Write your name here

| Surname | Other names |
|---|---|
| | |

**Pearson Edexcel GCSE**

| Centre Number | Candidate Number |
|---|---|
| | |

# Mathematics A

## Paper 2 (Calculator)

**Higher Tier**

Monday 8 June 2015 – Morning
**Time: 1 hour 45 minutes**

Paper Reference
**1MA0/2H**

**You must have:** Ruler graduated in centimetres and millimetres, protractor, pair of 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.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- **Calculators may be used.**
- If your calculator does not have a $\pi$ button, take the value of $\pi$ to be 3.142 unless the question instructs otherwise.

## 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.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed.

## Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

*Turn over* ▶

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P 4 5 8 7 2 A 0 1 2 8

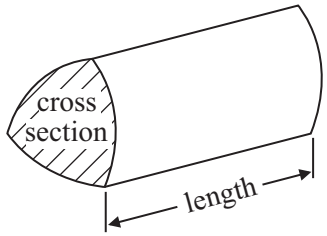
PEARSON

**GCSE Mathematics 1MA0**

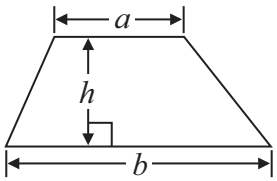
Formulae: Higher Tier

**You must not write on this formulae page.**
**Anything you write on this formulae page will gain NO credit.**

**Volume of prism** = area of cross section × length

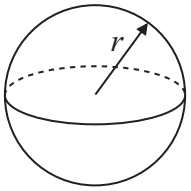



**Area of trapezium** = $\frac{1}{2}(a + b)h$



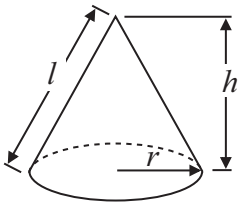

**Volume of sphere** = $\frac{4}{3}\pi r^3$

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

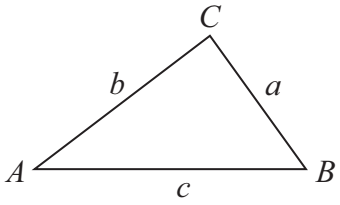



**Volume of cone** = $\frac{1}{3}\pi r^2 h$

**Curved surface area of cone** = $\pi rl$




**In any triangle *ABC***




**The Quadratic Equation**
The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$, are given by

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

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

**Answer ALL questions.**

**Write your answers in the spaces provided.**

**You must write down all stages in your working.**

**1** Uditi has a bag of chocolate sweets.

There are 30 sweets in the bag.

This table shows the types of sweets in the bag.

| | Strawberry | Caramel | Nut |
|---|---|---|---|
| **Dark chocolate** | 3 | 1 | 6 |
| **Milk chocolate** | 4 | 5 | 2 |
| **White chocolate** | 1 | 4 | 4 |

Uditi takes at random a sweet from the bag.

(a) Write down the probability that the sweet is a dark chocolate caramel.

.....

**(1)**

(b) Work out the probability that the sweet is a white chocolate.

.....

**(2)**

There are some dark chocolates, some milk chocolates and some white chocolates in a box.

The table below shows the probabilities that a chocolate taken at random from the box is a dark chocolate or is a milk chocolate.

| | Dark chocolate | Milk chocolate | White chocolate |
|---|---|---|---|
| **Probability** | 0.35 | 0.17 | |

A chocolate is taken at random from the box.

(c) Work out the probability that the chocolate is a white chocolate.

.....

**(2)**

**(Total for Question 1 is 5 marks)**

**2** The equation

$$x^3 - x^2 = 30$$

has a solution between 3 and 4

Use a trial and improvement method to find this solution.
Give your answer correct to one decimal place.
You must show **ALL** your working.

.....

**(Total for Question 2 is 4 marks)**

**3** Use your calculator to work out $\dfrac{\sqrt{70.25}}{4.2 - 2.37}$

(a) Write down all the figures on your calculator display.
You must give your answer as a decimal.

.....

**(2)**

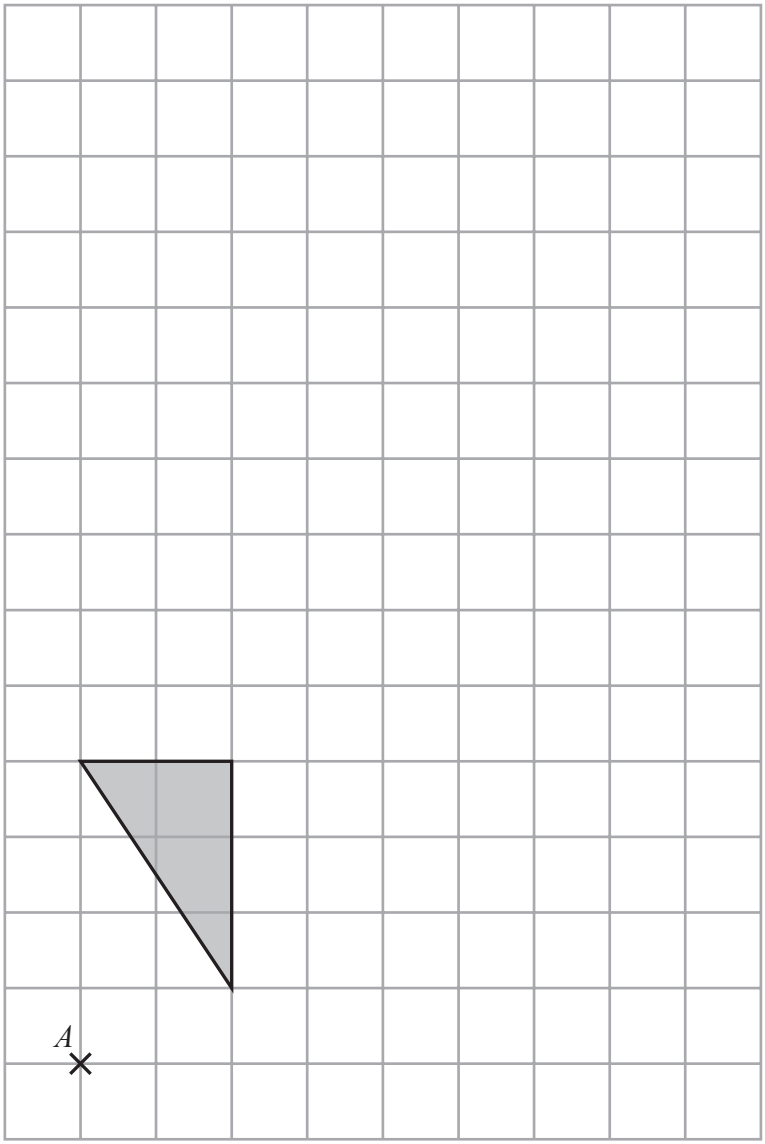
(b) Write your answer to part (a) correct to 4 decimal places.

.....

**(1)**

**(Total for Question 3 is 3 marks)**

**4** A shaded shape is shown on the grid.




On the grid, enlarge the shape by a scale factor of 2, centre $A$.

**(Total for Question 4 is 2 marks)**

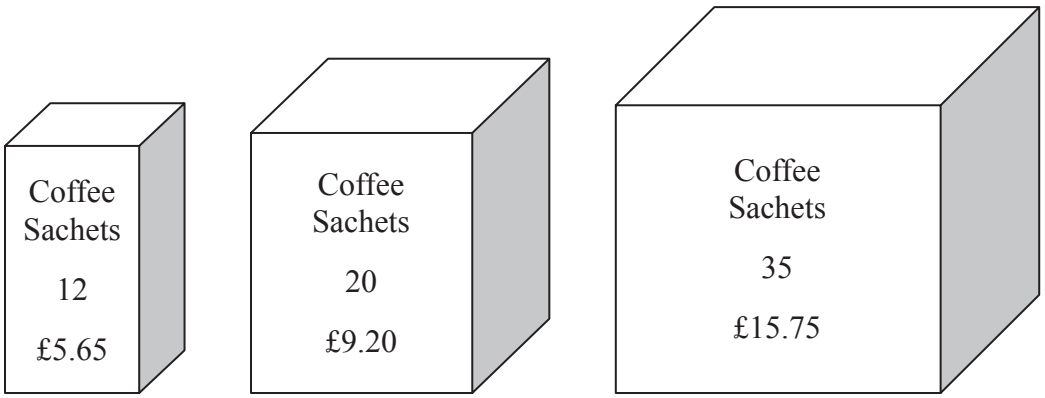
***5** Redlands School sent $x$ students to a revision day.
St Samuel's School sent twice as many students as Redlands School.
Francis Long School sent 7 fewer students than Redlands School.

Each student paid £15 for the revision day.
The students paid a total of £1155

Work out how many students were sent by each school to the revision day.
You must show all your working.

**(Total for Question 5 is 5 marks)**

***6** Coffee sachets are sold in three different sizes of box.




small medium large

A small box has 12 coffee sachets and costs £5.65
A medium box has 20 coffee sachets and costs £9.20
A large box has 35 coffee sachets and costs £15.75

Work out which size of box gives the best value for money.
You must show all your working.

**(Total for Question 6 is 4 marks)**

**7** (a) Expand $7(x + 5)$

.....

**(1)**

(b) Expand $3y(4y - 3)$

.....

**(1)**

(c) Expand and simplify $(t + 2)(t + 4)$

.....

**(2)**

**(Total for Question 7 is 4 marks)**

**8** Sandra has a piece of string 153 cm long.
She cuts the string into three lengths in the ratio 4 : 2 : 3

Work out the length, in centimetres, of each piece of string.

..... cm

..... cm

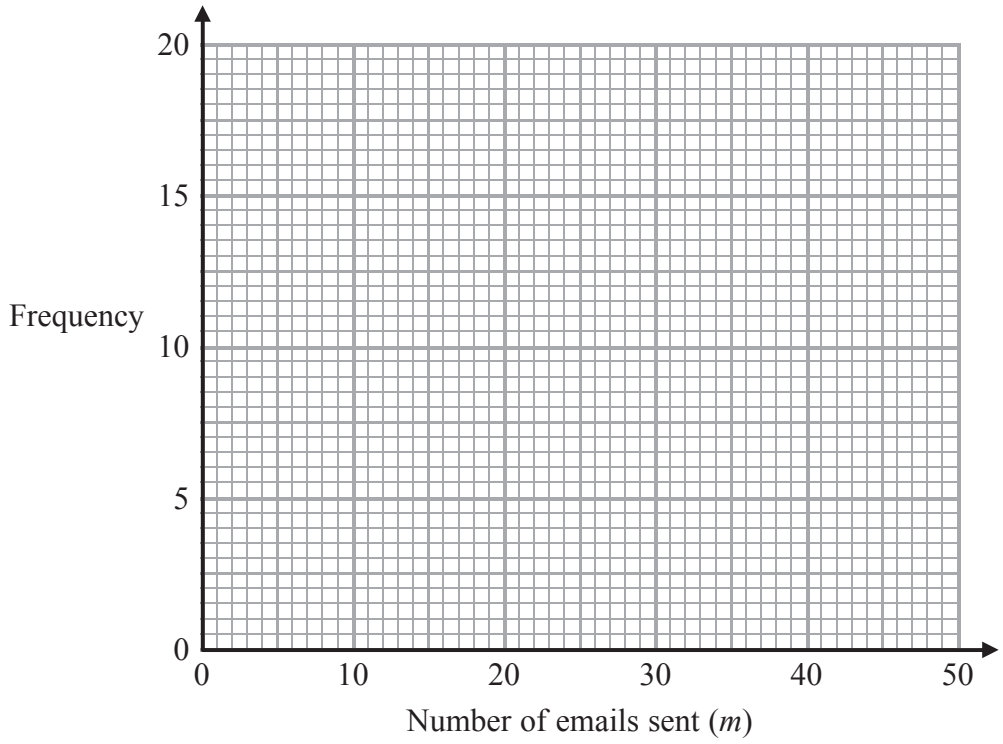
..... cm

**(Total for Question 8 is 3 marks)**

**9** The frequency table gives information about the numbers of emails sent by 51 teachers on Monday.

| Number of emails sent ($m$) | Frequency |
|---|---|
| $0 < m \leqslant 10$ | 5 |
| $10 < m \leqslant 20$ | 17 |
| $20 < m \leqslant 30$ | 14 |
| $30 < m \leqslant 40$ | 9 |
| $40 < m \leqslant 50$ | 6 |

(a) On the grid below, draw a frequency polygon for this information.




**(2)**

*(b) Nalini says that at least a quarter of these teachers sent more than 30 emails.

Is Nalini correct?
You must explain your answer.

**(2)**

**(Total for Question 9 is 4 marks)**

**10** Here is a scale drawing of an office.
The scale is 1 cm to 2 metres.

A photocopier is going to be put in the office.
The photocopier has to be closer to *B* than it is to *A*.
The photocopier also has to be less than 8 metres from *C*.

Show, by shading, the region where the photocopier can be put.

**(Total for Question 10 is 3 marks)**

***11** The diagram shows the top of Levi's birthday cake.

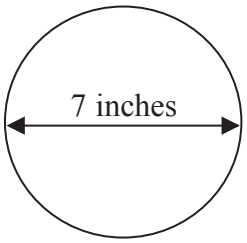



Diagram **NOT** accurately drawn

The top of the cake is in the shape of a circle.
The diameter of the circle is 7 inches.

A ribbon is going to be put around the side of the cake.
Ribbons are sold in 50 cm lengths.

1 inch is 2.54 cm.

Work out if one length of ribbon is long enough to go all the way around the cake.
You must show your working.

**(Total for Question 11 is 4 marks)**

**12** The points $A$, $B$ and $C$ lie in order on a straight line.

The coordinates of $A$ are $(2, 5)$
The coordinates of $B$ are $(4, p)$
The coordinates of $C$ are $(q, 17)$

Given that $AC = 4AB$, find the values of $p$ and $q$.

$p =$ .....

$q =$ .....

**(Total for Question 12 is 3 marks)**

**13** Martin and Janet are in an orienteering race.

Martin runs from checkpoint *A* to checkpoint *B*, on a bearing of 065°
Janet is going to run from checkpoint *B* to checkpoint *A*.

Work out the bearing of *A* from *B*.

.....°

**(Total for Question 13 is 2 marks)**

**14** Sumeet records the times, in minutes, for 40 runners to finish a half marathon.

Information about these times is shown in the table.

| Time ($t$ minutes) | Frequency |
|---|---|
| $60 < t \leqslant 90$ | 10 |
| $90 < t \leqslant 120$ | 14 |
| $120 < t \leqslant 150$ | 9 |
| $150 < t \leqslant 180$ | 5 |
| $180 < t \leqslant 210$ | 2 |

Calculate an estimate for the mean time.

..... minutes

**(Total for Question 14 is 4 marks)**

**15** (a) Work out the value of $25^{-3}$

.....

**(1)**

(b) Work out the value of $350^{3}$
Give your answer in standard form.

.....

**(2)**

**(Total for Question 15 is 3 marks)**

---

**16** Liquid A has a density of 0.7 g/cm$^3$.
Liquid B has a density of 1.6 g/cm$^3$.

140 g of liquid A and 128 g of liquid B are mixed to make liquid C.

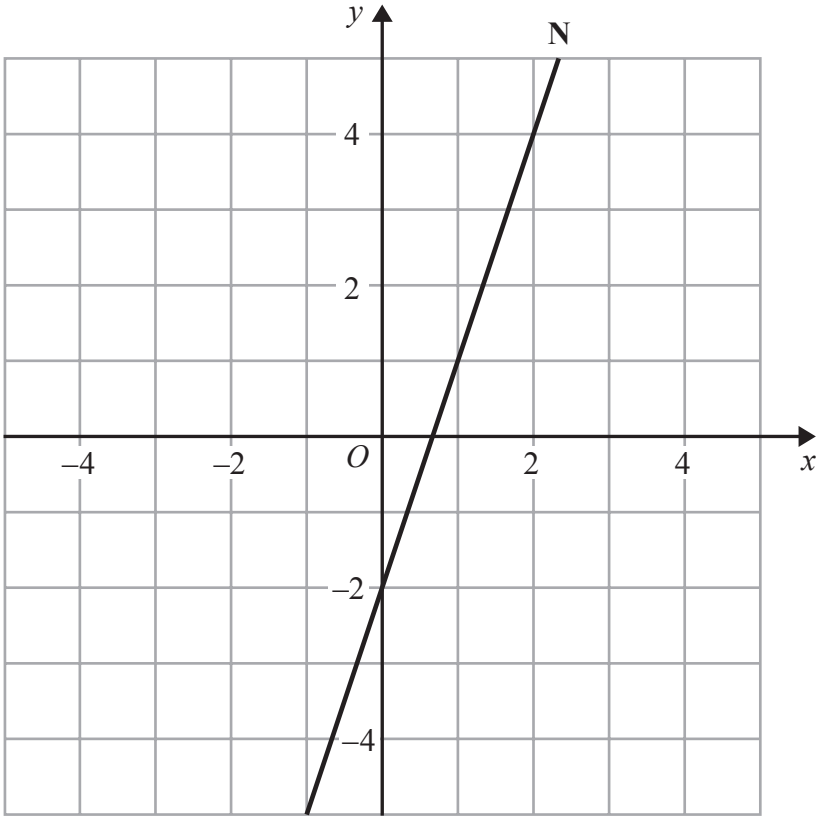
Work out the density of liquid C.

..... g/cm$^3$

**(Total for Question 16 is 4 marks)**

---

**17** The line **N** is drawn below.




Find an equation of the line perpendicular to line **N** that passes through the point (0, 1).

.....

**(Total for Question 17 is 3 marks)**

**18** The owners of a car park recorded the number of cars parked at 12 noon each day.

The table shows information about the number of cars parked in the car park at 12 noon each day in July and in December.

| | **July** | **December** |
|---|---|---|
| Least number of cars | 75 | 100 |
| Lower quartile | 90 | 115 |
| Median | 95 | 130 |
| Upper quartile | 150 | 150 |
| Greatest number of cars | 178 | 180 |

(a) What type of diagram could you draw to represent the information for each month?

.....

**(1)**

*(b) Compare the distribution of the number of cars recorded in July with the distribution of the number of cars recorded in December.

.....

.....

.....

.....

**(2)**

**(Total for Question 18 is 3 marks)**

**19**

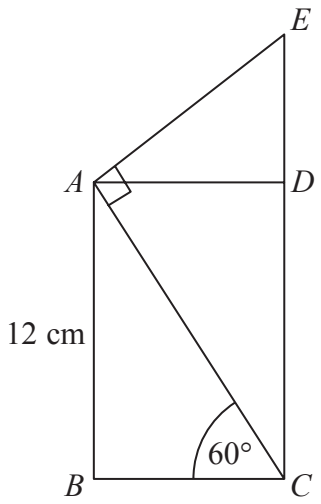



Diagram **NOT** accurately drawn

*ABCD* is a rectangle.
*CDE* is a straight line.

*AB* = 12 cm
Angle *ACB* = 60°
Angle *EAC* = 90°

Calculate the length of *CE*.
You must show all your working.

..... cm

**(Total for Question 19 is 4 marks)**

**20** Show that $(n + 3)^2 - (n - 3)^2$ is an even number for all positive integer values of $n$.

**(Total for Question 20 is 3 marks)**

**21** Fred is making two rectangular flower beds.
The dimensions of the larger rectangle will be three times the dimensions of the smaller rectangle.

There is going to be the same depth of soil in each flower bed.
Fred needs 180 kg of soil for the smaller flower bed.

Work out how much soil Fred needs for the larger flower bed.

..... kg

**(Total for Question 21 is 2 marks)**

**22** Claire is making a loaf of bread.
A loaf of bread loses 12% of its weight when it is baked.

Claire wants the baked loaf of bread to weigh 1.1 kg.

Work out the weight of the loaf of bread before it is baked.

..... kg

**(Total for Question 22 is 3 marks)**

**23** Here is a parallelogram.

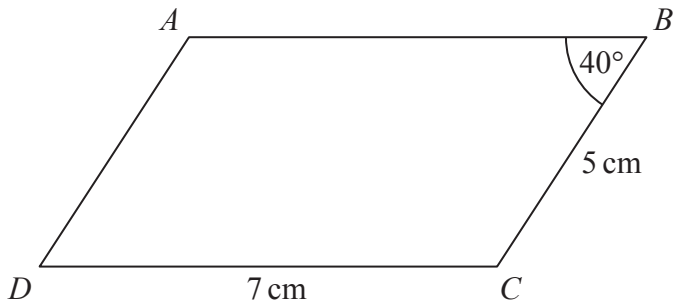



Diagram **NOT** accurately drawn

$DC = 7$ cm
$CB = 5$ cm
Angle $ABC$ is 40°

Work out the area of the parallelogram.
Give your answer correct to 1 decimal place.

..... $cm^2$

**(Total for Question 23 is 3 marks)**

**24** Steve travelled from Ashton to Barnfield.

He travelled 235 miles, correct to the nearest 5 miles.
The journey took him 200 minutes, correct to the nearest 5 minutes.

Calculate the lower bound for the average speed of the journey.
Give your answer in **miles per hour**, correct to 3 significant figures.
You must show all your working.

..... mph

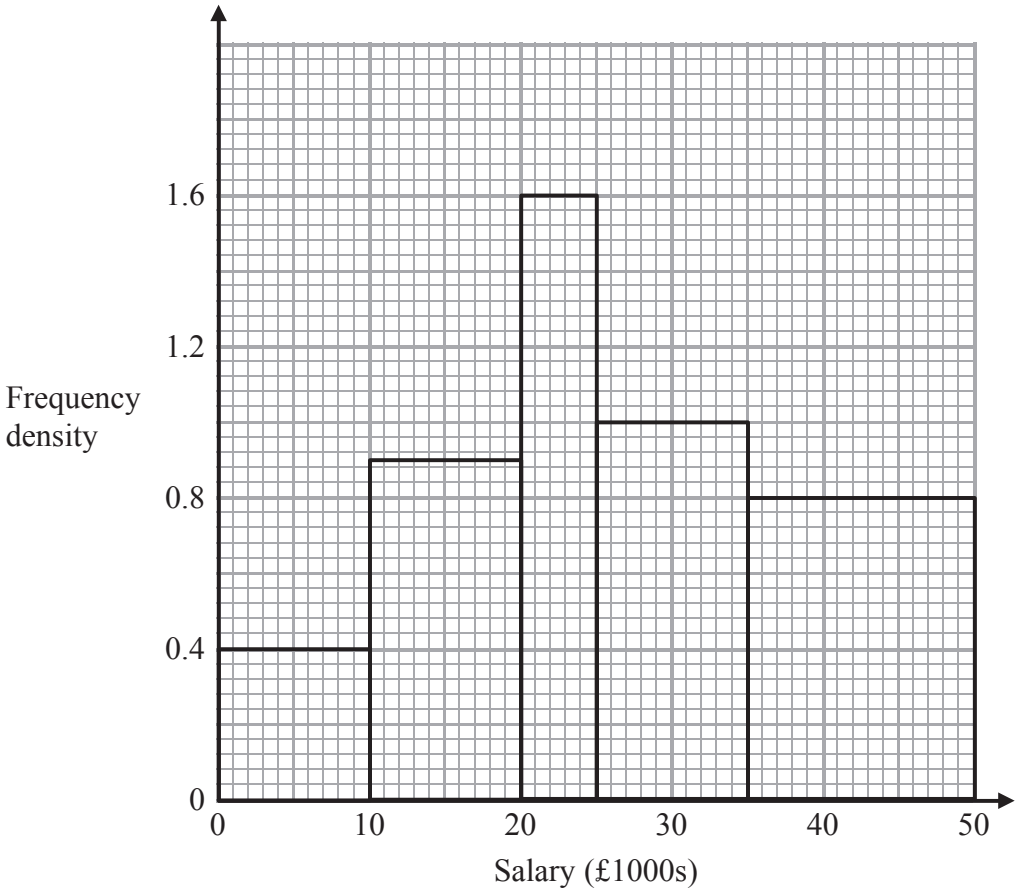
**(Total for Question 24 is 4 marks)**

**25** Solve the equation $3x^2 + 4x - 12 = 0$
Give your solutions correct to 2 decimal places.

.....

**(Total for Question 25 is 3 marks)**

**26** The histogram shows some information about the salaries of a sample of people.




(a) Use the histogram to complete the frequency table.

| Salary ($p$) in £1000s | Frequency |
|---|---|
| $0 < p \leqslant 10$ | 4 |
| $10 < p \leqslant 20$ | |
| $20 < p \leqslant 25$ | |
| $25 < p \leqslant 35$ | |
| $35 < p \leqslant 50$ | |

**(2)**

(b) Work out the proportion of people in the sample who have a salary greater than £40 000

.....

**(2)**

(c) Find an estimate for the median salary.

£.....

**(2)**

**(Total for Question 26 is 6 marks)**

**27**

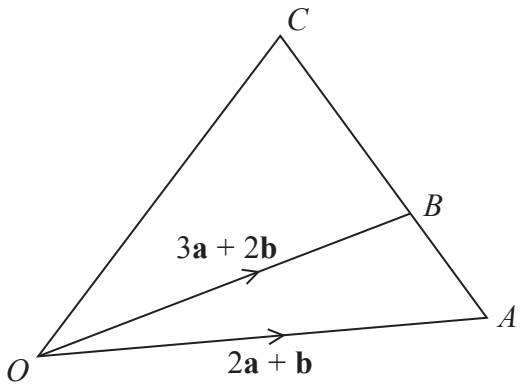



Diagram **NOT** accurately drawn

$ABC$ is a straight line.

$AB : BC = 2 : 5$

$\overrightarrow{OA} = 2\mathbf{a} + \mathbf{b}$

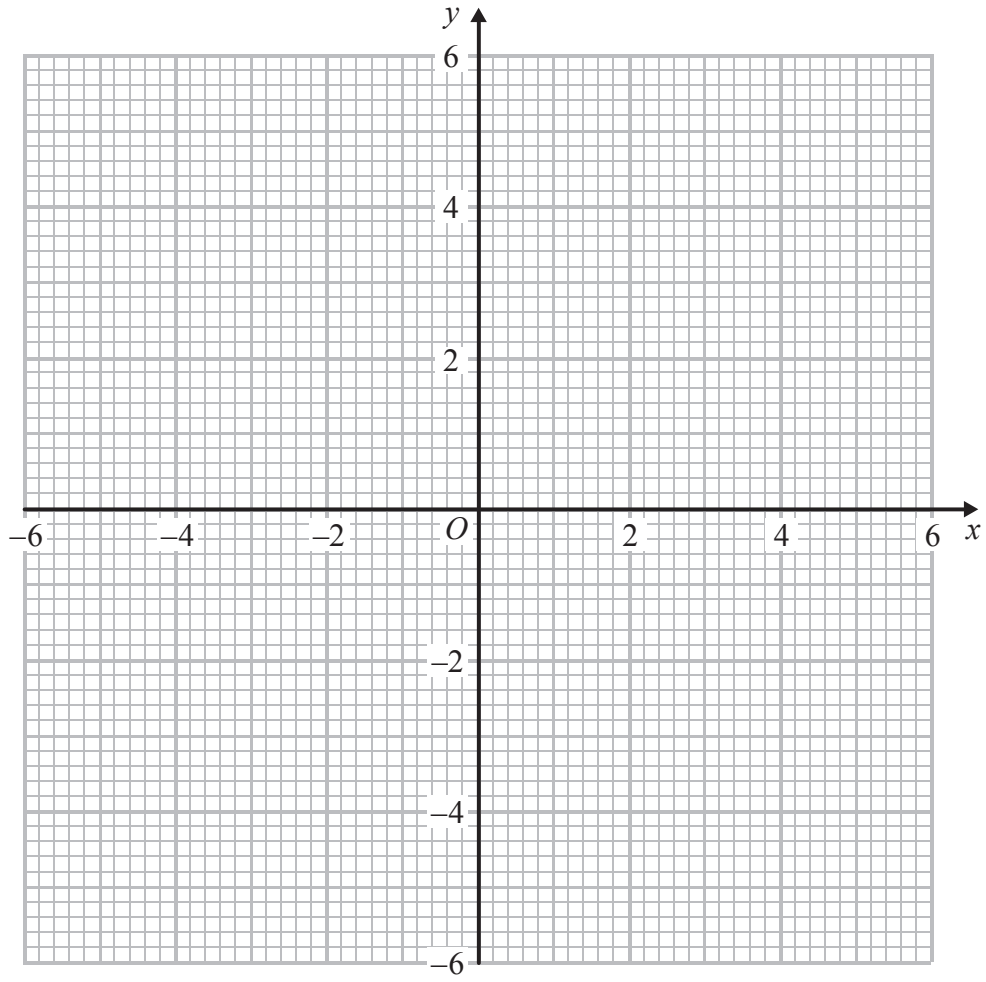
$\overrightarrow{OB} = 3\mathbf{a} + 2\mathbf{b}$

Express $\overrightarrow{OC}$ in terms of **a** and **b**.
Give your answer in its simplest form.

.....

**(Total for Question 27 is 4 marks)**

**28** (a) On the grid, construct the graph of $x^2 + y^2 = 16$




**(2)**

(b) Find estimates for the solutions of the simultaneous equations

$$x^2 + y^2 = 16$$
$$y = 2x + 1$$

.....

**(3)**

**(Total for Question 28 is 5 marks)**

**TOTAL FOR PAPER IS 100 MARKS**

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