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

Paper Reference(s)

4400/4H

Examiner's use only

Team Leader's use only

London Examinations IGCSE

Mathematics

Paper 4H

Higher Tier

Friday 11 June 2010 – 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.
Without sufficient working, correct answers may be awarded no marks.
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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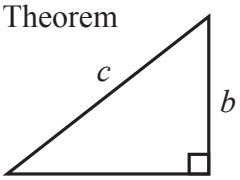
IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER

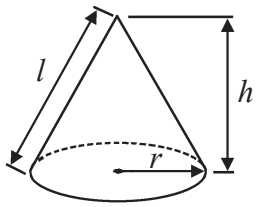
Pythagoras' Theorem



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

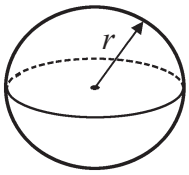
Volume of cone = $\frac{1}{3}\pi r^2 h$

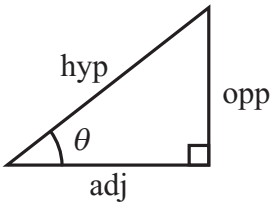
Curved surface area of cone = $\pi r l$



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

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





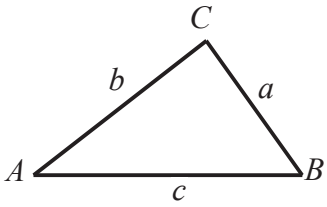
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

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

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

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

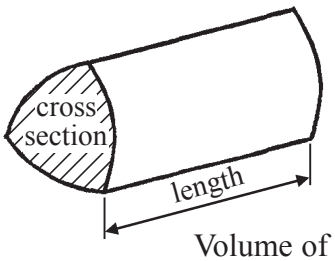
In any triangle ABC



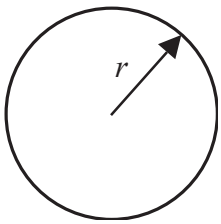
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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



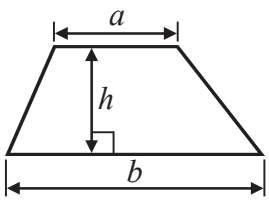
Volume of prism = area of cross section × length

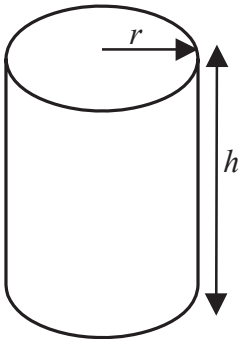


Circumference of circle = $2\pi r$

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

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

Leave blank

Answer ALL TWENTY TWO questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

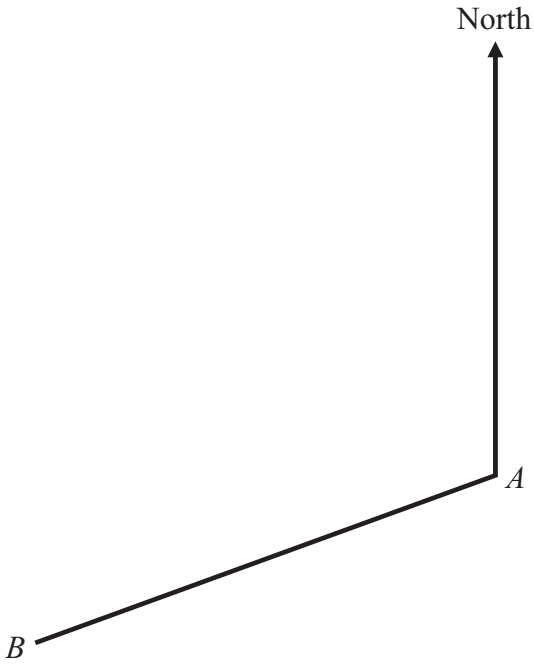
1. Solve $6y - 9 = 3y + 7$

$y =$ .....

Q1

(Total 3 marks)

2. The diagram shows two towns, A and B, on a map.



(a) By measurement, find the bearing of B from A.

° .....

(2)

(b) C is another town.
The bearing of C from A is 050°.
Find the bearing of A from C.

° .....

Q2

(2)

(Total 4 marks)

Leave blank

3. A spinner can land on red or blue or yellow.
The spinner is biased.
The probability that it will land on red is 0.5
The probability that it will land on blue is 0.2

(a) Imad spins the spinner once.
Work out the probability that it will land on yellow.

.....

(2)

(b) Janet spins the spinner 30 times.
Work out an estimate for the number of times the spinner will land on blue.

.....

(2) **Q3**

(Total 4 marks)

Leave blank

4. (a) Rosetta drives 85 kilometres in 1 hour 15 minutes.
Work out her average speed in kilometres per hour.

..... km/h
(2)

(b) Rosetta drives a total distance of 136 kilometres.
Work out 85 as a percentage of 136

..... %
(2)

(c) Sometimes Rosetta travels by train to save money.
The cost of her journey by car is £12
The cost of her journey by train is 15% less than the cost of her journey by car.
Work out the cost of Rosetta's journey by train.

£.....
(3)

Q4

(Total 7 marks)

Leave blank

5.

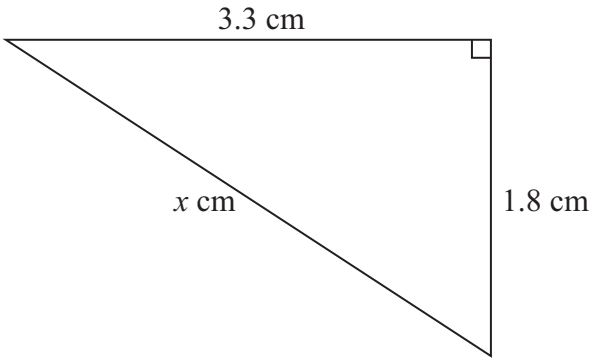


Diagram **NOT** accurately drawn

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

$x =$ .....

Q5

(Total 3 marks)

Leave blank

6. (a) $A = \{2, 3, 4, 5\}$

$B = \{4, 5, 6, 7\}$

(i) List the members of $A \cap B$.

.....

(ii) How many members are in $A \cup B$?

.....

(2)

(b) $\mathcal{E} = \{3, 4, 5, 6, 7\}$
$P = \{3, 4, 5\}$
Two other sets, Q and R, each contain exactly three members.
$P \cap Q = \{3, 4\}$
$P \cap R = \{3, 4\}$
Set Q is not the same as set R.

(i) Write down the members of a possible set Q.

.....

(ii) Write down the members of a possible set R.

.....

(2) **Q6**

(Total 4 marks)

Leave blank

7. Rectangular tiles have width $(x + 1)$ cm and height $(5x – 2)$ cm.

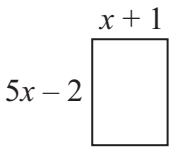


Diagram **NOT** accurately drawn

Some of these tiles are used to form a large rectangle.
The large rectangle is 7 tiles wide and 3 tiles high.

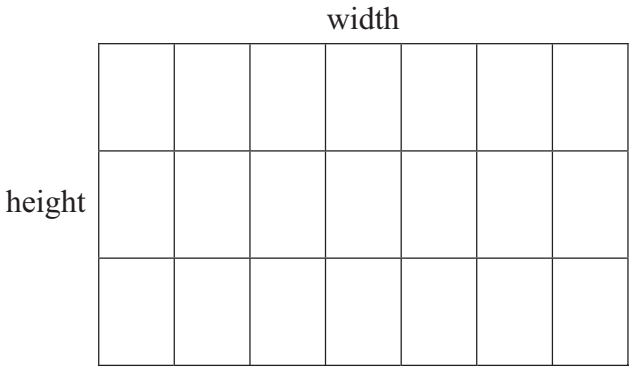


Diagram **NOT** accurately drawn

The perimeter of the large rectangle is 68 cm.

(a) Write down an equation in x.

.....

(3)

(b) Solve this equation to find the value of x.

$x =$ .....

(3)

Q7

(Total 6 marks)

Leave blank

8. Show that $1\frac{1}{2} \div 1\frac{1}{4} = 1\frac{1}{5}$

Q8

(Total 3 marks)

9. The depth of water in a reservoir increases from 14 m to 15.75 m.
Work out the percentage increase.

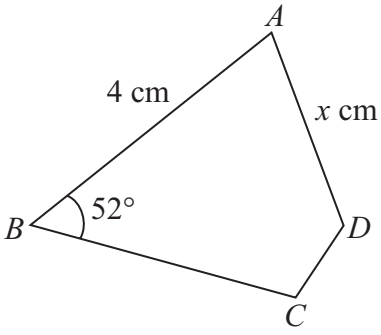
..... %

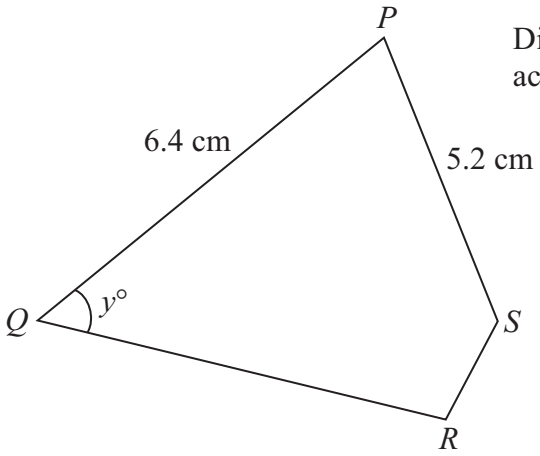
Q9

(Total 3 marks)

Leave blank

10. Quadrilaterals *ABCD* and *PQRS* are similar.





Diagrams **NOT** accurately drawn

AB corresponds to *PQ*.
BC corresponds to *QR*.
CD corresponds to *RS*.

Find the value of

(a) *x*

x = ...

(2)

(b) *y*

y = ...

(1)

Q10

(Total 3 marks)

Leave blank

11. Simplify fully $\frac{x}{6} + \frac{3x}{4}$

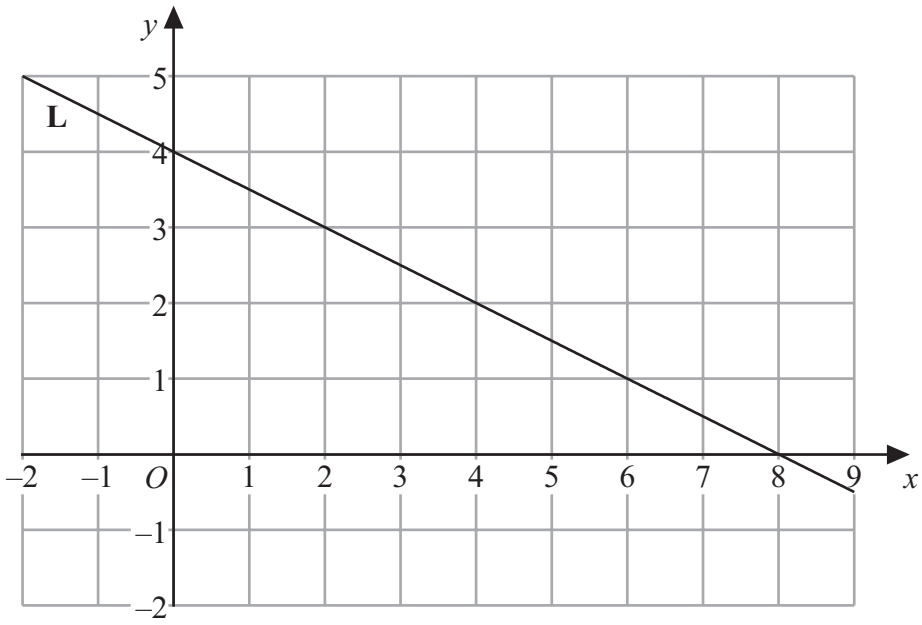
.....

Q11

(Total 3 marks)

Leave blank

12. (a)



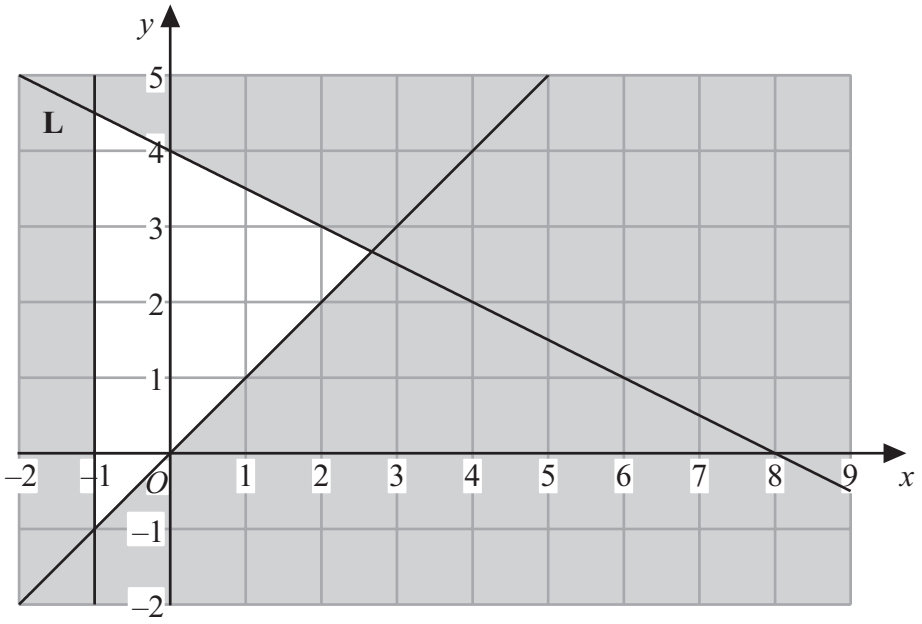
Find the equation of the line **L**.

.....

(3)

Leave blank

(b) Find the three inequalites that define the **unshaded** region shown in the diagram below.



.....

.....

.....

(3) **Q12**

(Total 6 marks)

Leave blank

13. (a) Solve $x^2 - 8x + 12 = 0$

.....

(3)

(b) Solve the simultaneous equations

$$y = 2x$$
$$4x - 5y = 9$$

$x =$ .....

$y =$ .....

(3) **Q13**

(Total 6 marks)

Leave blank

14.

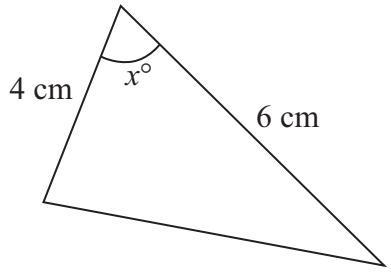


Diagram **NOT** accurately drawn

The area of the triangle is 6.75 cm^2.
The angle $x°$ is acute.
Find the value of x.
Give your answer correct to 1 decimal place.

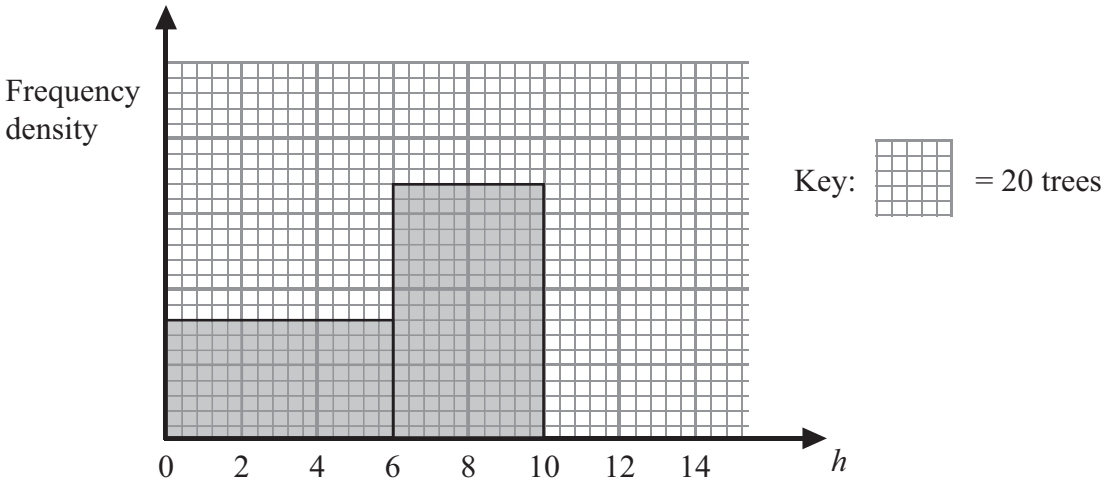
$x =$ .....

Q14

(Total 3 marks)

Leave blank

15. The unfinished histogram shows information about the heights, h metres, of some trees. A key is also shown.



(a) Calculate an estimate for the number of trees with heights in the interval $4.5 < h \leqslant 10$

.....

(3)

(b) There are 75 trees with heights in the interval $10 < h \leqslant 13$
Use this information to complete the histogram.

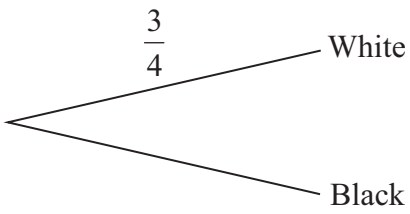
(2) **Q15**

(Total 5 marks)

Leave blank

16. A bag contains 3 white discs and 1 black disc.
John takes at random 2 discs from the bag without replacement.

(a) Complete the probability tree diagram.



(3)

(b) Find the probability that both discs are white.

.....

(2)

(c) All the discs are now replaced in the bag.
Pradeep takes at random 3 discs from the bag without replacement.

Find the probability that the disc left in the bag is white.

.....

(3) **Q16**

(Total 8 marks)

Leave blank

17. The diagram shows a sector of a circle, radius 45 cm, with angle 84°.

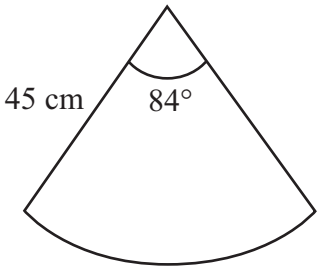


Diagram **NOT** accurately drawn

Calculate the area of the sector.
Give your answer correct to 3 significant figures.

..... cm^2 **Q17**

(Total 3 marks)

18.

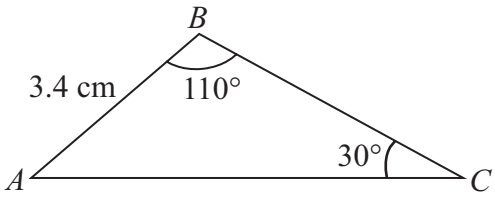


Diagram **NOT** accurately drawn

Calculate the length of AC.
Give your answer correct to 3 significant figures.

..... cm **Q18**

(Total 3 marks)

Leave blank

19. A cone has slant height 4 cm and base radius r cm.

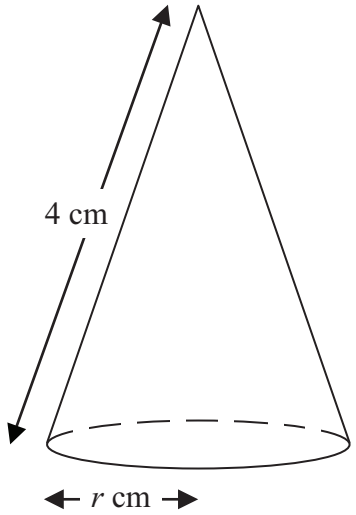


Diagram **NOT** accurately drawn

The **total** surface area of the cone is $\frac{33}{4}\pi$ cm^2.

Calculate the value of r.

$r =$ .....

Q19

(Total 4 marks)

Leave blank

20. $f(x) = (x - 1)^2$

(a) Find f(8)

.....

(1)

(b) The domain of f is all values of x where $x \geqslant 7$
Find the range of f.

.....

(2)

$g(x) = \dfrac{x}{x - 1}$

(c) Solve the equation $g(x) = 1.2$

.....

(2)

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

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

(ii) Hence write down $gg(x)$ in terms of x.

$gg(x) =$.....

(6)

Q20

(Total 11 marks)

Leave blank

21.

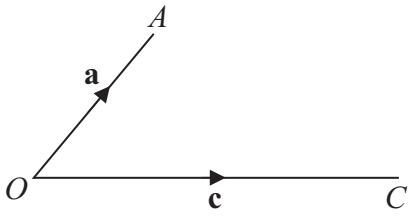


Diagram **NOT** accurately drawn

In the diagram $\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OC} = \mathbf{c}$.

(a) Find $\overrightarrow{CA}$ in terms of **a** and **c**.

.....

(1)

(b) The point B is such that $\overrightarrow{AB} = \frac{1}{2}\mathbf{c}$.

Give the mathematical name for the quadrilateral $OABC$.

.....

(1)

(c) The point P is such that $\overrightarrow{OP} = \mathbf{a} + k\mathbf{c}$, where $k \geqslant 0$

State the two conditions relating to $\mathbf{a} + k\mathbf{c}$ that must be true for $OAPC$ to be a rhombus.

(2) **Q21**

(Total 4 marks)

Leave blank

22. (a) Work out $5.2 \times 10^2 + 2.3 \times 10^4$
Give your answer in standard form.

.....

(2)

(b) $a \times 10^2 + b \times 10^4 = c \times 10^4$

Express c in terms of a and b.

$c =$.....

(2) **Q22**

(Total 4 marks)

TOTAL FOR PAPER: 100 MARKS

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