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Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						4	4	0	0	/	3	H	Signature	

Paper Reference(s)

4400/3H

Examiner's use only

Team Leader's use only

London Examinations IGCSE

Mathematics

Paper 3H

Higher Tier

Thursday 15 May 2008 – Morning

Time: 2 hours

Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 22 questions in this question paper. The total mark for this paper is 100.
There are 24 pages in this question paper. Any blank pages are indicated.
You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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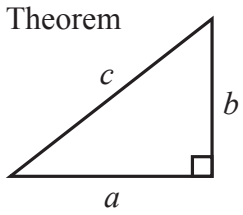
IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER

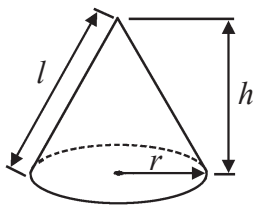
Pythagoras' Theorem



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

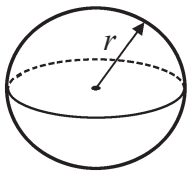
Volume of cone = $\frac{1}{3}\pi r^2 h$

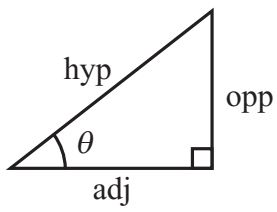
Curved surface area of cone = $\pi r l$



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

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





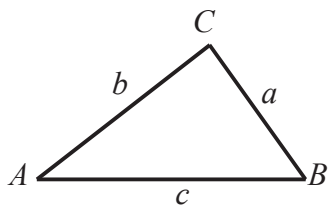
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

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

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

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

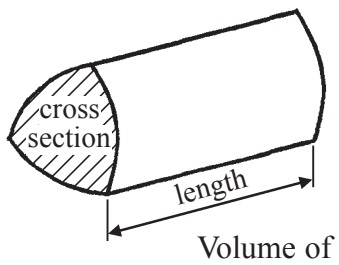
In any triangle ABC



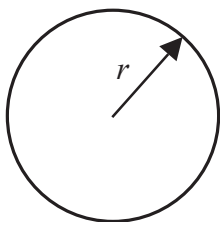
Sine rule: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

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

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



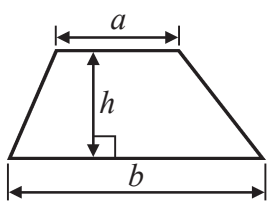
Volume of prism = area of cross section × length

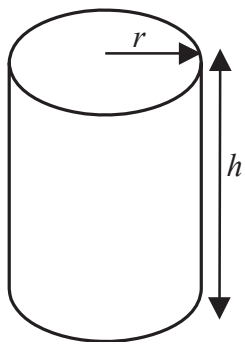


Circumference of circle = $2\pi r$

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 TWO questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

Without sufficient working, correct answers may be awarded no marks.

1. Find the value of $\dfrac{3.6\times4.8}{5.6-3.2}$

.....

(Total 2 marks)

Q1

2. A bag contains red discs, black discs and white discs.
The number of black discs is equal to the number of white discs.
Selina is going to take a disc at random from the bag.
The probability that she will take a red disc is 0.6

Work out the probability that she will take a black disc.

.....

(Total 2 marks)

Q2

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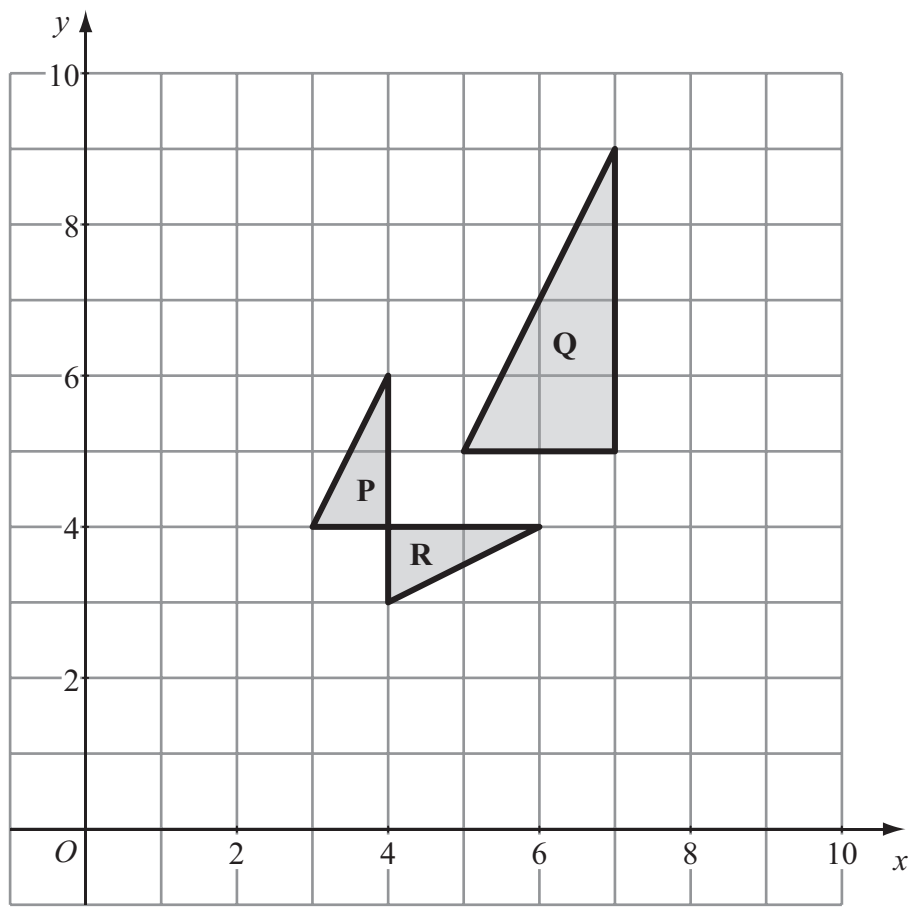
3.



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

.....

(3)

(b) Describe fully the single transformation that maps triangle **P** onto triangle **R**.

.....

(2)

(Total 5 marks)

Q3

N 2 9 4 3 7 A 0 4 2 4

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4. Bronze is made from copper and tin.
The ratio of the weight of copper to the weight of tin is 3 : 1

Work out the weight of copper in 280 grams of bronze.

..... grams

Q4

(Total 2 marks)

5. $\mathscr{E}$ = {odd numbers}
A = {1, 5, 9, 13, 17}
B = {1, 9, 17, 25, 33}
C = {7, 11, 15}

(a) List the members of the set

(i) $A \cap B$,

.....

(ii) $A \cup B$.

.....

(2)

(b) Explain why $A \cap C = \varnothing$

.....

.....

(1)

Q5

(Total 3 marks)

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6.

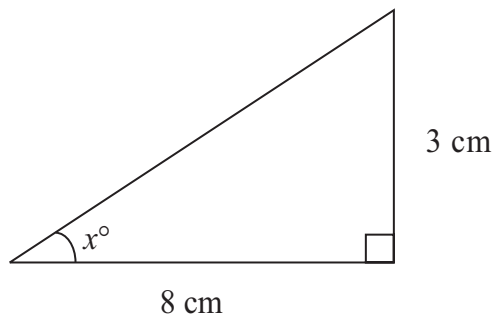

Diagram **NOT** accurately drawn

Work out the value of x.
Give your value correct to 1 decimal place.

x = ...

(Total 3 marks)

Q6

7. The diameter of a circle is 7.8 cm.

Calculate the circumference of the circle.
Give your answer correct to 3 significant figures.

..... cm

(Total 2 marks)

Q7

N 2 9 4 3 7 A 0 6 2 4

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8. Here are some patterns made from sticks.

Pattern number 1 | Pattern number 2 | Pattern number 3

This rule can be used to find the number of sticks in one of these patterns.

Multiply the pattern number by 2 and then add 1

(a) n is the number of sticks in Pattern number p.
Write down a formula for n in terms of p.

.....
(3)

(b) Make p the subject of your formula.

$p =$ .....
(2)

(Total 5 marks)

Q8

N 2 9 4 3 7 A 0 7 2 4

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9. (a) Solve $7(x - 1) = 5 - 2x$
You must show sufficient working.

$x =$ .....
(3)

(b) (i) Solve the inequality $4x + 5 \leqslant 21$

.....

(ii) n is a positive integer.

Write down all the values of n which satisfy $4n + 5 \leqslant 21$

.....
(4)

Q9

(Total 7 marks)

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10. Cara's salary was increased from \$28 250 to \$29 832

(a) Work out the percentage increase in Cara's salary.

..... %
(3)

Pedro's salary was increased by 5.2%.
After the increase, his salary was \$28 141

(b) Work out his salary before the increase.

\$ .....
(3)

Q10

(Total 6 marks)

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11. The table shows information about the pulse rates of 60 people, when they were resting.

Pulse rate (p beats/min)	**Frequency**
$50 < p \leqslant 60$	7
$60 < p \leqslant 70$	21
$70 < p \leqslant 80$	15
$80 < p \leqslant 90$	14
$90 < p \leqslant 100$	3

(a) Write down the modal class.

.....
(1)

(b) Work out an estimate for the mean pulse rate of the 60 people.

..... beats/min
(4)

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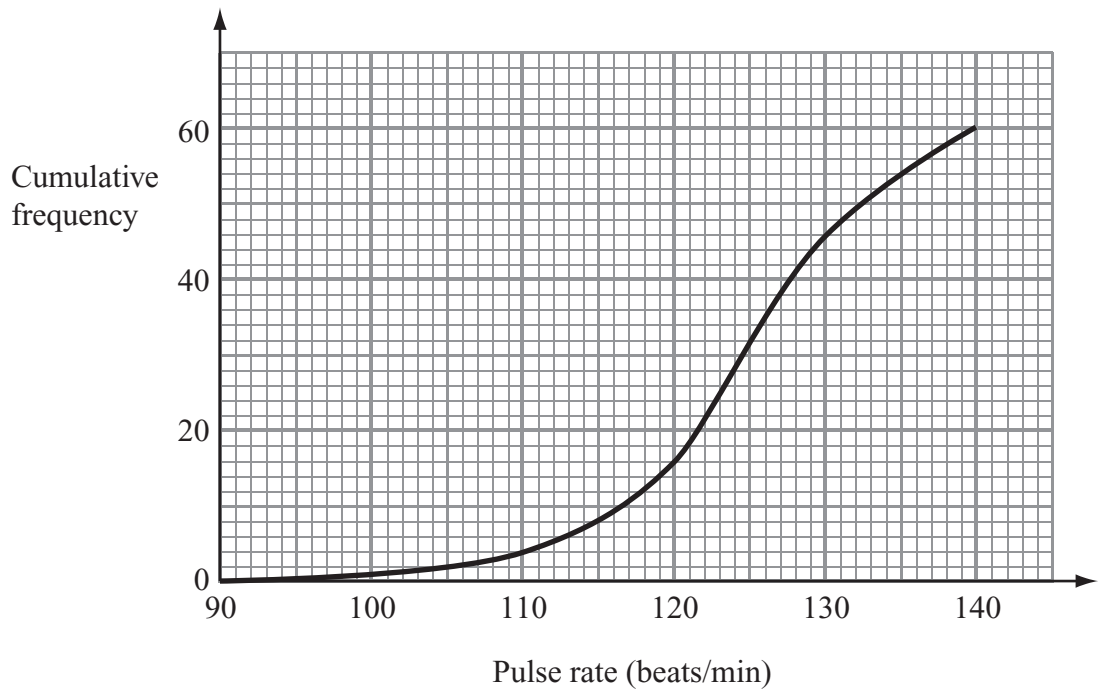
The cumulative frequency graph gives information about the pulse rates of the same 60 people, after they have exercised for ten minutes.



(c) Use the graph to find an estimate for the median pulse rate of the 60 people.

..... beats/min
(2)

(d) Use the graph to find an estimate for the number of people with a pulse rate of more than 131 beats/min.

.....
(2)

Q11

(Total 9 marks)

N 2 9 4 3 7 A 0 1 1 2 4

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12.

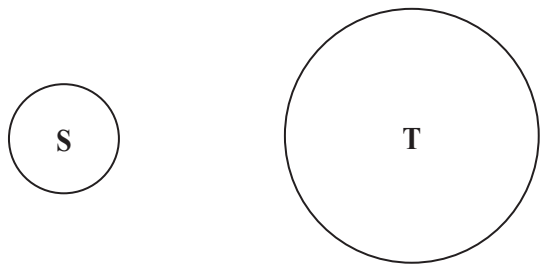

Diagram **NOT** accurately drawn

The area of circle **S** is 4 cm^2.
The radius of circle **T** is 3 times the radius of circle **S**.

Work out the area of circle **T**.

..... cm^2

(Total 2 marks)

Q12

N 2 9 4 3 7 A 0 1 2 2 4

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13.

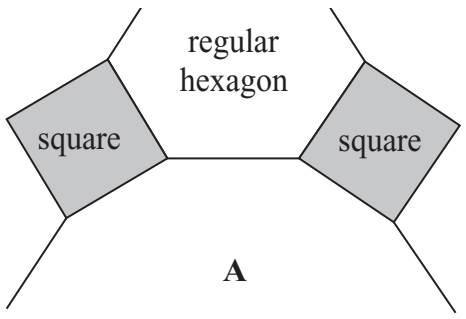

Diagram **NOT** accurately drawn

The diagram shows part of a tiling pattern.
The tiling pattern is made from three shapes.
Two of the shapes are squares and regular hexagons.
The third shape is a regular n-sided polygon **A**.

Work out the value of n.

n = ...

(Total 5 marks)

Q13

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14. (a) Factorise $10y - 15$

.....
(1)

(b) Factorise completely $9p^2q + 12pq^2$

.....
(2)

(c) (i) Factorise $x^2 + 6x - 16$

.....

(ii) Solve $x^2 + 6x - 16 = 0$

.....
(3)

Q14

(Total 6 marks)

15. Mia's weight is 57 kg, correct to the nearest kilogram.

(a) Write down

(i) the upper bound of her weight,

..... kg

(ii) the lower bound of her weight.

..... kg
(2)

Alice's weight is 62 kg, correct to the nearest kilogram.

(b) Work out the upper bound for the difference between Alice's weight and Mia's weight.

..... kg
(2)

Q15

(Total 4 marks)

N 2 9 4 3 7 A 0 1 4 2 4

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16. Here are 9 cards.
Each card has a number on it.

20	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**

Lee takes a card at random.
He records the number which is on the card and replaces the card.
He then takes a second card at random and records the number which is on the card.

(a) Calculate the probability that he will take two even numbers.

.....
(2)

(b) Calculate the probability that he will take two numbers with a sum of 43

.....
(3)

Q16

(Total 5 marks)

N 2 9 4 3 7 A 0 1 5 2 4

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17. The distance, d kilometres, of the horizon from a person is directly proportional to the square root of the person's height, h metres, above sea level.
When $h = 225$, $d = 54$

(a) Find a formula for d in terms of h.

$d =$ .....
(3)

(b) Calculate the distance of the horizon from a person whose height above sea level is 64 metres.

..... kilometres
(1)

(c) Calculate the height above sea level of a person, when the distance of the horizon is 61.2 kilometres.

..... metres
(2)

Q17

(Total 6 marks)

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18.

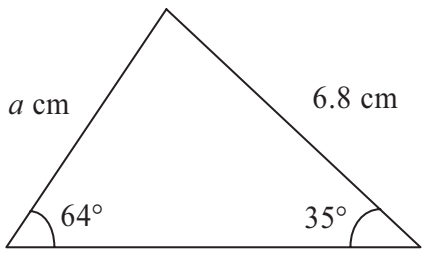

Diagram **NOT** accurately drawn

Calculate the value of a.
Give your value correct to 3 significant figures.

a = ...

(Total 3 marks)

Q18

19. Show that $\frac{12}{\sqrt{8}} = 3\sqrt{2}$

(Total 2 marks)

Q19

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20.

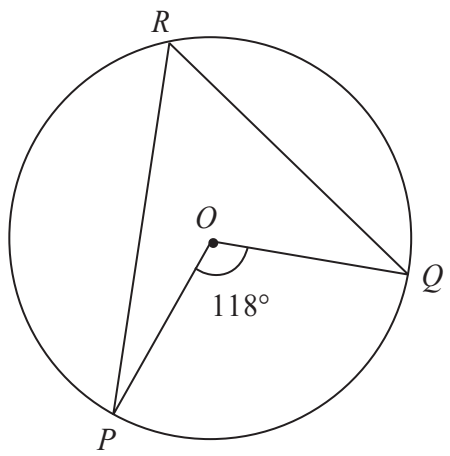

Diagram **NOT** accurately drawn

P, *Q* and *R* are points on a circle, centre *O*.

(a) (i) Find the size of angle *PRQ*.

.....°

(ii) Give a reason for your answer.

.....

.....

(2)

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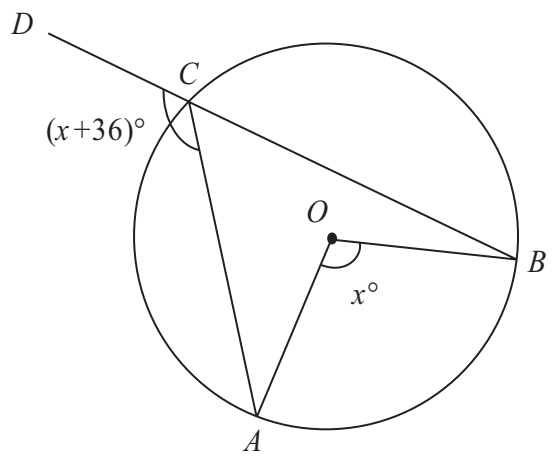

Diagram **NOT** accurately drawn

A, *B* and *C* are points on a circle, centre *O*.
BCD is a straight line.

(b) Find the value of *x*.

x = ...
(5) **Q20**

(Total 7 marks)

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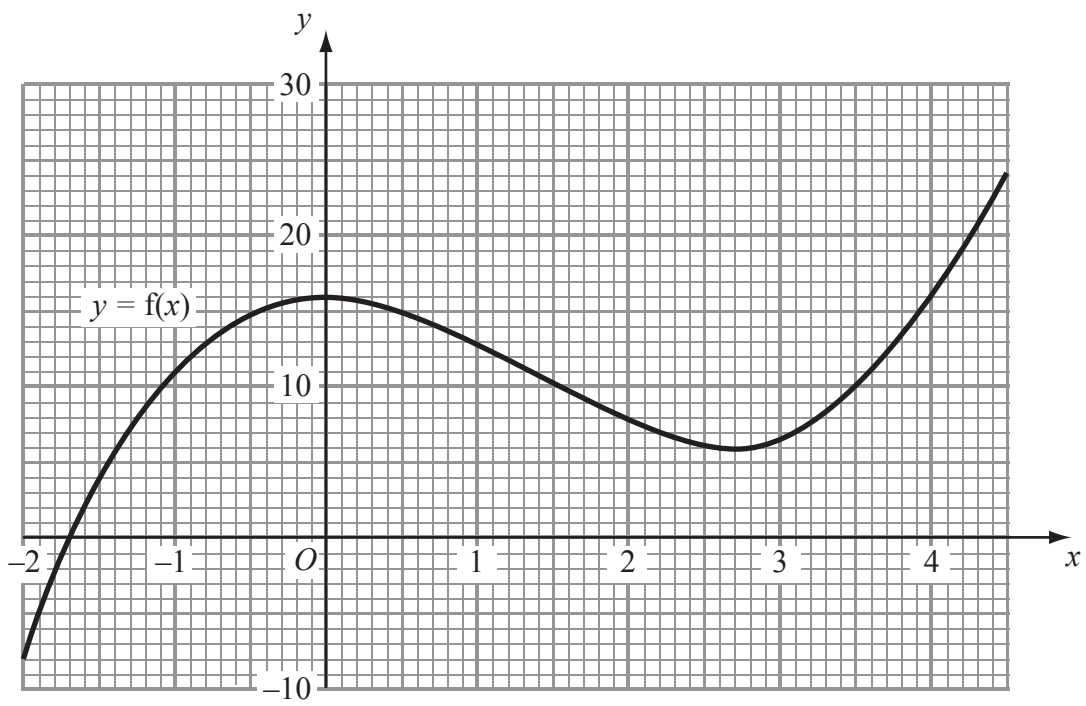
21. The diagram shows part of the graph of $y = \mathrm{f}(x)$.



(a) Calculate an estimate for the gradient of the curve at the point where $x = 3$

.....

(3)

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(b) Find an estimate for the solution of the equation $f(x) = 0$

$x =$ .....
(1)

The equation $f(x) = mx + c$ where m and c are numbers, has three solutions.
Two of the solutions are $x = -1$ and $x = 1$

(c) (i) Find the value of c.

$c =$ .....

(ii) Find the third solution of the equation $f(x) = mx + c$.

$x =$ .....
(4)

(Total 8 marks)

Q21

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22.

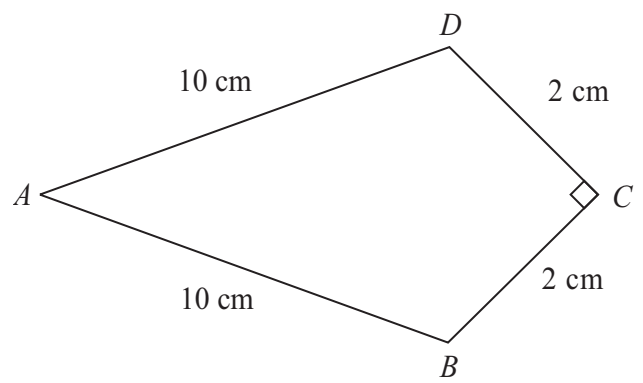

Diagram **NOT** accurately drawn

The diagram shows a kite *ABCD*.
AB = *AD* = 10 cm.
CB = *CD* = 2 cm.
Angle *BCD* = 90°.

Calculate the area of the kite.

..... cm^2 **Q22**

(Total 6 marks)

TOTAL FOR PAPER: 100 MARKS

END

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