WELSH JOINT EDUCATION COMMITTEE

General Certificate of Secondary Education

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184/05

# MATHEMATICS

## INTERMEDIATE TIER PAPER 1

A.M. TUESDAY, 12 November 2002

(2 Hours)

**CALCULATORS ARE NOT TO BE USED FOR THIS PAPER**

Centre Number .....

Candidate's Name (in full) .....

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Candidate's Examination Number .....

## INSTRUCTIONS TO CANDIDATES

Write your centre number, name and candidate number in the spaces provided above.

Answer **all** the questions in the spaces provided.

Take $\pi$ as 3·14.

## INFORMATION FOR CANDIDATES

A formula booklet is available and may be used.

You should give details of your method of solution.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

No certificate will be awarded to a candidate detected in any unfair practice during the examination.

| For Examiner's use only | | |
|---|---|---|
| Question | Maximum Mark | Mark Awarded |
| 1 | 3 | |
| 2 | 3 | |
| 3 | 3 | |
| 4 | 2 | |
| 5 | 4 | |
| 6 | 10 | |
| 7 | 4 | |
| 8 | 3 | |
| 9 | 8 | |
| 10 | 2 | |
| 11 | 3 | |
| 12 | 3 | |
| 13 | 3 | |
| 14 | 2 | |
| 15 | 6 | |
| 16 | 6 | |
| 17 | 3 | |
| 18 | 4 | |
| 19 | 3 | |
| 20 | 4 | |
| 21 | 5 | |
| 22 | 7 | |
| 23 | 2 | |
| 24 | 4 | |
| 25 | 3 | |
| TOTAL | | |

**1.** *(a)* Consider the following set of numbers.

60, 61, 62, 63, 64, 65, 66, 67, 68.

Using only the numbers in the set, write down

(i) a prime number,

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[1]

(ii) a cube number.

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[1]

*(b)* Find the value of $0{\cdot}3 \times 0{\cdot}4$.

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[1]

**2.** A text book costs £6.35. A school wishes to buy 48 of these text books.
Calculate the total cost of the 48 text books.

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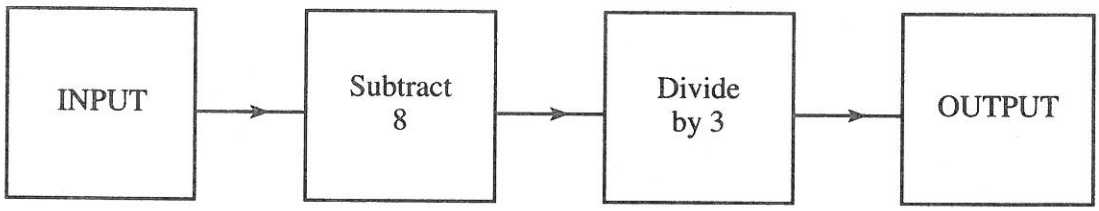
[3]

**3.** A cone is labelled A.
A cuboid is labelled B.
A square-based pyramid is labelled C and a tetrahedron labelled D.
Complete the following table. One has been done for you.

| **Property of the shape** | **Label on shape** |
|---|---|
| It has one circular face | A |
| It has exactly 5 vertices | |
| All its faces are triangles | |
| All its faces are rectangles | |

[3]

**4.** The diagram below represents a number machine.




If the input is $n$, write down the output in terms of $n$.

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[2]

**5.** *(a)* Simplify

$5x - 9 - 3x + 4.$

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[2]

*(b)* What is the value of $6d - 7e$ when $d = -3$ and $e = 2$?

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[2]

**6.** A black bag contains four discs numbered as shown.


A green bag contains five discs numbered as shown.


In a game a player chooses a disc from the black bag and then a disc from the green bag. The numbers on the discs are **multiplied** together to obtain the score.

*(a)* Complete the following table to show all the possible scores.

| Green bag \ Black bag | 1 | 2 | 5 | 6 |
|---|---|---|---|---|
| 8 | 8 | ..... | ..... | ..... |
| 7 | 7 | ..... | ..... | ..... |
| 4 | 4 | 8 | ..... | ..... |
| 3 | 3 | 6 | 15 | 18 |
| 1 | 1 | 2 | 5 | 6 |

[2]

*(b)* (i) What is the probability that a player scores less than 25?

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[2]

(ii) What is the probability that a player scores 25 or more?

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[1]

A player wins a prize by scoring 6 or less.

*(c)* Denise plays the game once. What is the probability that she wins a prize?

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[1]

*(d)* (i) 300 people each play the game once.
Approximately how many would you expect to win a prize?

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[2]

(ii) It costs £2 to play the game once. The prize for winning is £5. If the 300 people each play the game once, approximately how much profit do you expect the game to make?

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[2]

**7.** A rectangle has length 5cm and width 2cm.

*(a)* Write down the dimensions of the rectangle after each has been enlarged by a factor of 4.

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[2]

*(b)* How many times bigger is the area of the enlarged rectangle than the area of the original rectangle?

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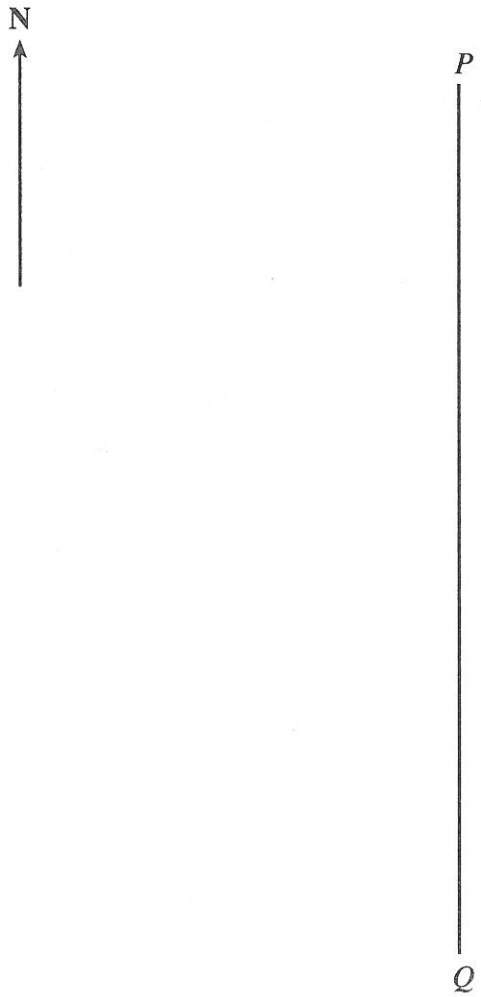
[2]

**8.** *P* and *Q* are two ports with *Q* due South of *P*. Another port is at a point *R* on a bearing of 230° (S50°W) from *P* and 300° (N60°W) from *Q*. By drawing suitable lines, mark the position of *R* on your diagram.

[3]



**9.** Solve the following equations.

*(a)* $6x - 8 = 10$

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[2]

*(b)* $4x - 5 = 30 - 3x$

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[3]

*(c)* $4(x + 2) = 36$

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[3]

**10.** Show clearly how you would obtain an ESTIMATE for the following calculation.

$$\frac{594{\cdot}3 \times 7{\cdot}6}{38{\cdot}7}$$

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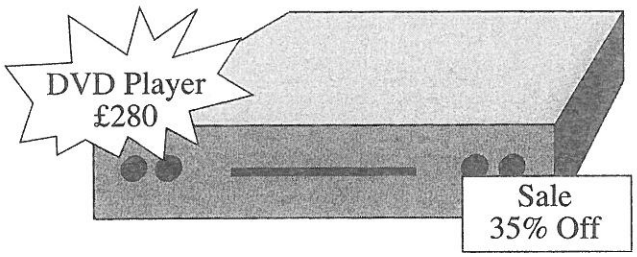
[2]

**11.**




A DVD player was priced at £280. In a sale it was offered at a reduction of 35%.
How much does it cost in the sale?

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[3]

**12.** Twice a day Chris gives his dog Kola $\frac{2}{3}$ of a bowl of biscuits. A 2·5kg bag of biscuits has enough biscuits to last Kola 15 days. Find the weight, in grams, of the biscuits in a full bowl of biscuits.

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[3]

**13.** Arwyn, Betty and Clive share out £3600 in the ratio of 4:5:9. How much do they each get?

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[3]

**14.** In quadrilateral $PQRS$, the line $PQ$ is parallel to $SR$, with $PQ = 16\text{cm}$ and $SR = 18\text{cm}$. The perpendicular distance between $PQ$ and $SR$ is 8cm.
Calculate the area of the quadrilateral $PQRS$.

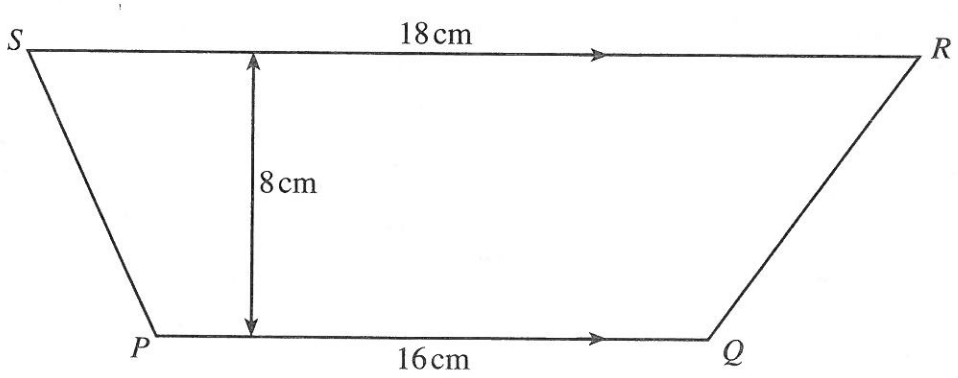


*Diagram not drawn to scale.*

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[2]

**15.** The masses of 8 people who went on a diet were measured before and after the diet. The results were as shown in the following table.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Mass before the diet (kg) | 130 | 50 | 75 | 93 | 112 | 68 | 61 | 83 |
| Mass after the diet (kg) | 112 | 51 | 61 | 83 | 92 | 60 | 49 | 68 |

*(a)* On the graph paper opposite, draw a scatter diagram to display these results. [2]

*(b)* What type of correlation does your scatter diagram show?

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[1]

*(c)* The mean mass of the 8 people before the diet was 84kg and after the diet it was 72kg. Use this information to draw a line of best fit on your scatter diagram. [2]

*(d)* Use your line of best fit to estimate the mass after the diet for a person whose mass was 95kg before going on the diet.

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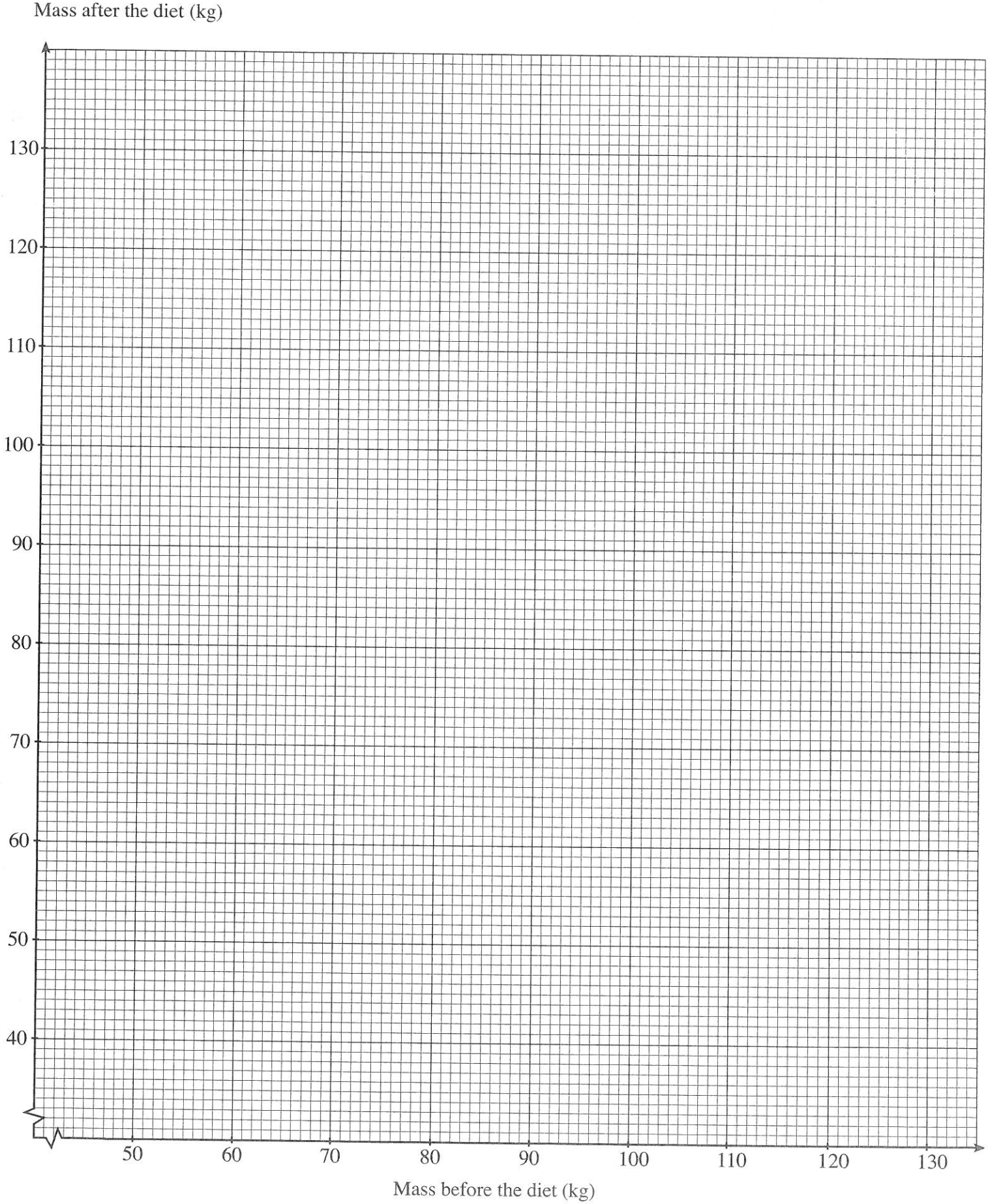
[1]

**For use with Question 15**



**16.** The table shows some of the values of $y = 3x^2 - 2x - 6$ for values of $x$ from –3 to 3.

*(a)* Complete the table by finding the value of $y$ when $x = -2$.

| $x$ | –3 | –2 | –1 | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|---|---|
| $y = 3x^2 - 2x - 6$ | 27 | | –1 | –6 | –5 | 2 | 15 |

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[1]

*(b)* On the graph paper opposite, draw the graph of $y = 3x^2 - 2x - 6$ for values of $x$ between –3 and 3. [2]

*(c)* Draw the line $y = 5$ on your graph paper and write down the $x$-values of the points where your two graphs intersect.

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[2]

*(d)* Write down the equation in $x$ whose solutions are the $x$-values you found in *(c)*.

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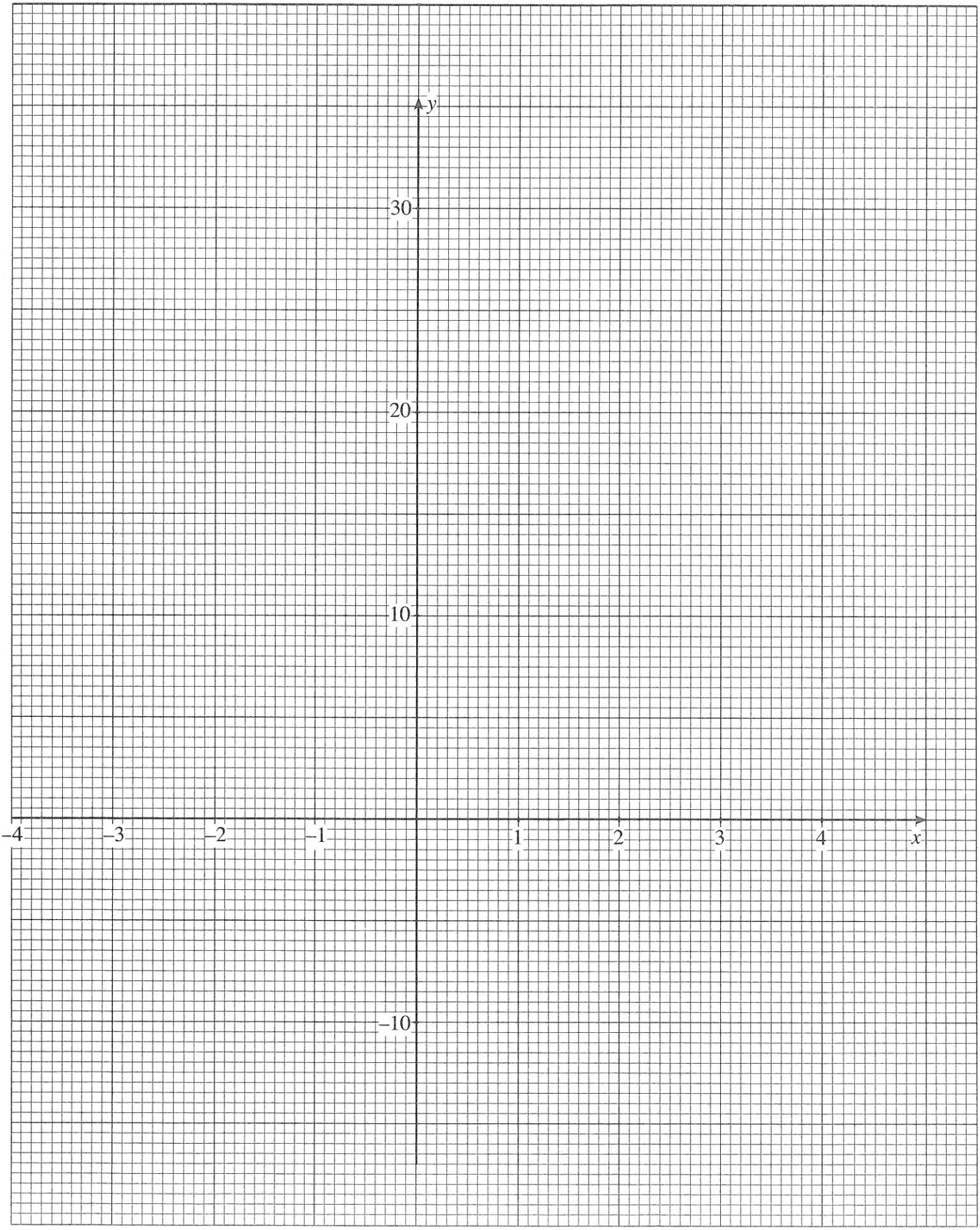
[1]

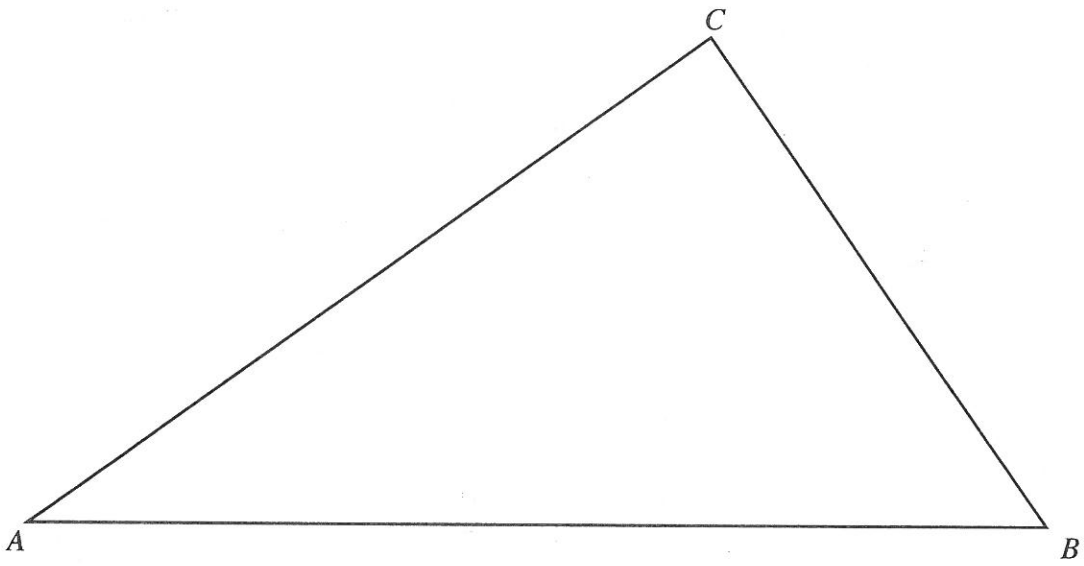
**For use with Question 16**



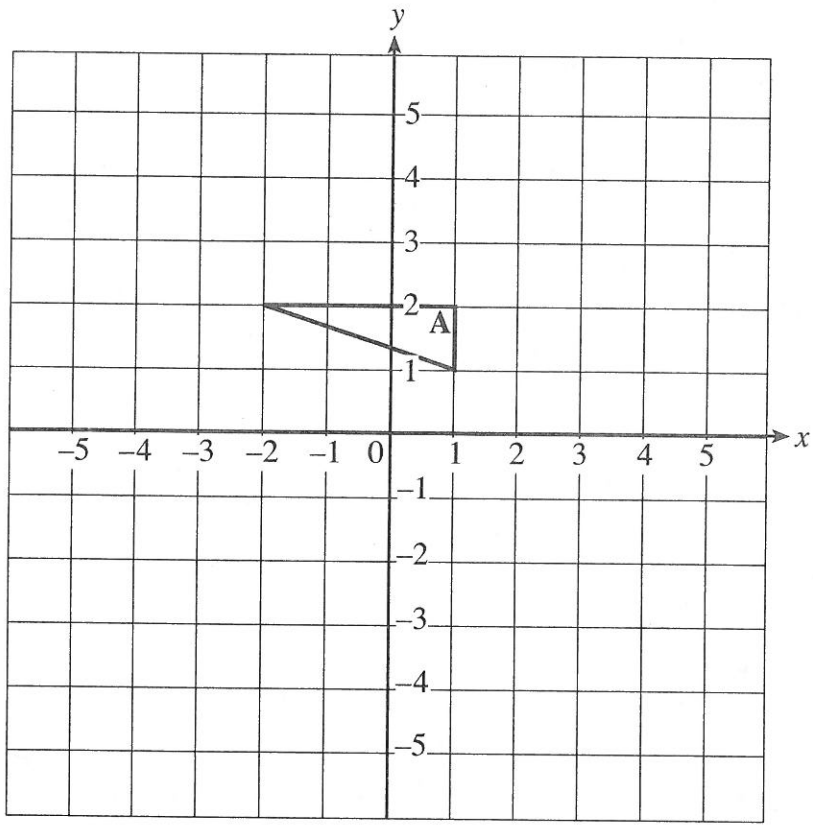
**17.** Shade in the region of points inside the triangle $ABC$ which satisfy **both** of the following conditions.

(i) The points are nearer the point $A$ than the point $B$

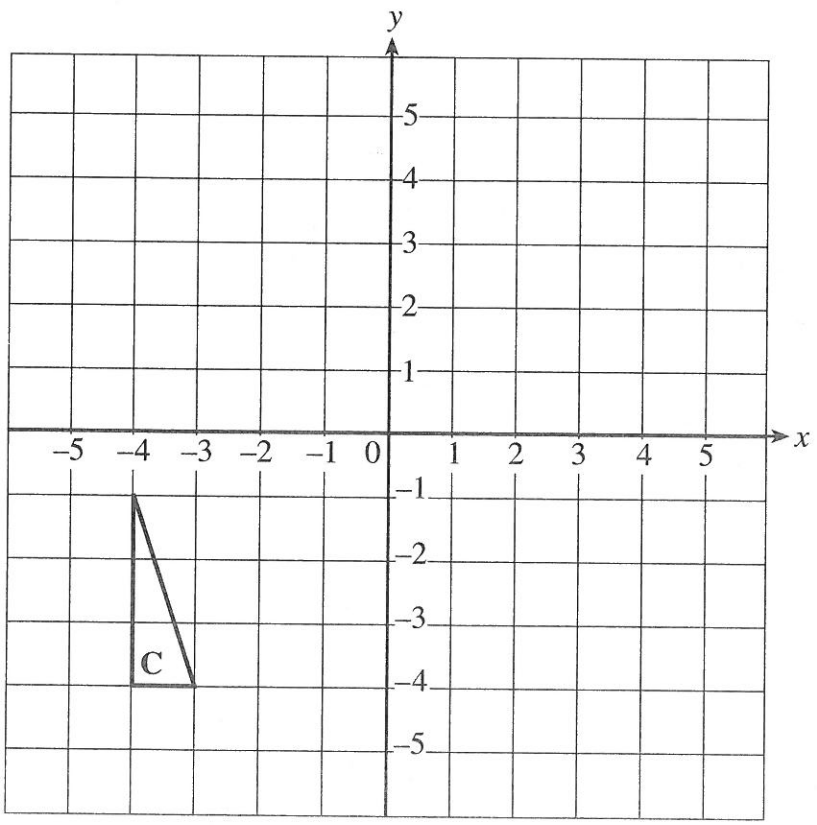
and (ii) the points are further from $B$ than the distance $BC$. [3]



**18.** *(a)* Draw the image of the shape A after a translation of 3 units in the $x$ direction and $-5$ in the $y$ direction. Label the image B. [2]




*(b)* Rotate the shape C through 90° clockwise about the point (1, –2). Label the image D. [2]



**19.** The letters of the word MAESTEG are written on seven cards, one letter per card and placed in a box. Similarly, the ten letters of CAERNARFON are written on ten cards and placed in another box.
A person selects one card at random from each of the two boxes. What is the probability that the person has the letter E on both cards?

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[3]

**20.** Solve the following simultaneous equations by an algebraic (not graphical) method.
Show all your working.

$$5x + 2y = 10$$
$$2x + 3y = -7$$

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[4]

**21.** *(a)* Write each of the following numbers in standard form.

(i) 0·0000086

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[1]

(ii) 62 400 000

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[1]

*(b)* Find, in standard form, the value of

(i) $(5 \times 10^{-8}) \times (3{\cdot}2 \times 10^{-4})$,

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[1]

(ii) $(2 \times 10^{-5}) \div (5 \times 10^{7})$.

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[2]

**22.** A group of 200 pupils sat an examination. The table gives a grouped frequency distribution of their marks in the examination.

| Mark | 0 - 9 | 10 - 19 | 20 - 29 | 30 - 39 | 40 - 49 | 50 - 59 | 60 - 69 | 70 - 79 |
|---|---|---|---|---|---|---|---|---|
| Frequency | 4 | 14 | 46 | 52 | 46 | 30 | 6 | 2 |

*(a)* Complete the following cumulative frequency table.

| Mark (less than) | 9·5 | 19·5 | 29·5 | 39·5 | 49·5 | 59·5 | 69·5 | 79·5 |
|---|---|---|---|---|---|---|---|---|
| Cumulative frequency | | | | | | | | |

[1]

*(b)* On the graph paper opposite, draw a cumulative frequency diagram to show this information. [3]

*(c)* Use your cumulative frequency diagram to find the median.

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[1]

*(d)* The minimum mark for the top grade A was 58. Use your cumulative frequency diagram to estimate how many pupils achieved grade A.

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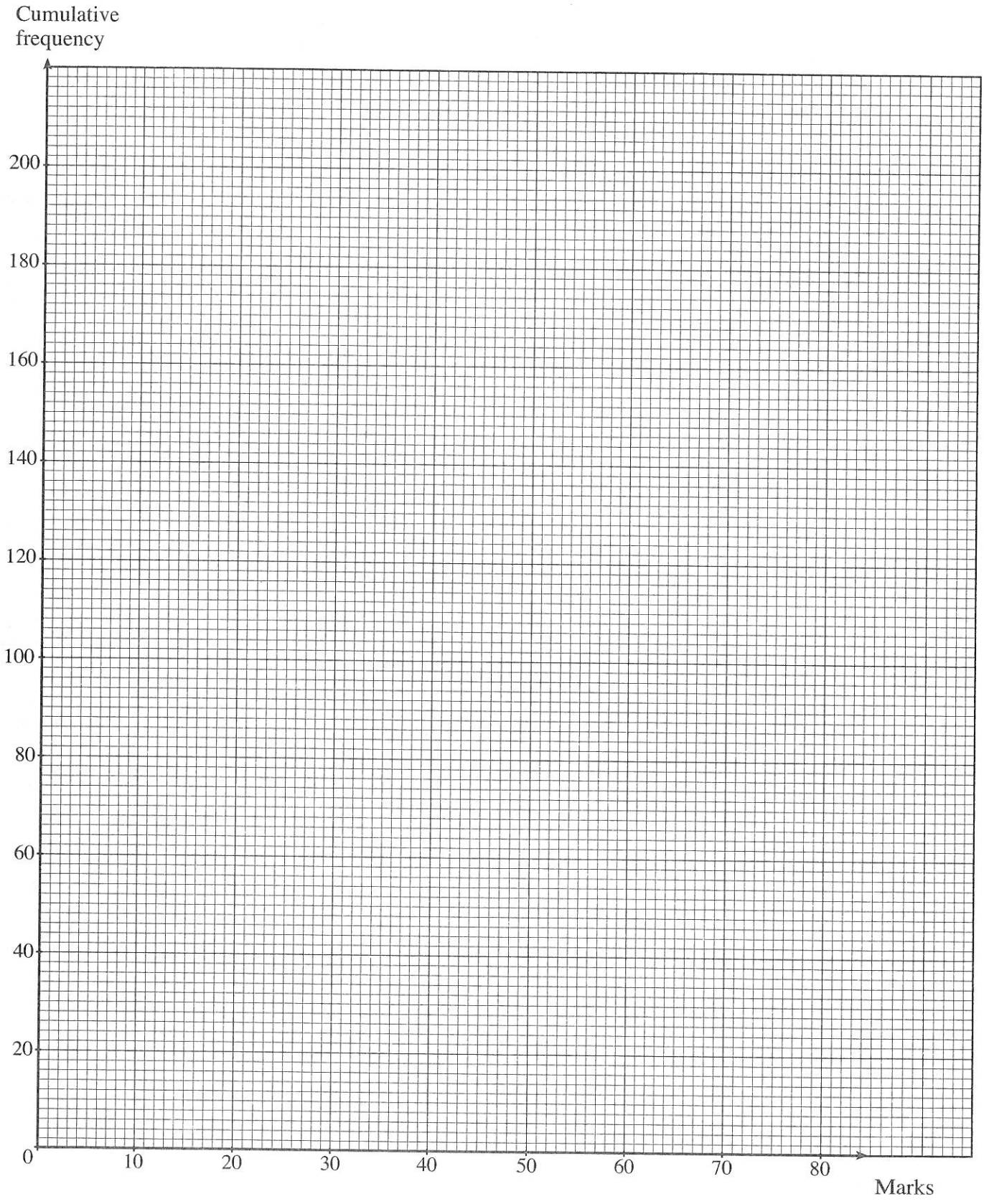
[2]

**For use with Question 22**

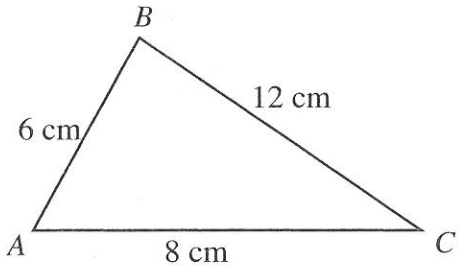


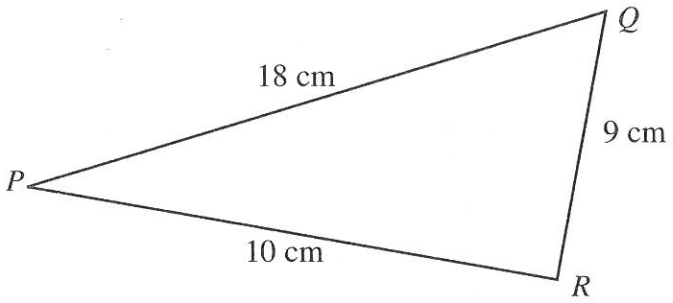
**23.** Each of the following quantities has a particular number of dimensions. Give the number of dimensions of each quantity. The first one has been done for you.

| **Quantity** | **Number of dimensions** |
|---|---|
| The area of a circle | 2 |
| The distance a javelin is thrown by an athlete | |
| The capacity of a jug | |
| The perimeter of a circle | |
| The cross-sectional area of a prism | |

[2]

**24.** *(a)* Show, giving reasons, why the triangles *ABC* and *PQR* below are NOT similar. You must give all your reasoning.




*Diagrams not drawn to scale.*

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[3]

*(b)* Every cube is similar to every other cube. Name another 3 dimensional object that has this property.

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[1]

**25.** Solve the following equation.

$$\frac{2x+6}{3} - \frac{4x-1}{2} = \frac{1}{2}$$

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[3]