Write your name here

Surname	Other names

Pearson Edexcel International GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Mathematics A

Paper 3HR

Higher Tier

Tuesday 6 January 2015 – Afternoon
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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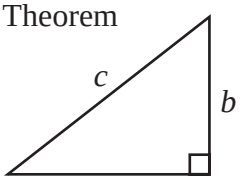
P 4 4 6 1 9 A 0 1 2 0

PEARSON

International GCSE MATHEMATICS
FORMULAE SHEET – HIGHER TIER

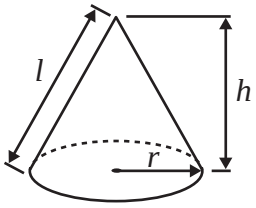
Pythagoras' Theorem



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

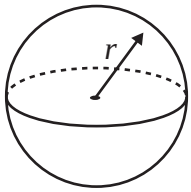
Volume of cone = $\frac{1}{3}\pi r^2 h$

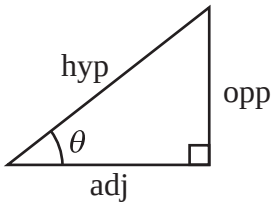
Curved surface area of cone = πrl



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

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





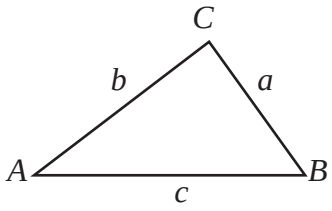
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

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

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

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

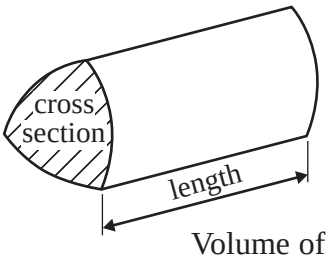
In any triangle ABC



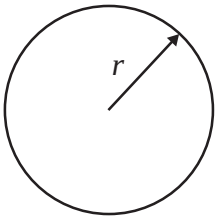
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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



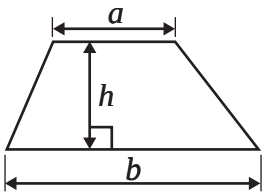
Volume of prism = area of cross section × length

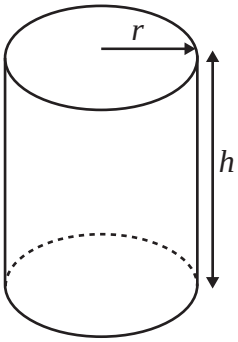


Circumference of circle = $2\pi r$

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 FOUR questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 In a school, there is a total of 640 children.
The ratio of the number of girls to the number of boys is 7 : 9

How many boys are there in this school?

.....

(Total for Question 1 is 2 marks)

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

$$125^2 + \frac{173}{9.3 - 6.8}$$

Give your answer as a decimal.

.....

(2)

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

.....

(1)

(Total for Question 2 is 3 marks)

3 The table shows information about the numbers of goals scored by some football teams last week.

Number of goals	Number of teams
0	5
1	8
2	2
3	3
4	2

Work out the total number of goals scored by these football teams last week.

.....

(Total for Question 3 is 2 marks)

4 (a) Factorise $6w + 15$

.....

(1)

(b) Expand and simplify $(x + 4)(x + 7)$

.....

(2)

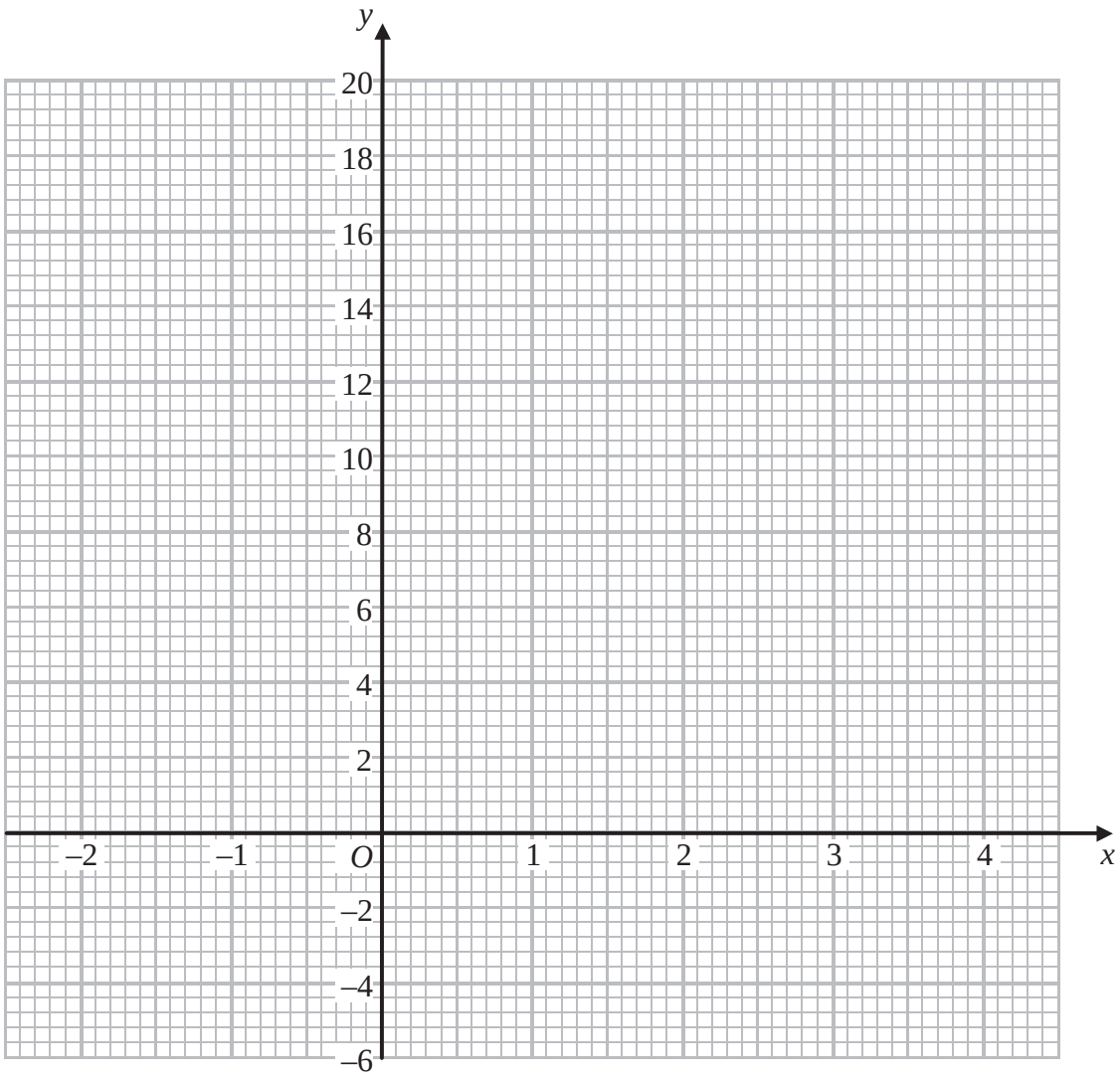
(c) Solve $3(x - 5) = 7x + 12$
Show clear algebraic working.

$x =$ .....

(3)

(Total for Question 4 is 6 marks)

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



(Total for Question 5 is 4 marks)

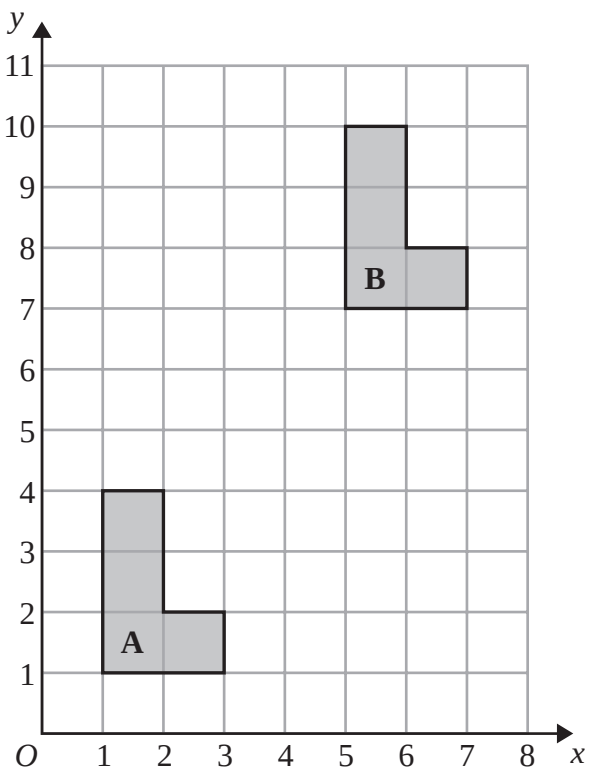
6 *A* is the point with coordinates (4, 1)
B is the point with coordinates (1, 9)

Find the coordinates of the midpoint of *AB*.

(..... , ...)

(Total for Question 6 is 2 marks)

7



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

.....

.....

(Total for Question 7 is 2 marks)

8 Lisa sees a dress in a sale.
The normal price of the dress is $45
The price of the dress is reduced by 12% in the sale.

(a) Work out the price of the dress in the sale.

$ .....

(3)

Lisa's weekly pay increases from $525 to $546

(b) Calculate her percentage pay increase.

..... %

(3)

(Total for Question 8 is 6 marks)

9 Show that $7\frac{1}{2} - 4\frac{2}{3} = 2\frac{5}{6}$

(Total for Question 9 is 3 marks)

10 The diagram shows a solid cylinder.

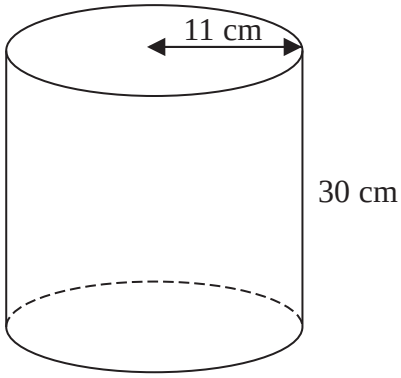


Diagram **NOT** accurately drawn

The cylinder has a height of 30 cm and a radius 11 cm.

(a) Work out the **total** surface area of the cylinder.
Give your answer correct to 2 significant figures.

..... cm^2

(4)

(b) The height of the cylinder is 30 cm, correct to the nearest centimetre.

(i) Write down the lower bound of the height of the cylinder.

..... cm

(ii) Write down the upper bound of the height of the cylinder.

..... cm

(2)

(Total for Question 10 is 6 marks)

11

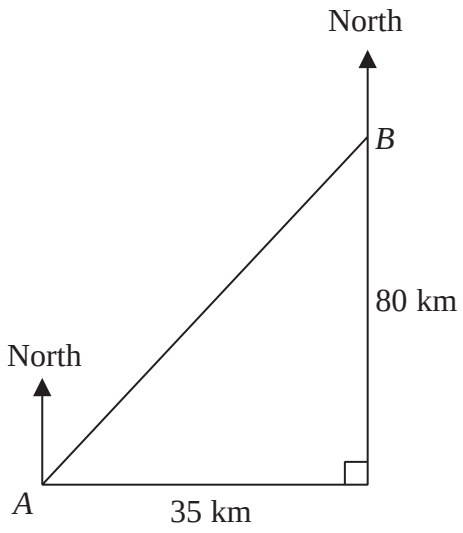


Diagram **NOT** accurately drawn

Town *B* is 35 km east and 80 km north of town *A*.

Work out the bearing of *A* from *B*.
Give your answer correct to the nearest degree.

.....°

(Total for Question 11 is 4 marks)

Do NOT write in this space.

12 Here are the marks scored in a test by the girls in class 8C.

2 8 10 12 15 16 16 17 18 19 20

(a) Work out the interquartile range of the girls' marks.

.....

(2)

The boys in class 8C did the same test.
The boys' marks had a range of 19 and an interquartile range of 11 marks.

Gareth says that the girls' marks are more spread out than the boys' marks.

(b) Is Gareth right?

Tick (✓) the appropriate box.

Yes	No
☐	☐

Give a reason for your answer.

.....

.....

(1)

(Total for Question 12 is 3 marks)

13 Given that $A = 2^3 \times 3$ and $B = 2^2 \times 3^2$

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

.....

(Total for Question 13 is 2 marks)

14 The size of each interior angle of a regular polygon with n sides is 140°

Work out the size of each interior angle of a regular polygon with $2n$ sides.

.....°

(Total for Question 14 is 5 marks)

15 Simplify $\left(2x^{\frac{3}{2}}y\right)^4$

.....

(Total for Question 15 is 2 marks)

16 The table shows information about the lengths of time that 120 people spent in a supermarket.

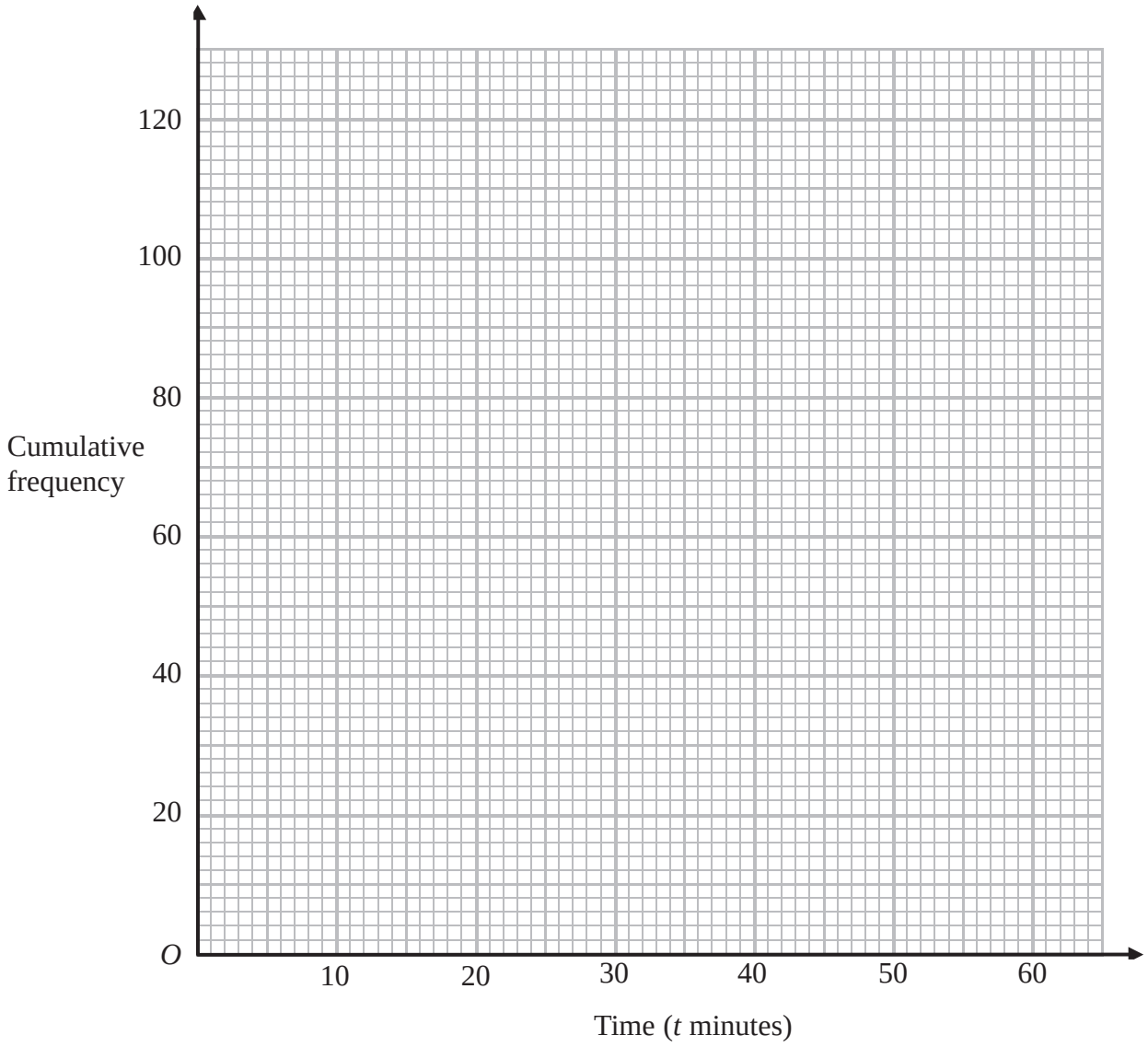
Time (t minutes)	Frequency
$0 < t \leqslant 10$	8
$10 < t \leqslant 20$	17
$20 < t \leqslant 30$	25
$30 < t \leqslant 40$	40
$40 < t \leqslant 50$	22
$50 < t \leqslant 60$	8

(a) Complete the cumulative frequency table.

Time (t minutes)	Cumulative frequency
$0 < t \leqslant 10$	
$0 < t \leqslant 20$	
$0 < t \leqslant 30$	
$0 < t \leqslant 40$	
$0 < t \leqslant 50$	
$0 < t \leqslant 60$	

(1)

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



(2)

(c) Use your graph to find an estimate for the median length of time spent in the supermarket by these people.

..... minutes

(2)

(Total for Question 16 is 5 marks)

17

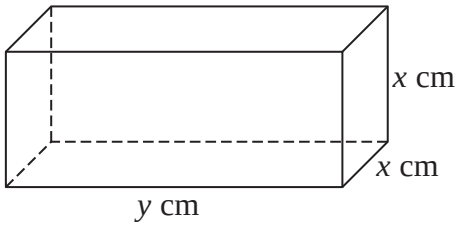


Diagram **NOT** accurately drawn

The diagram shows a cuboid of volume V cm^3
The length of the cuboid is y cm
The width and height of the cuboid are both x cm

The total length of all the edges of the cuboid is 112 cm

(a) Show that $V = 28x^2 - 2x^3$

(3)

(b) Find $\dfrac{\mathrm{d}V}{\mathrm{d}x}$

$\dfrac{\mathrm{d}V}{\mathrm{d}x} =$ .....

(2)

(c) Find the maximum value of V
Give your answer correct to 3 significant figures.

$V =$ .....

(3)

(Total for Question 17 is 8 marks)

18

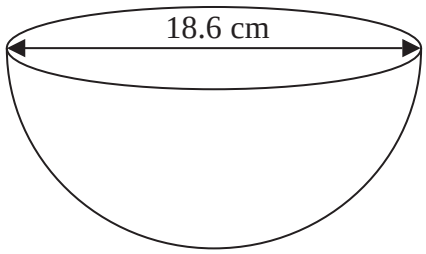


Diagram **NOT** accurately drawn

The diagram shows a hemisphere with a diameter of 18.6 cm.

Work out the volume of the hemisphere.
Give your answer correct to 3 significant figures.

..... cm^3

(Total for Question 18 is 3 marks)

19

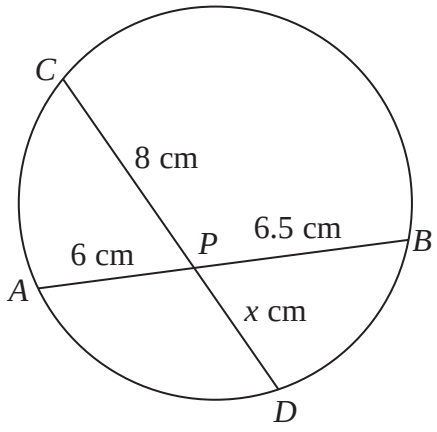


Diagram **NOT** accurately drawn

APB and *CPD* are chords of a circle.

AP = 6 cm, *PB* = 6.5 cm, *CP* = 8 cm, *PD* = *x* cm

Work out the value of *x*.

x = ...

(Total for Question 19 is 2 marks)

20 R is **inversely** proportional to the square of c.
When $c = 4$, $R = 30$

(a) Find a formula for R in terms of c.

.....

(3)

(b) Calculate the positive value of c when $R = 1920$

$c =$ .....

(2)

(Total for Question 20 is 5 marks)

Do NOT write in this space.

21 The functions g and h are defined as

$$g(x) = \frac{x}{2x - 5}$$

$$h(x) = x + 4$$

(a) Find the value of g(1)

.....

(1)

(b) State which value of x must be excluded from any domain of g

.....

(1)

(c) Find gh(x)
Simplify your answer.

gh(x) = ...

(2)

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

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

(3)

(Total for Question 21 is 7 marks)

22 Here are 7 cards.
Each card has a number on it.

1	2	2	3	3	3	4

Harry takes at random two cards.

(a) Calculate the probability that the numbers on the two cards are the same.

.....

(3)

(b) Calculate the probability that the sum of the numbers on the two cards is 5

.....

(3)

(Total for Question 22 is 6 marks)

23 Here is triangle *LMN*, where angle *LMN* is an obtuse angle.

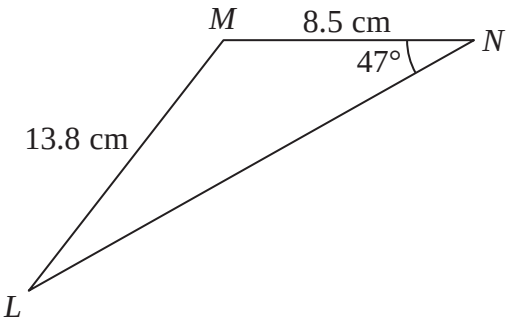


Diagram **NOT** accurately drawn

ML = 13.8 cm
MN = 8.5 cm
Angle *MNL* = 47°

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

..... cm^2

(Total for Question 23 is 6 marks)

24 Solve the simultaneous equations

$$y = 2x - 3$$
$$x^2 + y^2 = 41$$

Show clear algebraic working.

(Total for Question 24 is 6 marks)

TOTAL FOR PAPER IS 100 MARKS