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Surname	Other names

Pearson Edexcel International GCSE

Centre Number | Candidate Number

Mathematics A

Paper 3HR



Higher Tier

Thursday 21 May 2015 – 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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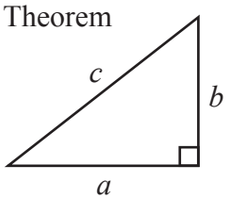
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International GCSE MATHEMATICS
FORMULAE SHEET – HIGHER TIER

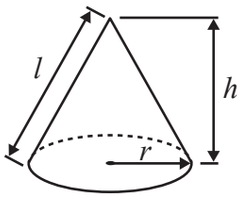
Pythagoras' Theorem



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

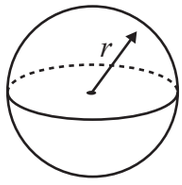
Volume of cone = $\frac{1}{3}\pi r^2 h$

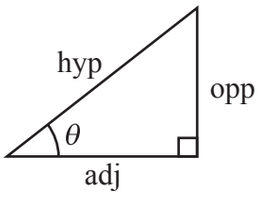
Curved surface area of cone = $\pi r l$



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

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





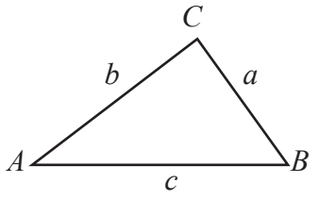
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

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

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

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

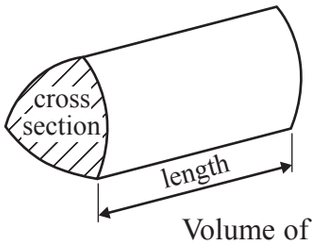
In any triangle ABC



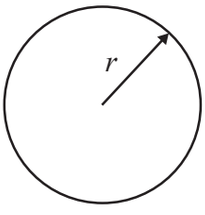
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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



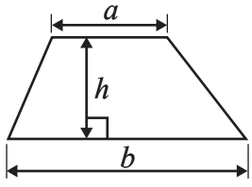
Volume of prism = area of cross section × length

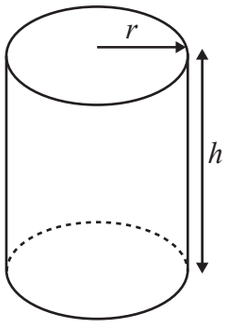


Circumference of circle = $2\pi r$

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

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

P 4 4 3 9 2 A 0 2 2 4

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Answer ALL TWENTY THREE questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 The table shows information about the numbers of fish caught by 40 people in one day.

Number of fish	Frequency
0	2
1	12
2	15
3	8
5	2
8	1

(a) Work out the mean number of fish caught.

.....

(3)

(b) Work out what percentage of the 40 people caught less than 2 fish.

..... %

(2)

(Total for Question 1 is 5 marks)

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2 Each exterior angle of a regular polygon is 15°

(a) How many sides has the regular polygon?

.....

(2)

The diagram shows 3 identical regular pentagons.

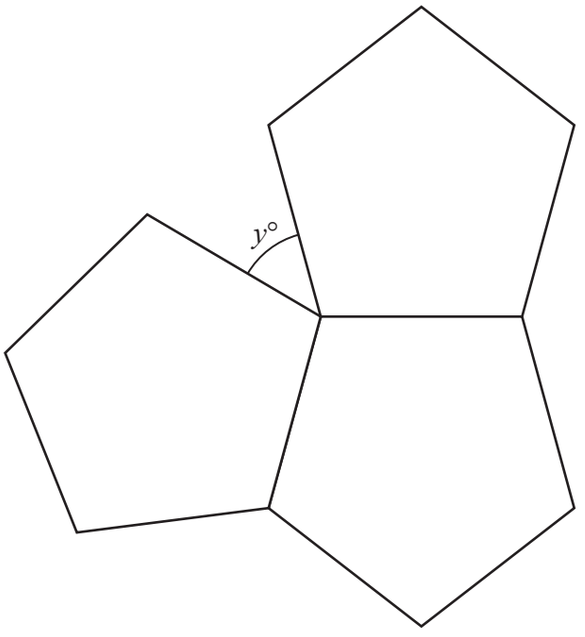


Diagram **NOT** accurately drawn

(b) Work out the value of y.

$y =$.....

(3)

(Total for Question 2 is 5 marks)

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3 Use your calculator to work out the value of

$$\frac{12.5 \times 4.5}{6.8 + \sqrt{67.24}}$$

.....

(Total for Question 3 is 2 marks)

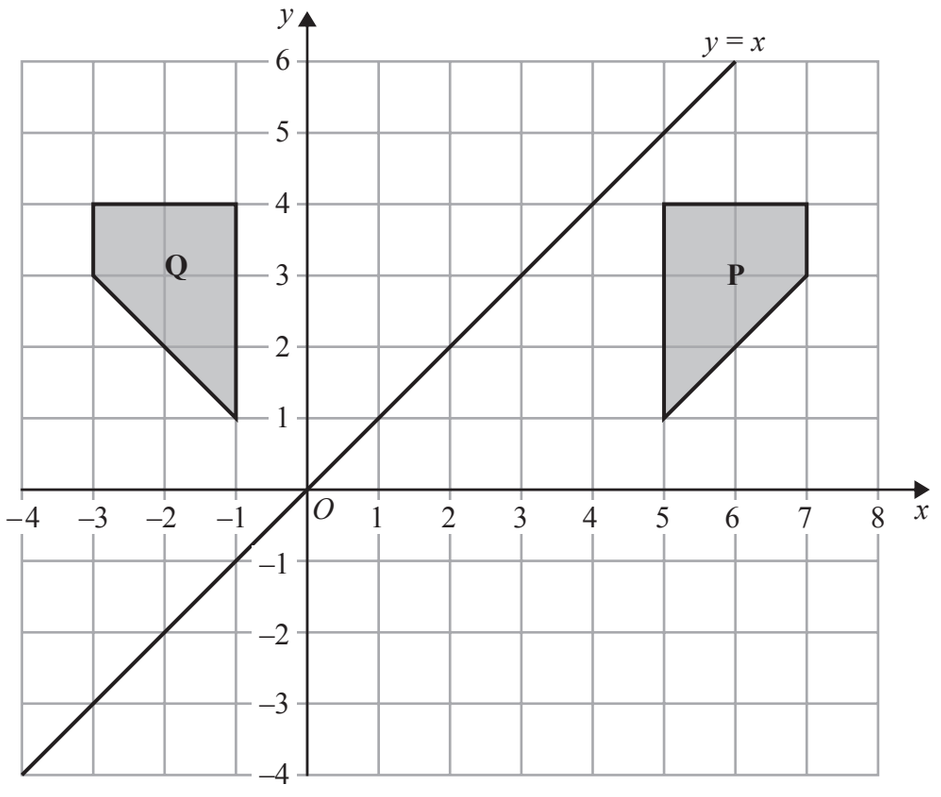
4 Solve $7x - 2 = 1 - 3x$
Show clear algebraic working.

$x =$.....

(Total for Question 4 is 3 marks)

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5



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

.....

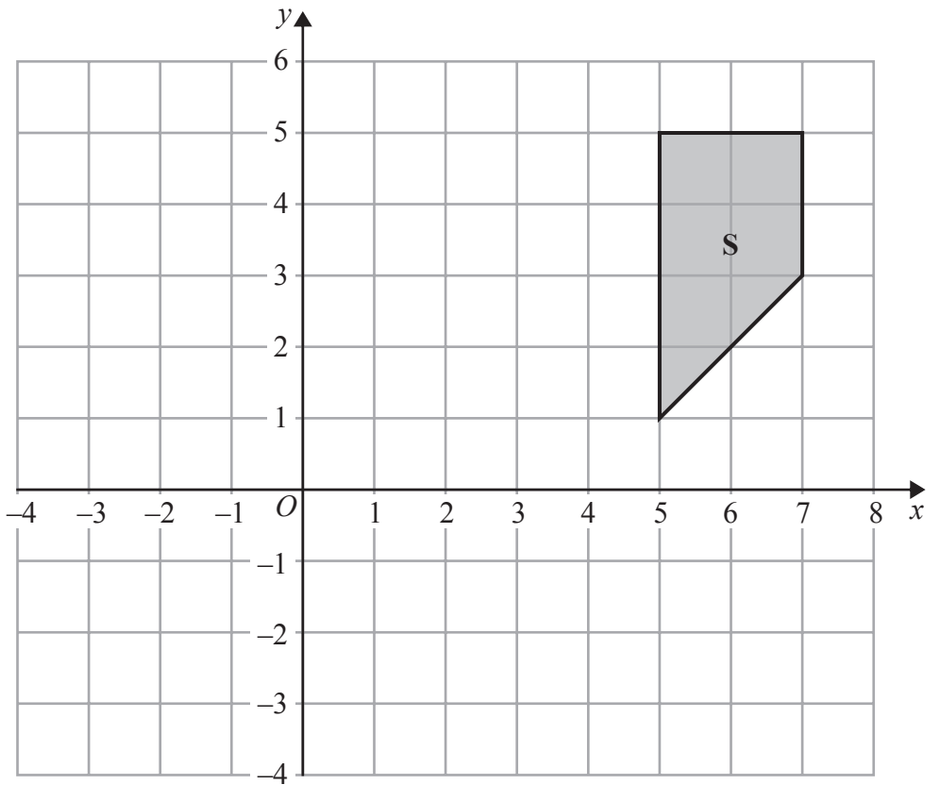
.....

(2)

(b) Reflect the shape **Q** in the line $y = x$.
Label the new shape **R**.

(2)

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(c) Enlarge shape **S** with scale factor $\frac{1}{2}$ and centre (1, 3)

(2)

(Total for Question 5 is 6 marks)

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6 The mean height of a group of 6 children is 165 cm.
One child, whose height is 155 cm, leaves the group.

Find the mean height of the remaining 5 children.

..... cm

(Total for Question 6 is 3 marks)

7

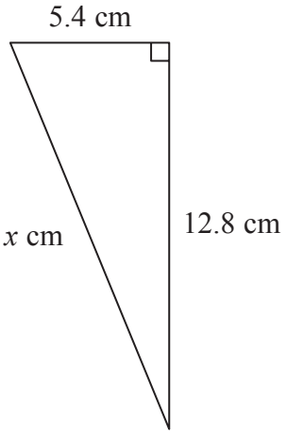


Diagram **NOT** accurately drawn

Work out the value of x.
Give your answer correct to 3 significant figures.

$x =$.....

(Total for Question 7 is 3 marks)

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8 (a) Factorise $g^2 + 4g$

.....

(2)

(b) Factorise $e^2 - 2e - 24$

.....

(2)

(Total for Question 8 is 4 marks)

9 Make r the subject of the formula $A = 4\pi r^2$ where r is positive.

$r =$.....

(Total for Question 9 is 2 marks)

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10 (a) $A = 2^2 \times 3 \times 5^2$

$B = 2^3 \times 5$

(i) Find the Highest Common Factor (HCF) of A and B.

.....

(ii) Find the Lowest Common Multiple (LCM) of A and B.

.....

(3)

(b) $\dfrac{8^2 \times 8^3}{8^4} = 2^n$

Find the value of n.

$n =$.....

(2)

(Total for Question 10 is 5 marks)

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11 The diagram shows a right-angled triangle and a rectangle.

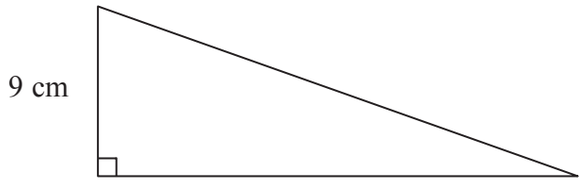




Diagram **NOT** accurately drawn

The area of the triangle is twice the area of the rectangle.

(i) Write down an equation for x.

.....

(ii) Find the area of the rectangle.
Show clear algebraic working.

..... cm^2

(Total for Question 11 is 7 marks)

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12 The grouped frequency table gives information about the times recorded for 20 runners in a 1500 metre race.

Time (t seconds)	Frequency
$225 < t \leqslant 230$	1
$230 < t \leqslant 235$	3
$235 < t \leqslant 240$	7
$240 < t \leqslant 245$	6
$245 < t \leqslant 250$	2
$250 < t \leqslant 255$	1

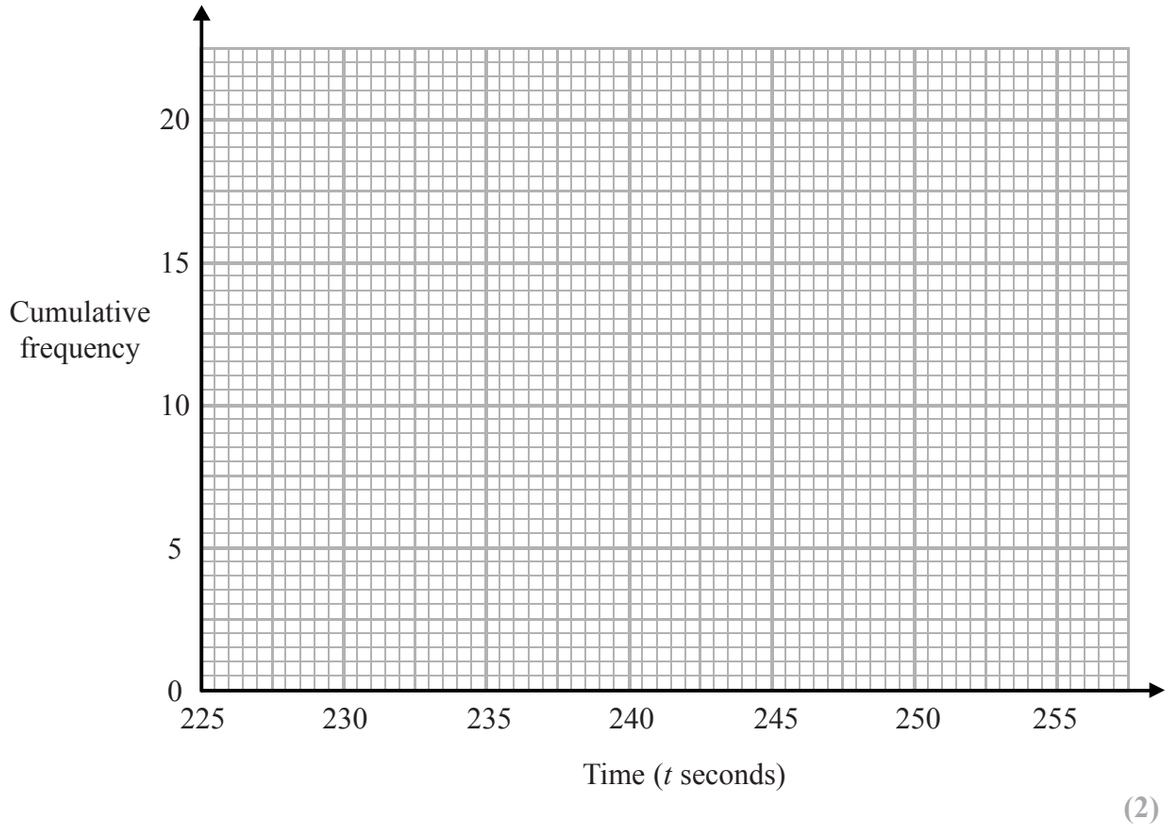
(a) Complete the cumulative frequency table.

Time (t seconds)	Cumulative frequency
$225 < t \leqslant 230$	
$225 < t \leqslant 235$	
$225 < t \leqslant 240$	
$225 < t \leqslant 245$	
$225 < t \leqslant 250$	
$225 < t \leqslant 255$	

(1)

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



(2)

(c) Use your graph to find an estimate for the median of the recorded times.

.....seconds

(2)

(Total for Question 12 is 5 marks)

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13 The table shows information about the oil production, in barrels per day, of five countries during one year.

Country	Oil production (barrels per day)
India	8.97×10^5
Brazil	2.63×10^6
United States	8.4×10^6
Russia	1.09×10^7
Saudi Arabia	9.9×10^6

(a) Which country had the highest oil production?

.....

(1)

(b) Calculate the difference between the oil production of Brazil and the oil production of India. Give your answer in standard form.

.....barrels per day

(2)

During the same year, the oil production of California was 6.3×10^5 barrels per day.

(c) Work out the oil production of California as a proportion of the oil production of the United States.

.....

(2)

(Total for Question 13 is 5 marks)

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14 Solve the simultaneous equations

$$8x - 4y = 7$$
$$12x - 8y = 6$$

Show clear algebraic working.

$x =$ .....

$y =$ .....

(Total for Question 14 is 3 marks)

15 Use algebra to show that the recurring decimal $0.\dot{4}1\dot{7} = \frac{139}{333}$

(Total for Question 15 is 2 marks)

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16 *ABCD* is a kite.

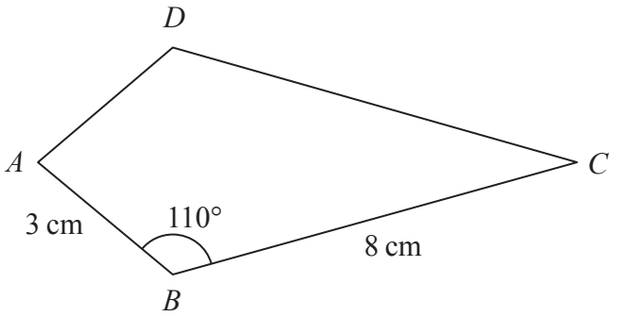


Diagram **NOT** accurately drawn

AB = 3 cm
BC = 8 cm
Angle *ABC* = 110°

Calculate the area of the kite *ABCD*.
Give your answer correct to 3 significant figures.

..... cm^2

(Total for Question 16 is 3 marks)

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17 Two bags contain discs.

Bag **A** contains 12 discs.
5 of the discs are red, 6 are blue and 1 is white.

Bag **B** contains 25 discs.
n of the discs are red and the rest are blue.

James takes at random a disc from Bag **A**.
Lucy takes at random a disc from Bag **B**.

Given that the probability that James and Lucy both take a red disc is $\frac{2}{15}$

(i) find the value of n, the number of red discs in Bag **B**.

$n =$ .....

(ii) Hence calculate the probability that James and Lucy take discs of different colours.

.....

(Total for Question 17 is 5 marks)

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18

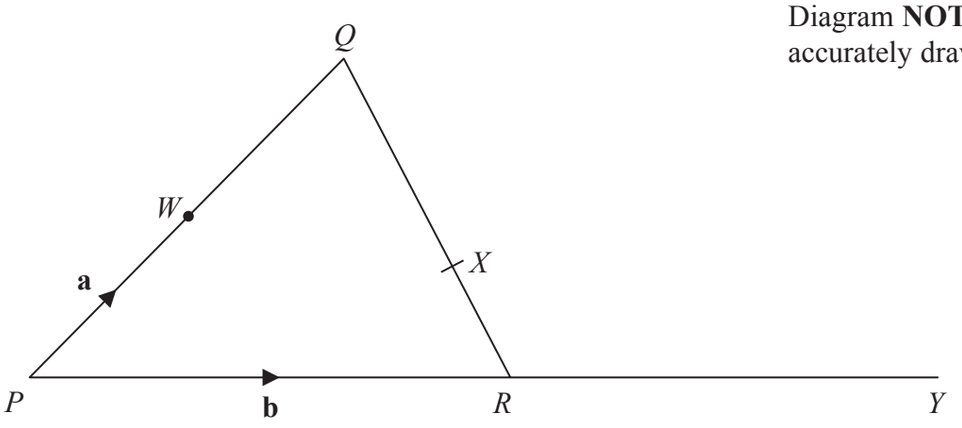


Diagram **NOT** accurately drawn

PQR is a triangle.
The midpoint of *PQ* is *W*.
X is the point on *QR* such that $QX : XR = 2 : 1$
PRY is a straight line.

$\overrightarrow{PW} = \mathbf{a}$ $\overrightarrow{PR} = \mathbf{b}$

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

(i) $\overrightarrow{QR}$

.....

(ii) $\overrightarrow{QX}$

.....

(iii) $\overrightarrow{WX}$

.....

(3)

R is the midpoint of the straight line *PRY*.

(b) Use a vector method to show that *WXY* is a straight line.

(2)

(Total for Question 18 is 5 marks)

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19 The diagram shows a circular pond, of radius r metres, surrounded by a circular path.
The circular path has a constant width of 1.5 metres.

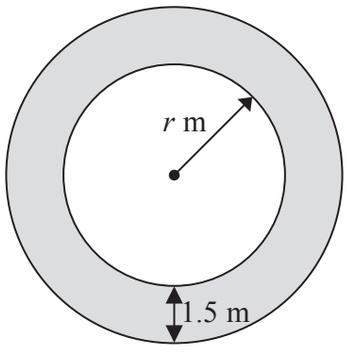


Diagram **NOT** accurately drawn

The area of the path is $\frac{1}{10}$ the area of the pond.

(a) Show that $2r^2 - 60r - 45 = 0$

(3)

(b) Calculate the area of the pond.
Show your working clearly.
Give your answer correct to 3 significant figures.

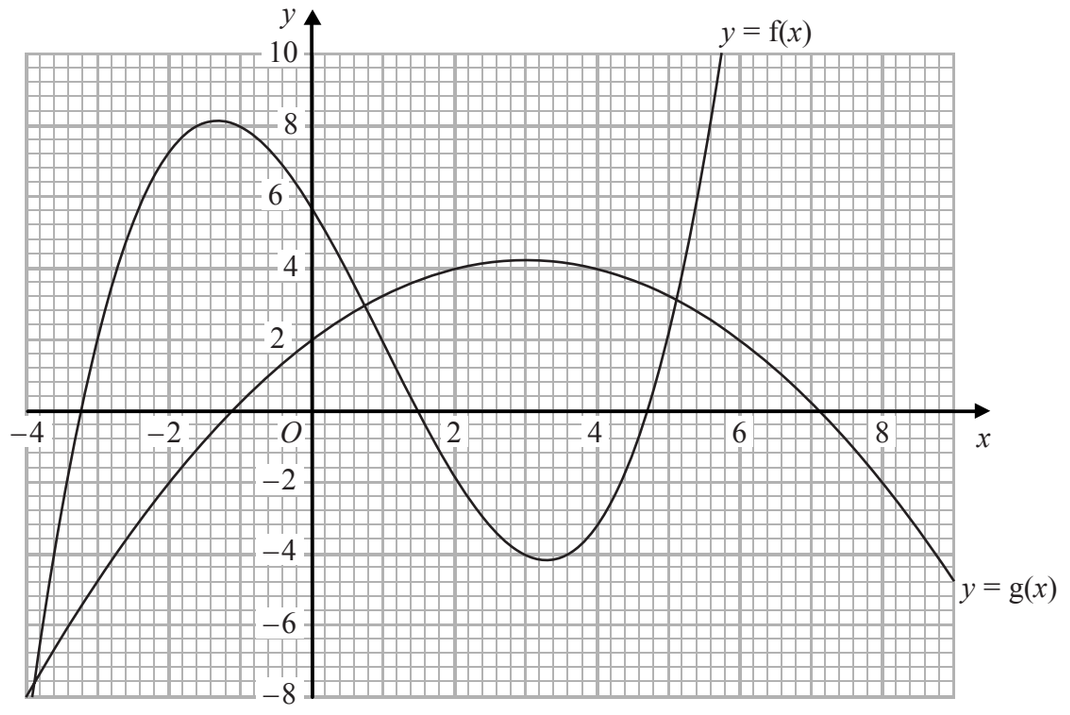
..... m^2

(5)

(Total for Question 19 is 8 marks)

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20 The diagram shows parts of the graphs of $y = f(x)$ and $y = g(x)$.



(a) Find g(0)

.....

(1)

(b) Find gf(–1)

.....

(2)

(c) Calculate an estimate for the gradient of the curve $y = f(x)$ at the point on the curve where $x = 3$

.....

(3)

(Total for Question 20 is 6 marks)

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21 Correct to 2 significant figures, $a = 58$, $b = 28$ and $c = 18$

Calculate the upper bound for the value of $\dfrac{a}{b - c}$

Show your working clearly.

.....

(Total for Question 21 is 3 marks)

22 Simplify fully $\dfrac{6x^2 + x - 15}{12x^2 - 27}$

Show clear algebraic working.

.....

(Total for Question 22 is 4 marks)

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23

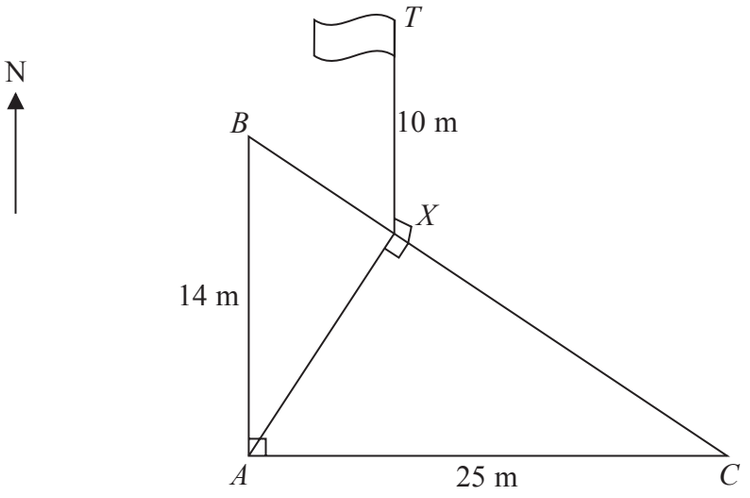


Diagram **NOT** accurately drawn

A, *B* and *C* are points on horizontal ground.
B is due North of *A* and *AB* is 14 m.
C is due East of *A* and *AC* is 25 m.

A vertical flagpole, *TX*, has its base at the point *X* on *BC* such that the angle *AXC* is a right angle.

The height of the flagpole, *TX*, is 10 m.

Calculate the size of the angle of elevation of *T* from *A*.
Give your answer correct to 1 decimal place.

.....°

(Total for Question 23 is 6 marks)

TOTAL FOR PAPER IS 100 MARKS

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