Paper Reference

4 4 0 0 / 4 H

Surname

Initial(s)

Signature

Paper Reference(s)

4400/4H

London Examinations IGCSE

Mathematics

Paper 4H

Higher Tier

Tuesday 16 November 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 20 pages in this question paper. Any blank pages are indicated.
You may use a calculator.

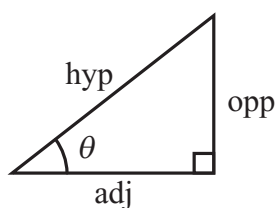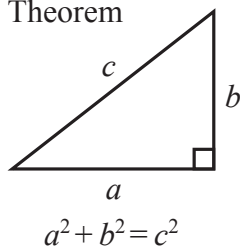**Advice to Candidates**

Write your answers neatly and in good English.

Turn over

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IGCSE MATHEMATICS 4400
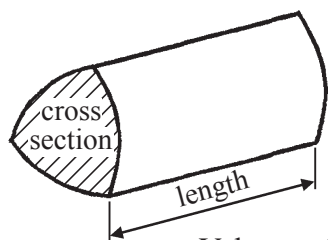## FORMULA SHEET – HIGHER TIER

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 $\times \cos\theta$
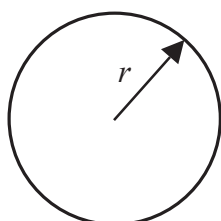opp $=$ hyp $\times \sin\theta$
opp $=$ adj $\times \tan\theta$

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 $= \frac{1}{2}ab\sin C$
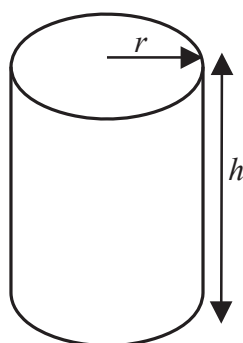

Volume of prism $=$ area of cross section $\times$ length

Circumference of circle $= 2\pi r$

Area of circle $= \pi r^2$

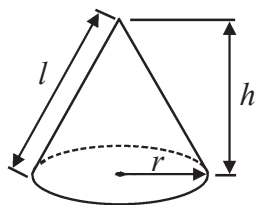Area of a trapezium $= \frac{1}{2}(a + b)h$

Volume of cylinder $= \pi r^2 h$

Curved surface area
of cylinder $= 2\pi rh$
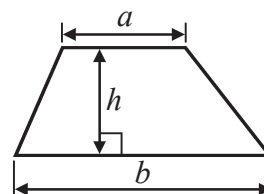
The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$,
where $a \neq 0$, are given by

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

Answer ALL TWENTY TWO questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

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

$$\frac{3.7 \times 2.9}{5.3} + 1.4$$

Give your answer as a decimal.
Write down all the figures on your calculator display.

....
(2)

(b) Give your answer to part (a) correct to 2 decimal places.

....
(1) **Q1**

(Total 3 marks)

2. Anya flew from Kuala Lumpur to Singapore.
The average speed for the journey was 248 km/h.
The journey time was 1 hour 15 minutes.

Work out the distance from Kuala Lumpur to Singapore.

.... km
(Total 3 marks) **Q2**

3.
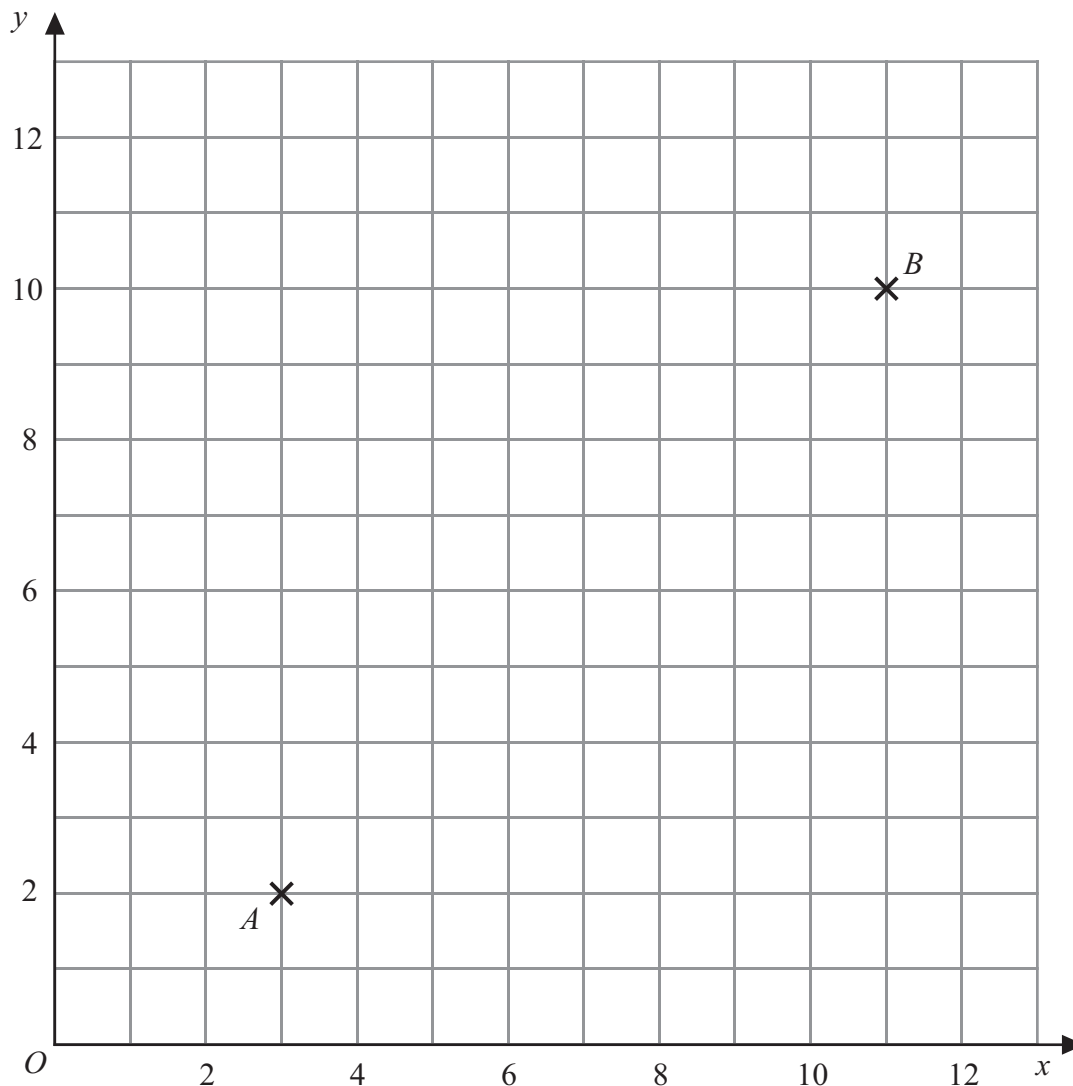
The point *A* has coordinates (3, 2) and the point *B* has coordinates (11, 10).

(a) Find the coordinates of the midpoint of *AB*.

(............... , ...)

(2)

AB is a diameter of a circle.
CD is another diameter of this circle.
CD is perpendicular to *AB*.

(b) Find the coordinates of *C* and the coordinates of *D*.

C   (............... , ...)

D   (............... , ...)

(2)

(Total 4 marks)

4. A bag contains some shapes.
Each shape is a circle or a triangle or a square.
Lewis takes at random a shape from the bag.
The probability that he will take a circle is 0.3
The probability that he will take a triangle is 0.1

(a) Work out the probability that he will take a square.

....
(2)

(b) Work out the probability that he will take a shape with straight sides.

....
(2)

Grace takes at random one of the shapes from the bag and then replaces the shape.
She does this 160 times.

(c) Work out an estimate for the number of times she will take a circle.

....
(2)   Q4

(Total 6 marks)

5.

1 euro = £0.72
£1 = 221 Sri Lankan rupees

Change 50 euros to Sri Lankan rupees.

.... Sri Lankan rupees   **Q5**

(Total 2 marks)

6. $V = \frac{2}{3}hy^2$

(a) $h = 2.6$ $y = 1.5$
Work out the value of V.

$V =$ ....
(2)

(b) $V = 35$ $y = 2.5$
Work out the value of h.

$h =$ ....
(2)

(c)   Make y the subject of the formula $V = \frac{2}{3}hy^2$

$y =$ ....
(2)   **Q6**

(Total 6 marks)

7.
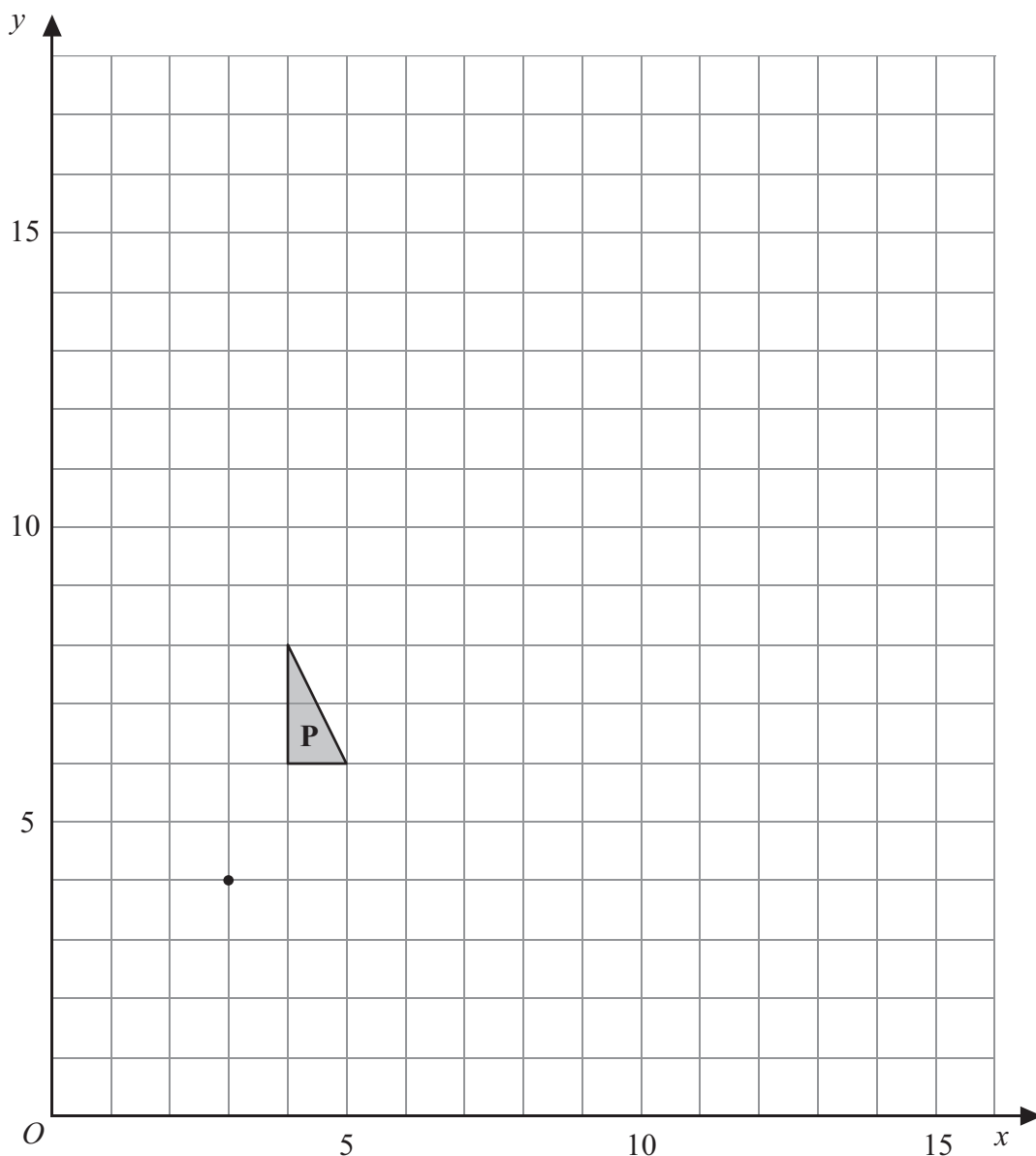
(a) On the grid, enlarge triangle **P** with scale factor 3 and centre (3, 4).
Label the new triangle **Q**.

(3)

(b) On the grid, translate triangle **Q** by the vector $\begin{pmatrix} 4 \\ -8 \end{pmatrix}$

Label the new triangle **R**.

(2)

(c) Describe fully the single transformation which maps triangle **P** onto triangle **R**.

....

....

(2)

(Total 7 marks)

8. The scale of a map is 1 : 50 000
On the map, the distance between two schools is 19.6 cm.

Work out the real distance between the schools.
Give your answer in kilometres.

.... km

(Total 3 marks)

9.
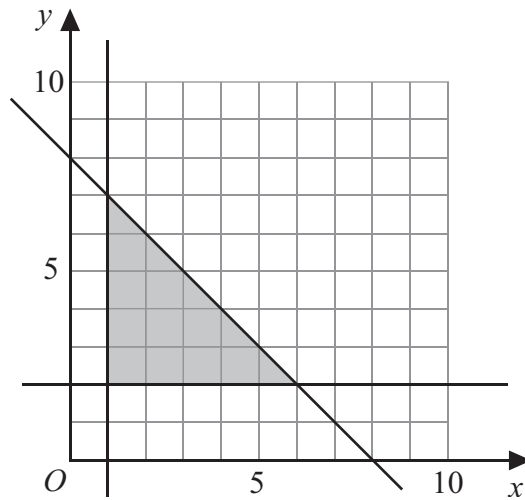
Write down the 3 inequalities that define the shaded region.

....

....

....

(Total 3 marks)

10.
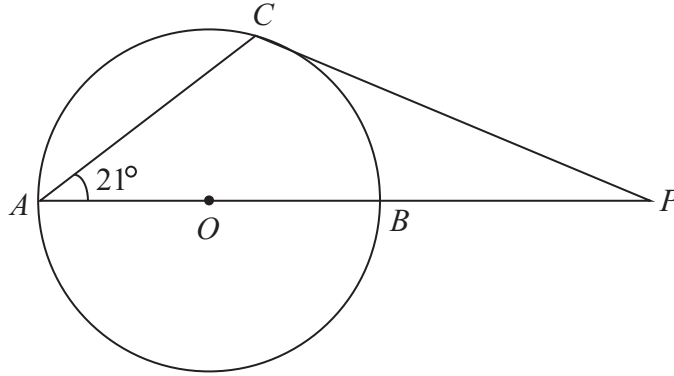
Diagram **NOT** accurately drawn

A, *B* and *C* are points on a circle, centre *O*.
AB is a diameter of the circle.
PC is a tangent to the circle.
ABP is a straight line.
Angle *BAC* = 21°.

Work out the size of angle *APC*.

.... °

(Total 4 marks)

Q10

Turn over

11. Tom buys a painting for $1350
He sells it for $1269

(a) Work out his percentage loss.

.... %

(3)

Kelly bought a boat.
Later, she sold the boat for $9519
She made a profit of 14%.

(b) Work out the original price of the boat.

$ ....

(3)

(Total 6 marks)

12. The line **L** cuts the *y*-axis at (0, 5).
   L also passes through the point (2, 1).

   (a) Find the equation of the line **L**.

   ....
   (3)

   (b) Find the equation of the line which is parallel to **L** and which passes through the point
   (3, 0).

   ....
   (2)   Q12

   (Total 5 marks)

13. The size of each interior angle of a regular polygon is 11 times the size of each exterior
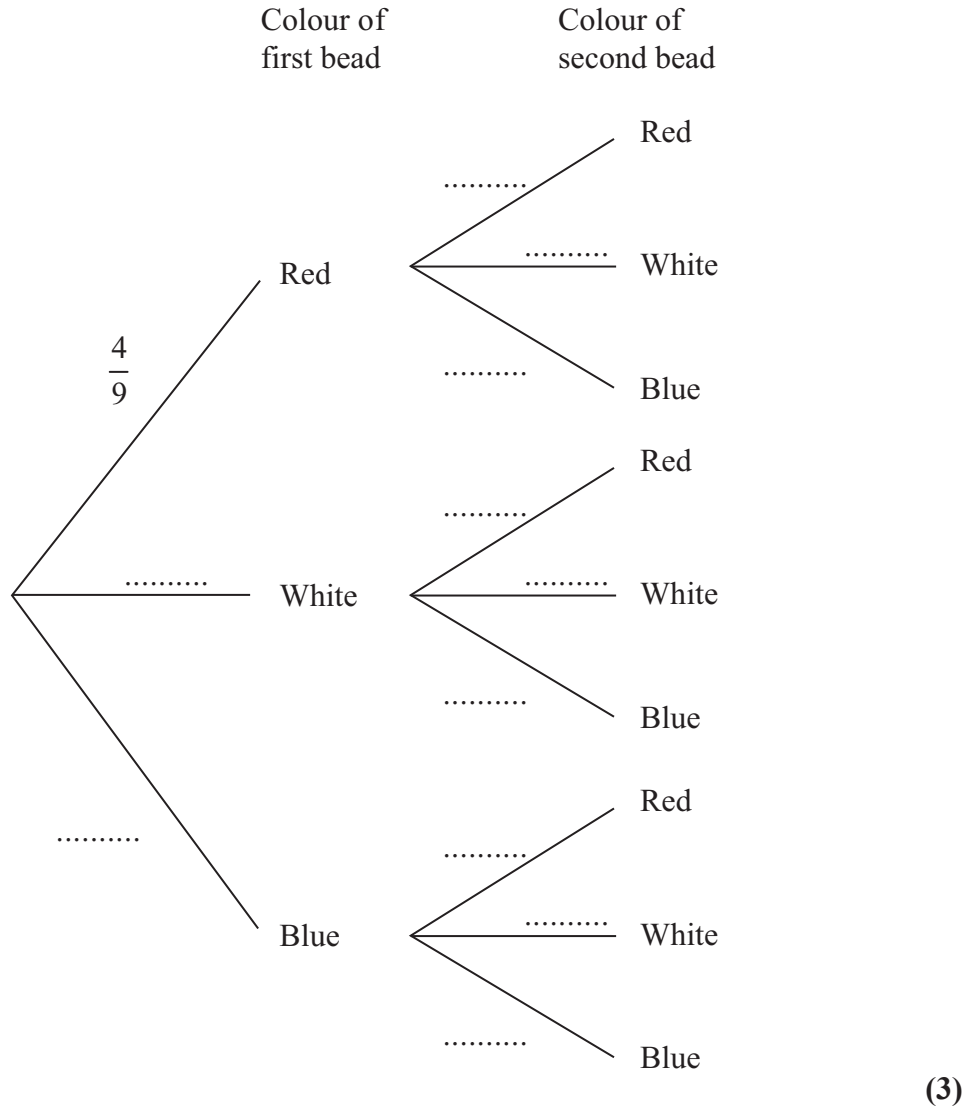   angle.

   Work out the number of sides the polygon has.

   ....   Q13
   (Total 4 marks)

H 3 7 7 7 1 A 0 1 1 2 0

14. There are 9 beads in a bag.
4 of the beads are red.
3 of the beads are white.
2 of the beads are blue.
Sanjay takes at random a bead from the bag and does not replace it.
He then takes at random a second bead from the bag.

(a) Complete the probability tree diagram.

Colour of
first bead

Colour of
second bead

$\dfrac{4}{9}$

Red

.... Red

.... White

.... Blue

.... White

.... Red

.... White

.... Blue

.... Blue

.... Red

.... White

.... Blue

(3)

(b) Calculate the probability that one of Sanjay's beads is red and his other bead is blue.

....

(3)

(Total 6 marks)

Q14

15. (a) Work out $(9 \times 10^8) \times (4 \times 10^6)$

Give your answer in standard form.

....

(b) $x = 7 \times 10^m$ and $y = 5 \times 10^n$, where m and n are integers.

   (i) It is given that $xy = 3.5 \times 10^{12}$

     Show that $m + n = 11$

   (ii) It is also given that $\dfrac{x}{y} = 1.4 \times 10^{27}$

     Find the value of m and the value of n.

$m = $ ....

$n = $ ....

(5)

(Total 6 marks)

16. P is inversely proportional to V.
$P = 18$ when $V = 24$

(a) Express P in terms of V.

....
(3)

(b) Find the positive value of V when $P = 3V$
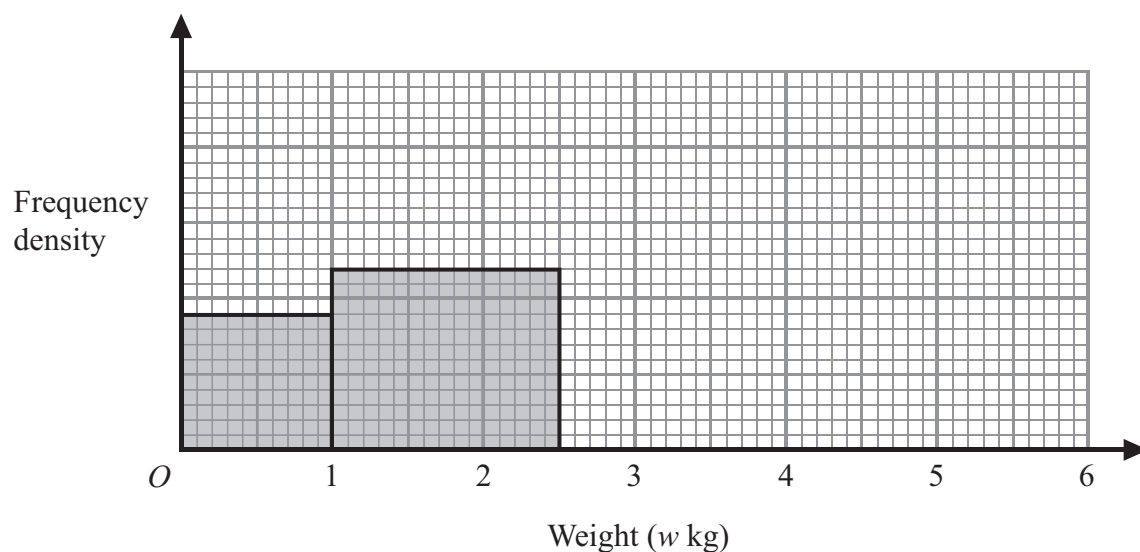
$V =$ ....
(2)

(Total 5 marks)

17. The incomplete table and histogram show information about the weights of some books.

Weight (*w* kg)	Frequency
$0 < w \leqslant 1$	
$1 < w \leqslant 2.5$	36
$2.5 < w \leqslant 4$	57
$4 < w \leqslant 6$	24

Frequency density

Weight (*w* kg)

(a) Use the information in the histogram to complete the table.

(1)

(b) Use the information in the table to complete the histogram.

(2)   **Q17**

(Total 3 marks)

18. Solve $3x^2 + 8x + 2 = 0$
   Give your solutions correct to 3 significant figures.

....
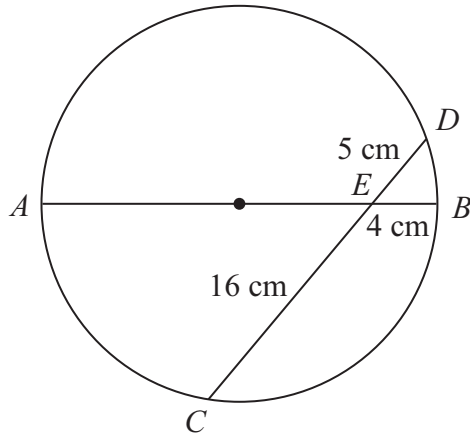
(Total 3 marks)

19.

Diagram **NOT**
accurately drawn

AB is a diameter of a circle.
CD is a chord of the circle.
AB and *CD* intersect at *E*.
BE = 4 cm, *CE* = 16 cm and *DE* = 5 cm.

(a) Calculate the length of *AE*.

.... cm

(2)

(b) (i) Find the radius of the circle.

.... cm

(ii) Calculate the size of angle *AED*.
Give your answer correct to 1 decimal place.

.........................°

(5)

(Total 7 marks)

Turn over

20. Solve the simultaneous equations

$$y = x^2$$
$$y = 7x - 10$$

....

(Total 5 marks)

21.
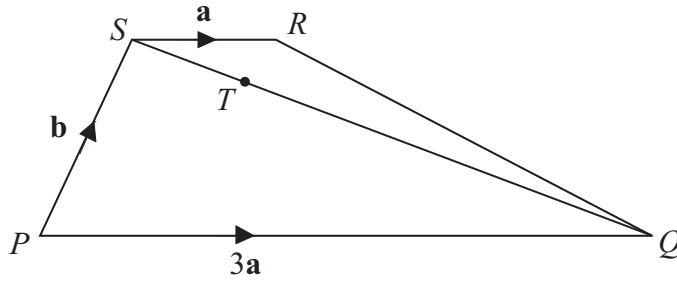
PQRS is a trapezium with *PQ* parallel to *SR*.

$\overrightarrow{SR} = \mathbf{a}$ $\overrightarrow{PQ} = 3\mathbf{a}$ $\overrightarrow{PS} = \mathbf{b}$

T is the point on *SQ* such that $ST = \frac{1}{4}SQ$.

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

   (i) $\overrightarrow{PR}$

   ....

   (ii) $\overrightarrow{SQ}$

   ....

   (iii) $\overrightarrow{PT}$

   ....
   (3)

(b) $\overrightarrow{PT} = k\,\overrightarrow{PR}$ where *k* is a fraction.

   (i) What does this result tell you about the points *P*, *T* and *R*?

   ....

   (ii) Find the value of *k*.

   k = ...
   (2)

   (Total 5 marks)

22. Simplify fully $\quad 1 + \dfrac{x^2 + x - 6}{(x+4)(x-2)}$

....

(Total 4 marks)

Q22

TOTAL FOR PAPER: 100 MARKS

END

H 3 7 7 7 1 A 0 2 0 2 0