scale of a map is 1 : 25 000
On the map, the distance between two railway stations is 22 cm.

Work out the real distance between the two railway stations.
Give your answer in kilometres.

.... km

(Total for Question 10 is 3 marks)

PAPACAMBRIDGE

11 For $y = x^3 - 6x^2 + 20$

(a) (i) show that $y = 4$ when $x = 2$

(ii) complete the table of values

x	-1	0	1	2	3	4	5	6
y		20	15		-7	-12		20

(2)

(b) On the grid, draw the graph of $y = x^3 - 6x^2 + 20$ for values of x from -1 to 6
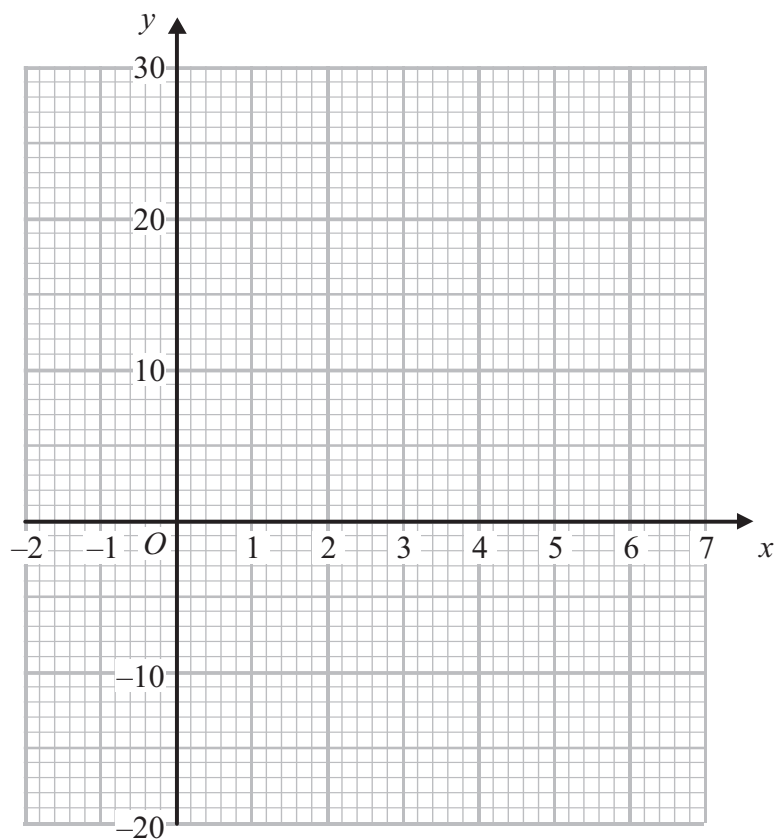
(2)

(c) For the curve with equation $y = x^3 - 6x^2 + 20$

(i) find $\dfrac{\mathrm{d}y}{\mathrm{d}x}$

....

(ii) find the gradient of the curve at $x = -3$

....

....

(4)

(Total for Question 11 is 8 marks)

12 The table shows information about the amount of money, in dollars, spent in a shop in one day by 80 people.

Money spent (x dollars)	Frequency
$0 < x \leqslant 20$	24
$20 < x \leqslant 40$	20
$40 < x \leqslant 60$	9
$60 < x \leqslant 80$	12
$80 < x \leqslant 100$	15

Work out an estimate for the total amount of money spent in the shop that day.

.... dollars

(Total for Question 12 is 3 marks)

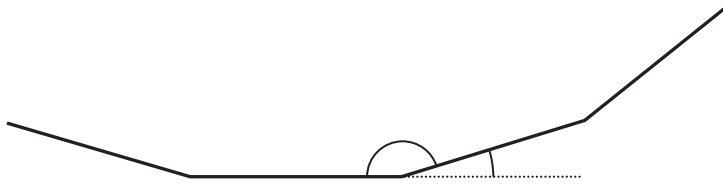**13** The diagram shows an incomplete regular polygon.

Diagram **NOT** accurately drawn

The size of each interior angle is 140 degrees greater than the size of each exterior angle.

Work out the number of sides the regular polygon has.

....

(Total for Question 13 is 4 marks)

Do NOT write in this space.

14 The table shows the surface areas, in km², of five oceans.

Ocean	Surface area (km²)
Atlantic	7.68×10^7
Indian	6.86×10^7
Pacific	1.56×10^8
Southern	2.03×10^7
Arctic	1.41×10^7

(a) Which of these oceans has the largest surface area?

....
(1)

(b) Work out the total surface area, in km², of all five oceans.
Give your answer in standard form.

.... km²
(2)

The total surface area of the Earth is 5.10×10^8 km².

(c) Express the total surface area of the five oceans as a percentage of the total surface area of the Earth.
Give your answer correct to 1 decimal place.

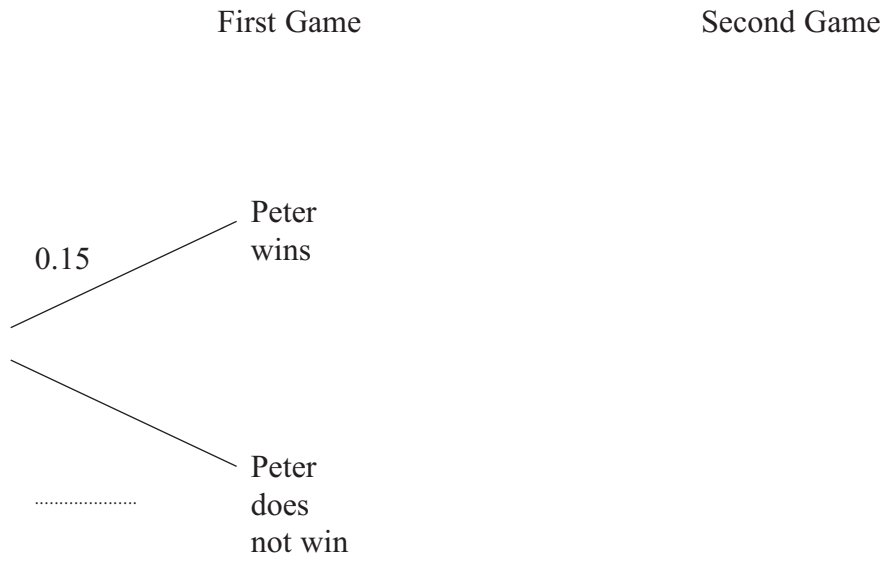.............................. %
(2)

(Total for Question 14 is 5 marks)

Do NOT write in this space.

Turn over ▶

P 4 2 0

15 Peter and John play two games of badminton against each other.
For each game, the probability that Peter wins is 0.15

(a) Complete the probability tree diagram.

First Game   Second Game

0.15   Peter
                wins

.... Peter
                does
                not win

(3)

(b) Calculate the probability that Peter wins both games.

....

(2)

(Total for Question 15 is 5 marks)

Do NOT write in this space.

PAPACAMBRIDGE

16 The pressure P, of water leaving a cylindrical pipe, is inversely proportional to the square of the radius, r, of the pipe.

$P = 22.5$ when $r = 2$

(a) Find a formula for P in terms of r.

....
(3)

(b) Calculate the value of P when $r = 1.5$

$P =$ ....
(1)

(c) Calculate the value of r when $P = 10$

$r =$ ....
(2)

(Total for Question 16 is 6 marks)

Do NOT write in this space.

17 The function f is defined as

$$f(x) = \frac{x - 6}{2}$$

(a) Find $f(8)$

....
(1)

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

$f^{-1}(x) =$ ....
(2)

The function g is defined as

$$g(x) = \sqrt{x - 4}$$

(c) Which values of x cannot be included in a domain of g?

....
(2)

(d) Express the function gf in the form $gf(x) = ...$
Give your answer as simply as possible.
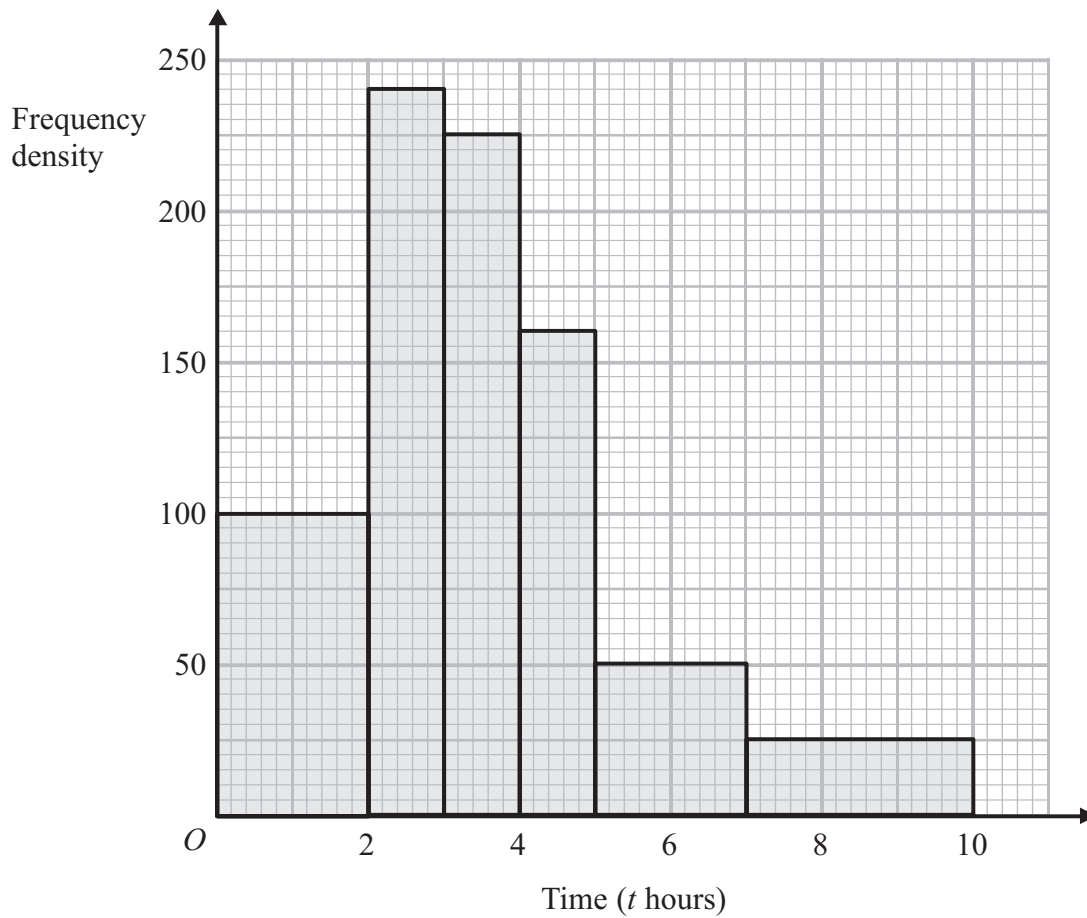
$gf(x) =$ ....
(2)

(Total for Question 17 is 7 marks)

18 The histogram shows information about the times, t hours, for which some cars were left in a car park.

Calculate an estimate for the number of cars which were left in the car park for between 4.5 hours and 8 hours.

....

(Total for Question 18 is 3 marks)

Turn over ▶

19 The sides of triangle *PQR* are tangents to a circle.
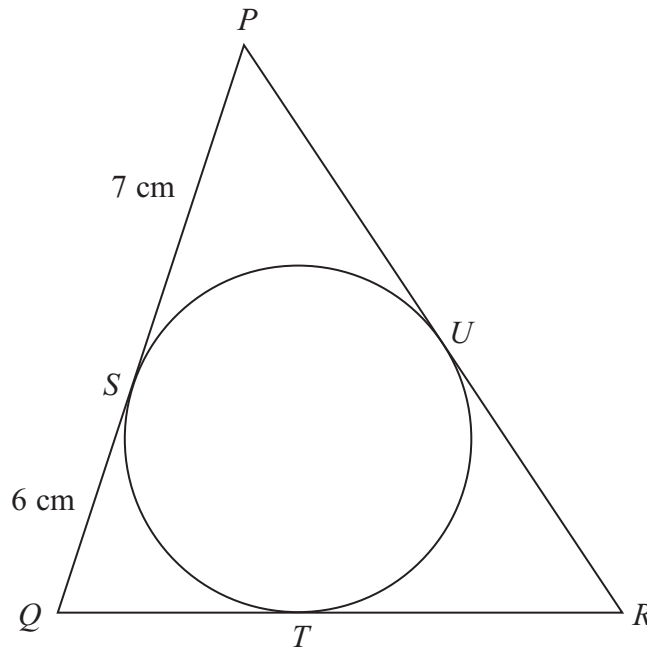The tangents touch the circle at the points *S*, *T* and *U*.
QS = 6 cm. *PS* = 7 cm.

Diagram **NOT** accurately drawn

(a) (i) Write down the length of *QT*.

.... cm

(ii) Give a reason for your answer.

....

(2)

The perimeter of triangle *PQR* is 42 cm.

(b) Calculate the size of angle *PQR*.
Give your answer correct to 1 decimal place.

°

....

(4)

(Total for Question 19 is 6 marks)

20 The Venn diagram shows a universal set $\mathscr{E}$ and 3 sets A, B and C.
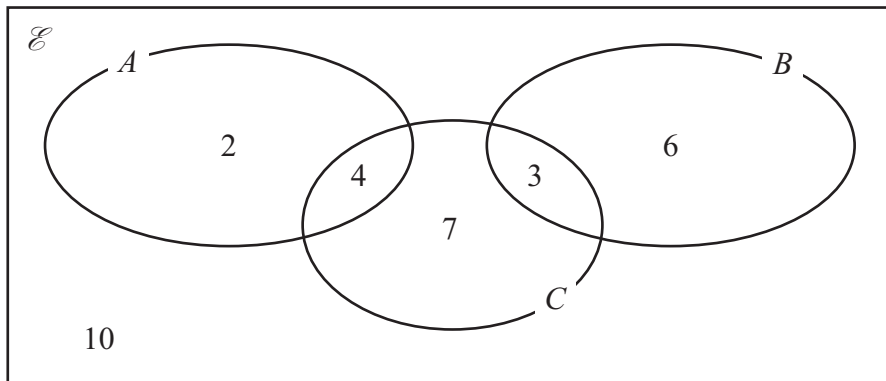
2, 4, 7, 3, 6 and 10 represent **numbers** of elements.

Find

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

....

(ii) n (B')

....

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

....

(iv) n $(B' \cap C')$

....

(Total for Question 20 is 4 marks)

Turn over ▶

21
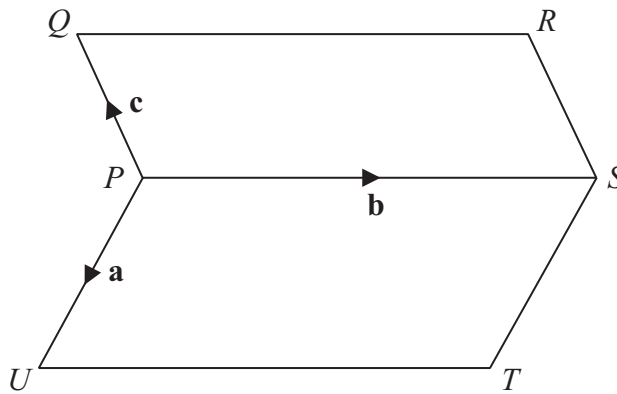
Diagram **NOT** accurately drawn

PQRS and *PSTU* are parallelograms.

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

Find, in terms of **a**, **b** and **c**

(i) $\overrightarrow{TQ}$

....

(ii) $\overrightarrow{PX}$ where *X* is the midpoint of *TQ*.

Simplify your answer as much as possible.

....

(Total for Question 21 is 3 marks)

22 The diagram shows a triangular prism with a horizontal rectangular base *ABCD*.
   AB = 10 cm. *BC* = 7 cm.
   M is the midpoint of *AD*.
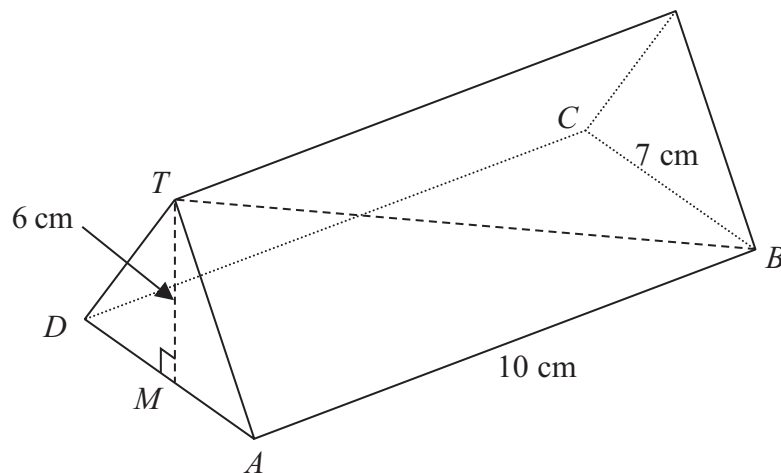   The vertex *T* is vertically above *M*.
   MT = 6 cm.

Diagram **NOT**
accurately drawn

Calculate the size of the angle between *TB* and the base *ABCD*.

Give your answer correct to 1 decimal place.

....°

(Total for Question 22 is 4 marks)

23 Solve $\dfrac{3}{(x+1)} + \dfrac{2}{(2x-3)} = 1$

Show clear algebraic working.

....

(Total for Question 23 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS