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Surname	Other names

Pearson Edexcel International GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Mathematics A

Paper 3HR

Higher Tier

Monday 9 January 2017 – 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 ▶

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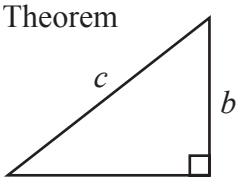
International GCSE MATHEMATICS
FORMULAE SHEET – HIGHER TIER

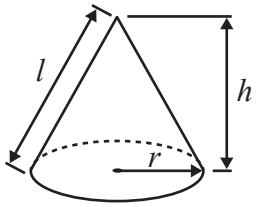
Pythagoras' Theorem



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

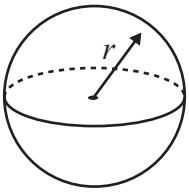
Volume of cone = $\frac{1}{3}\pi r^2 h$

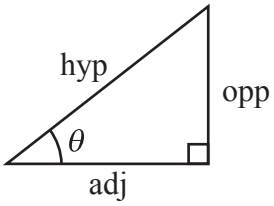
Curved surface area of cone = $\pi r l$



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

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





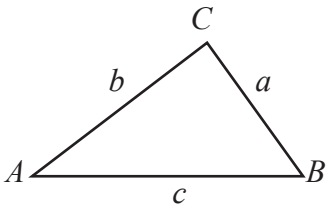
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

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

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

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

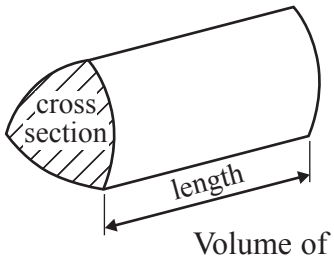
In any triangle ABC



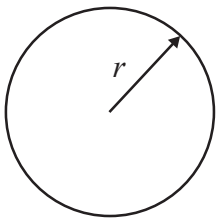
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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



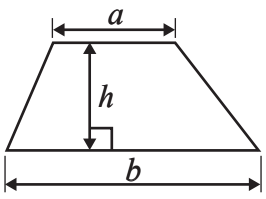
Volume of prism = area of cross section × length

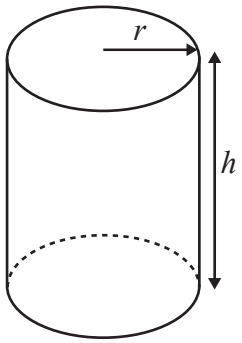


Circumference of circle = $2\pi r$

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

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

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Answer ALL TWENTY THREE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 The area of the floor of a room is $12\,m^2$

Change $12\,m^2$ into cm^2

..... cm^2

(Total for Question 1 is 2 marks)

2 Each exterior angle of a regular polygon is 18°

Work out the number of sides of this regular polygon.

.....

(Total for Question 2 is 2 marks)

3 *A* is the point with coordinates (4, 11)
B is the point with coordinates (8, 3)

Work out the coordinates of the midpoint of *AB*.

(..... , ...)

(Total for Question 3 is 2 marks)

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4 A plane flew 8740 km from Nairobi to Hong Kong.
The flight time was 13 hours 15 minutes.

Work out the average speed of the plane.
Give your answer, in kilometres per hour, correct to the nearest whole number.

..... kilometres per hour

(Total for Question 4 is 3 marks)

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5 There are 80 counters in a bag.
The counters are either red or blue.

The ratio of the number of red counters to the number of blue counters is 3 : 1

Michael takes 15% of the red counters out of the bag.

Alison takes $\frac{1}{5}$ of the blue counters out of the bag.

How many counters are now in the bag?

(Total for Question 5 is 5 marks)

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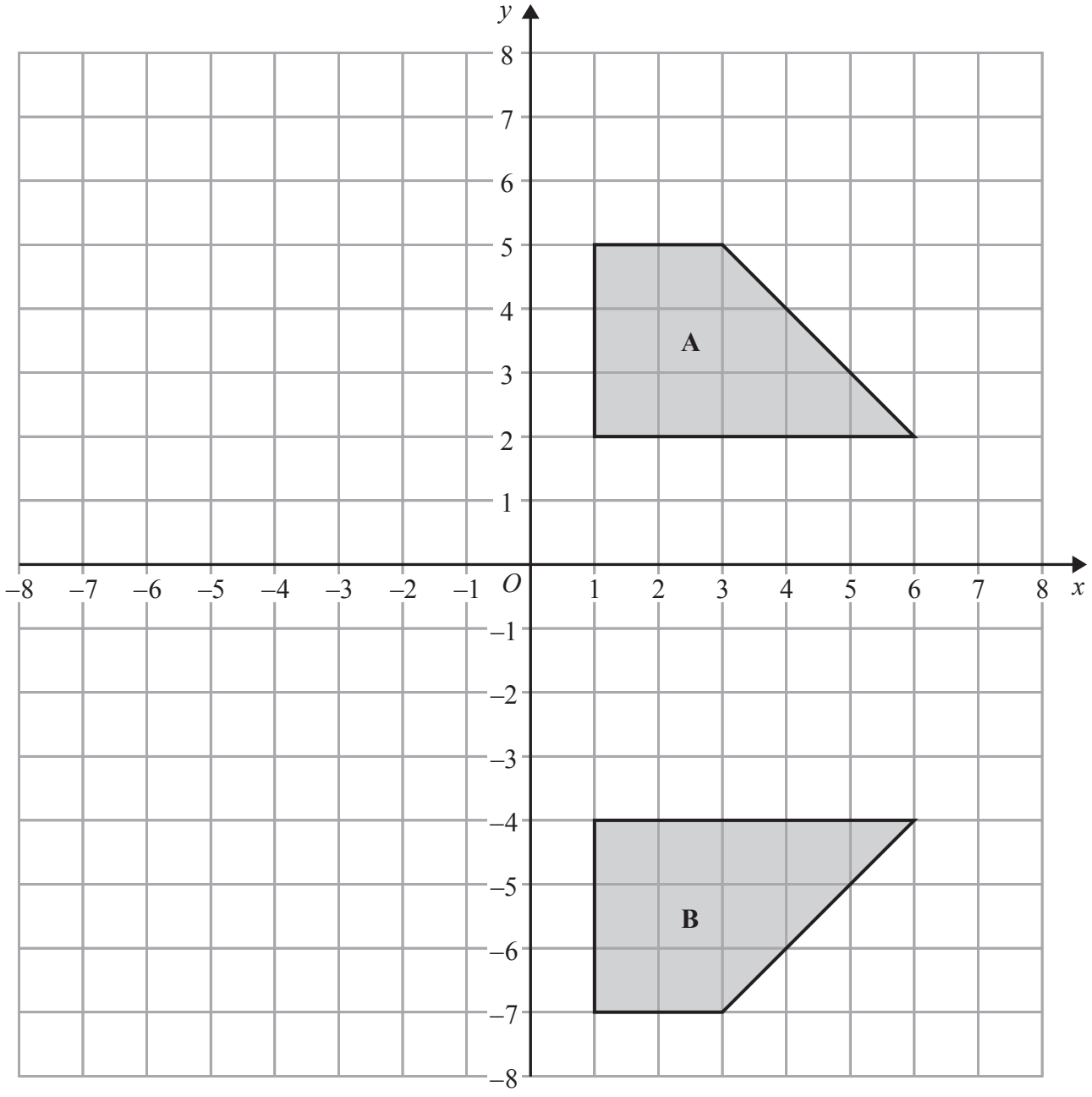
6



(a) Describe fully the single transformation that maps shape **A** onto shape **B**.

.....

.....

(2)

(b) On the grid, rotate shape **A** 90° anticlockwise about (0, 0)
Label the new shape **C**.

(2)

(Total for Question 6 is 4 marks)

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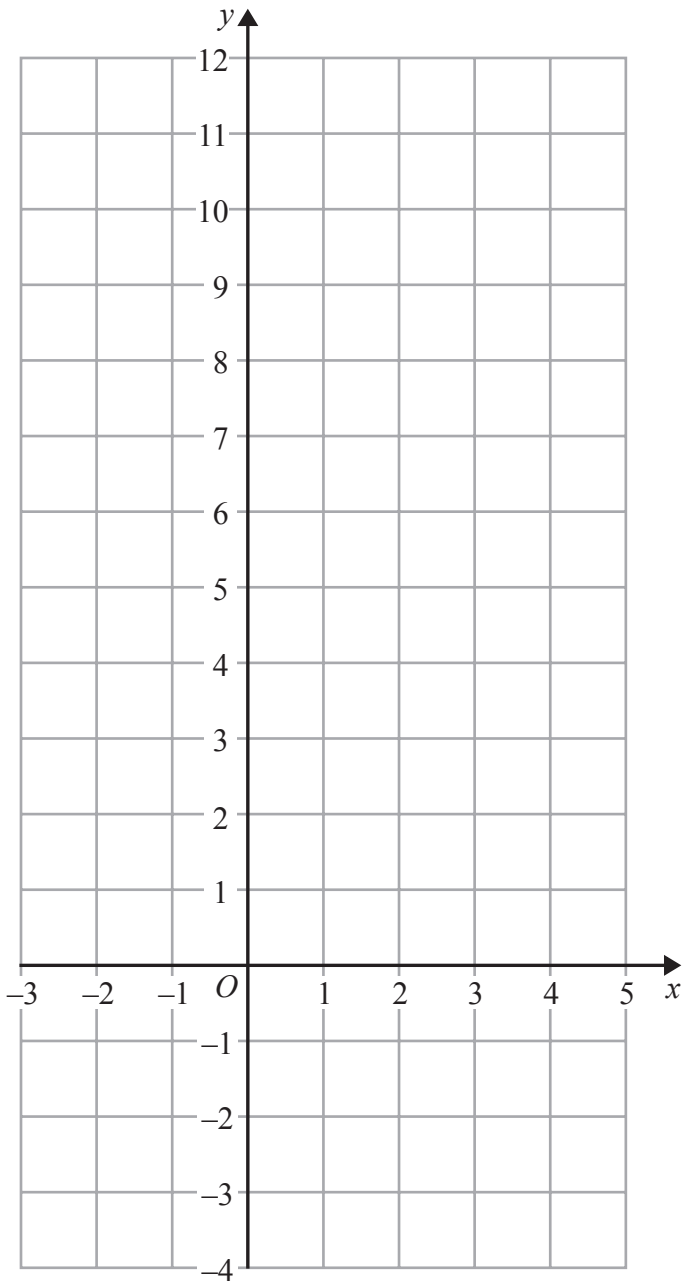
7 On the grid, draw the graph of $y + 2x = 6$ for values of x from –2 to 4



(Total for Question 7 is 4 marks)

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8 A lion is 224 cm long.

Simon makes a scale model of the lion.
He uses a scale of 1 : 8

(a) Work out the length of the scale model.

..... cm

(2)

In 2010, there were 411 Asiatic lions in India.
In 2015, there were 523 Asiatic lions in India.

(b) Work out the percentage increase in the number of Asiatic lions in India from 2010 to 2015
Give your answer correct to 1 decimal place.

..... %

(3)

(Total for Question 8 is 5 marks)

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9 The table gives information about the weights of 20 rugby players.

Weight (w kg)	Frequency
$80 < w \leqslant 90$	3
$90 < w \leqslant 100$	5
$100 < w \leqslant 110$	7
$110 < w \leqslant 120$	4
$120 < w \leqslant 130$	1

(a) Write down the modal class.

.....

(1)

(b) Work out an estimate for the total weight of these 20 rugby players.

..... kg

(3)

(Total for Question 9 is 4 marks)

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10 Here is an isosceles triangle.

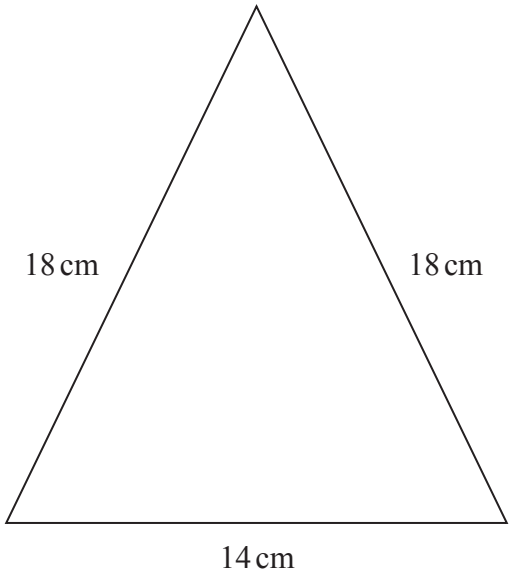

Diagram **NOT** accurately drawn

Work out the area of the triangle.
Give your answer correct to 3 significant figures.

..... cm^2

(Total for Question 10 is 4 marks)

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11 (a) Solve $7x + 2y = 16$
$5x - 2y = 20$

Show clear algebraic working.

$x =$ .....

$y =$ .....

(3)

(b) Expand and simplify $(k + 9)(k - 5)$

.....

(2)

(c) Simplify $\left(\frac{y^5}{8x^6y^8}\right)^{-\frac{1}{3}}$

.....

(3)

(Total for Question 11 is 8 marks)

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12 The cumulative frequency table shows information about the times, in minutes, 80 people waited at an airport.

Time (t minutes)	Cumulative frequency
$0 < t \leqslant 20$	5
$0 < t \leqslant 40$	18
$0 < t \leqslant 60$	42
$0 < t \leqslant 80$	66
$0 < t \leqslant 100$	78
$0 < t \leqslant 120$	80

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

(2)

(b) Use your graph to find an estimate for the median time.

..... minutes

(2)

(c) Use your graph to find an estimate for the number of these people who waited more than $1\frac{1}{2}$ hours at the airport.

.....

(2)

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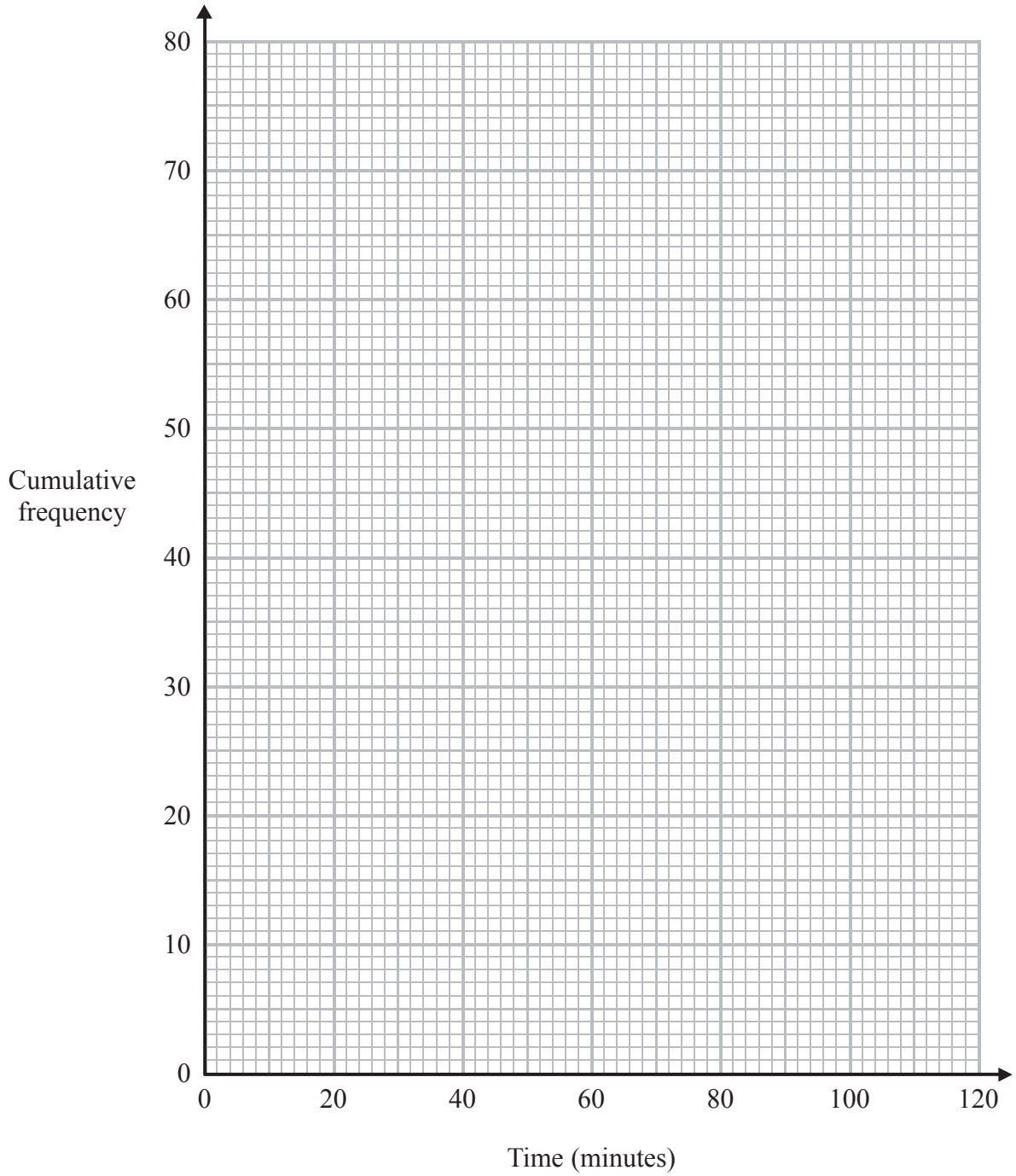

(Total for Question 12 is 6 marks)

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13 (a) Write 7.9×10^{-4} as an ordinary number.

.....

(1)

(b) Work out $(6.5 \times 10^5) \times (3.1 \times 10^4)$
Give your answer in standard form.

.....

(2)

(Total for Question 13 is 3 marks)

14 Amil invests £9000 for 3 years in a savings account.
He gets 1.8% per year compound interest.

How much money will Amil have in his savings account at the end of 3 years?

£.....

(Total for Question 14 is 3 marks)

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15 Line **A** has equation $3x - 4y = 5$
Line **B** goes through the points (4, 7) and (–1, 3)

Are lines **A** and **B** parallel?
Show your working clearly.

(Total for Question 15 is 4 marks)

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16 (a) Solve $\frac{3x+1}{5} - \frac{x-4}{3} = 2$

Show clear algebraic working.

$x =$ .....

(3)

(b) Make p the subject of the formula $t = \frac{7-2p}{3p+1}$

.....

(4)

(Total for Question 16 is 7 marks)

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17 P, R, Q and S are four points on a circle.

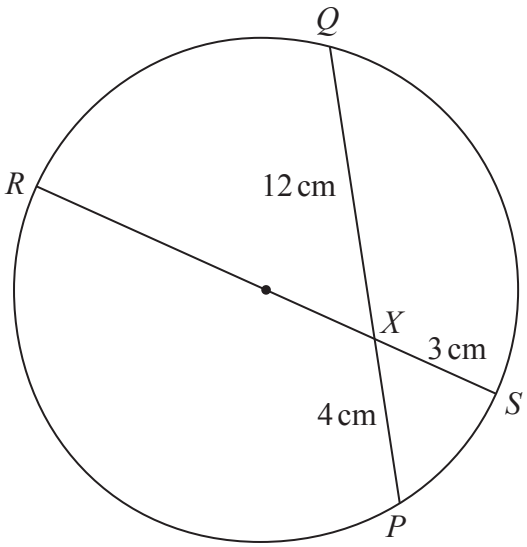

Diagram **NOT** accurately drawn

RXS is a diameter of the circle.
PXQ is a chord of the circle.

$PX = 4$ cm, $XQ = 12$ cm, $SX = 3$ cm.

Work out the radius of the circle.

..... cm

(Total for Question 17 is 3 marks)

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18 Given that p is a prime number, rationalise the denominator of $\dfrac{7\sqrt{p} - p^2}{\sqrt{p^3}}$

Simplify your answer.

(Total for Question 18 is 3 marks)

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19 The function f is defined as $f(x) = \dfrac{3}{2 - x}$

(a) State the value of x which cannot be included in any domain of f.

.....

(1)

(b) Find f(–4)

.....

(1)

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

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

(2)

The function g is defined as $g(x) = \dfrac{2x + 1}{3}$

(d) Express the function fg in the form $fg(x) = ...$
Simplify your answer.

$fg(x) =$ .....

(2)

(Total for Question 19 is 6 marks)

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20 A curve has equation $y = x^3 - 4x^2 + 5x + 4$

(a) Find $\frac{dy}{dx}$

(2)

(b) Find the x coordinates of the points where the curve with equation $y = x^3 - 4x^2 + 5x + 4$ has a gradient of 1
Show clear algebraic working.

(4)

(Total for Question 20 is 6 marks)

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21 The shape $OABC$ is made from a triangle and a sector of a circle.

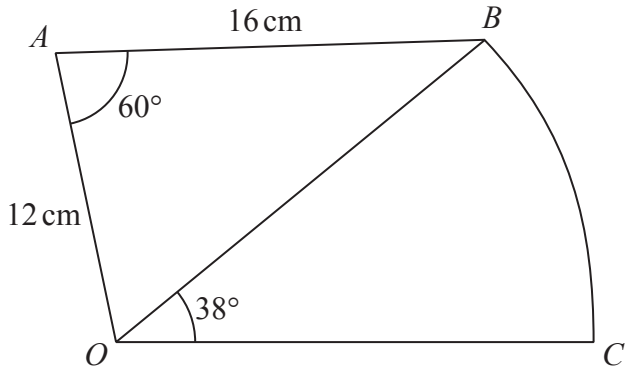

Diagram **NOT** accurately drawn

OAB is a triangle.
OBC is a sector of a circle, centre O.

$OA = 12$ cm
$AB = 16$ cm
Angle $OAB = 60°$
Angle $BOC = 38°$

Work out the area of $OABC$.
Give your answer correct to 3 significant figures.

..... cm^2

(Total for Question 21 is 5 marks)

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22 There are 12 sweets in a bag.

4 of the sweets are lemon flavour.
4 of the sweets are strawberry flavour.
4 of the sweets are orange flavour.

Luke takes at random 3 of the sweets.

Work out the probability that exactly 2 of the sweets that Luke takes are the same flavour.

(Total for Question 22 is 5 marks)

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23 The diagram shows trapezium $ABCD$.

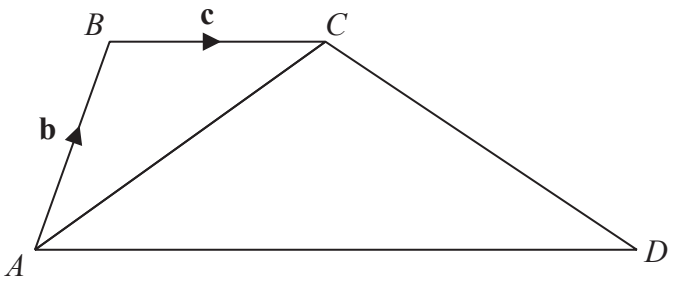

Diagram **NOT** accurately drawn

BC is parallel to AD
$AD = 3BC$

$\overrightarrow{AB} = \mathbf{b}$, $\overrightarrow{BC} = \mathbf{c}$

(a) Find, in terms of **b** and **c**, the vector $\overrightarrow{CD}$
Give your answer in its simplest form.

(2)

The point P lies on the line AC such that $AP : PC = 2 : 1$

(b) Is BPD a straight line?
Show your working clearly.

(4)

(Total for Question 23 is 6 marks)

TOTAL FOR PAPER IS 100 MARKS

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