



for **AQA, Edexcel** and **OCR**
two-tier GCSE mathematics

Resource sheets for *Foundation 2*

© The School Mathematics Project 2007

The resource sheets in this publication may, free of charge, be downloaded, copied or stored digitally or mechanically for use by an educational institution or private student that has purchased the textbook to which they relate. Digital and mechanically produced copies (or copies of any other kind whatever) of all or part of this publication remain in the copyright of The School Mathematics Project and may not be stored, distributed or used in any way whatever (other for the normal purposes of setting homework to the institution's students) outside the purchasing institution or, in the case of a private student, outside that student's residence.

www.smpmaths.org.uk

Elco uses a formula to work out electricity bills.

$$C = S + np$$

C is the total charge in £; S is a standing (fixed) charge in £;
 n is the number of units of electricity used; p is the cost in £ of 1 unit.

- (a) (i) For this bill for Mrs Smith,
 write down the values of
 S , n and p .

$S =$

$n =$

$p =$

- (ii) Use the formula above to fill in
 Mrs Smith's total charge.

- (b) Fill in the blanks in the bills below.

ELCO plc - the supplier it's a pleasure to pay

| | | | |
|--|------------------|----------------|--|
| Mrs J Smith The Meadows Fingleton Bucks BB1 8NU | Current reading | 1568 | |
| | Previous reading | 1212 | |
| | Units used | 356 | |
| Standing charge £ | 15.00 | Total charge £ | |
| Cost per unit £ | 0.12 | | |

P

ELCO plc - the supplier it's a pleasure to pay

| | | | |
|---|------------------|----------------|--|
| S J Jones Ltd 21 The Flingge Postlethwaite Yorks YO3 9JG | Current reading | 4780 | |
| | Previous reading | 4100 | |
| | Units used | | |
| Standing charge £ | 25.00 | Total charge £ | |
| Cost per unit £ | 0.10 | | |

Q

ELCO plc - the supplier it's a pleasure to pay

| | | | |
|--|------------------|----------------|--|
| Pet International Unit 653 Fido Ind Estate Barking BA2 8UU | Current reading | 59850 | |
| | Previous reading | 41100 | |
| | Units used | | |
| Standing charge £ | 60.00 | Total charge £ | |
| Cost per unit £ | 0.07 | | |

R

ELCO plc - the supplier it's a pleasure to pay

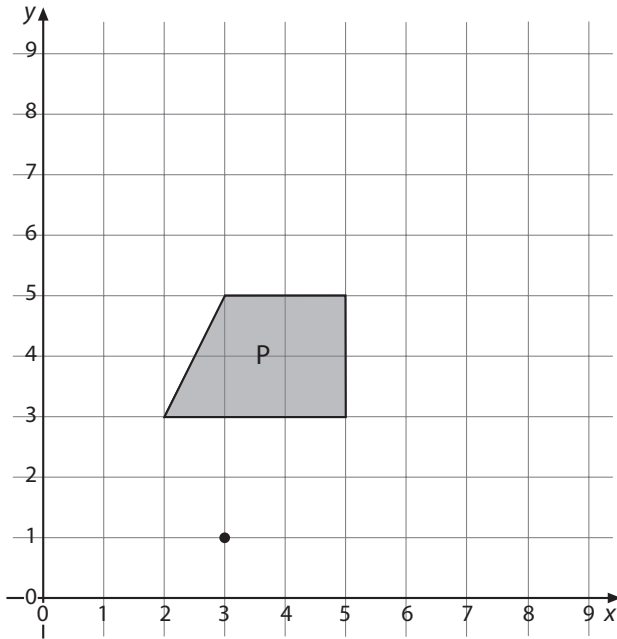
| | | | |
|---|------------------|----------------|--|
| Garden Tools plc 7 Digworthy Road Weedon WE6 7OP | Current reading | 42000 | |
| | Previous reading | 31200 | |
| | Units used | | |
| Standing charge £ | 50.00 | Total charge £ | |
| Cost per unit £ | 0.08 | | |

S

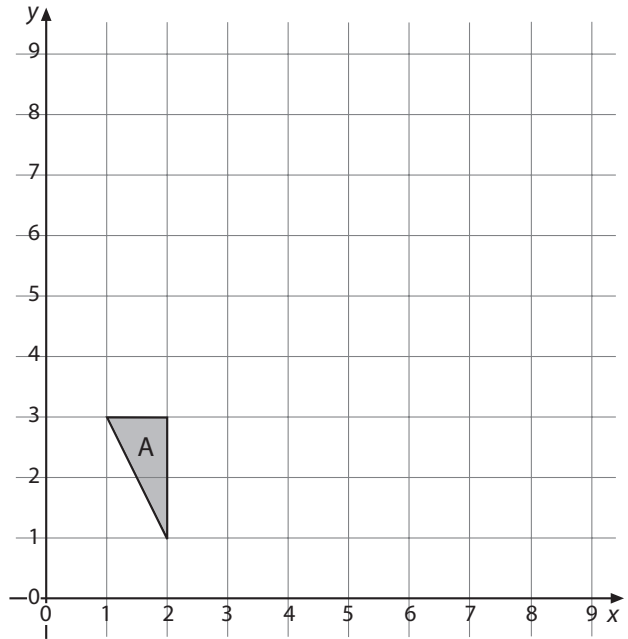
ELCO plc - the supplier it's a pleasure to pay

| | | | |
|---|------------------|----------------|--------|
| Ductile Metals Pullem House Thinly TH5 6YY | Current reading | | |
| | Previous reading | 3500 | |
| | Units used | | |
| Standing charge £ | 40.00 | Total charge £ | 110.00 |
| Cost per unit £ | 0.10 | | |

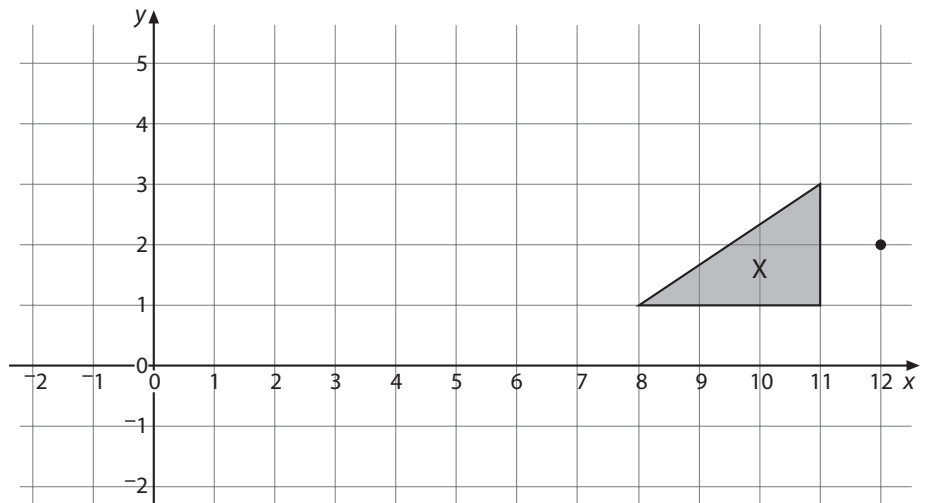
- (a) Enlarge P by a scale factor of 2 with centre of enlargement (3, 1).
Label the image Q.



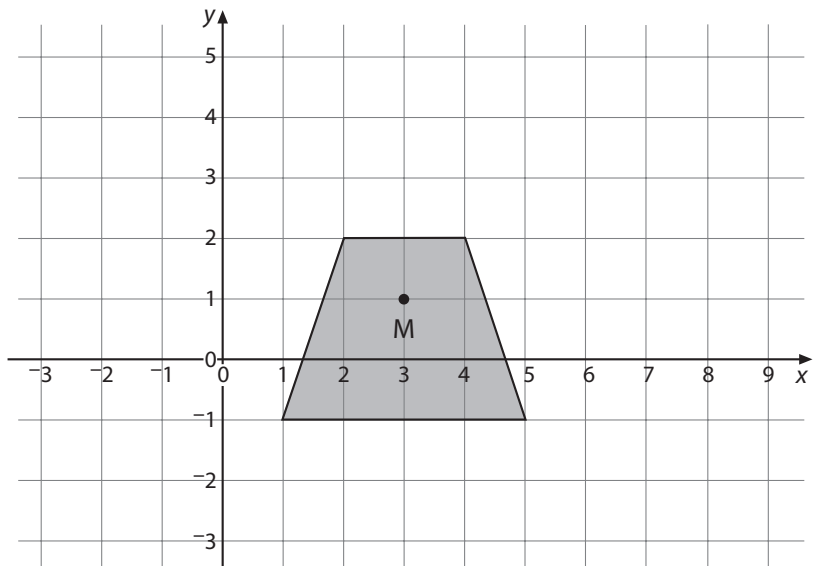
- (b) Enlarge A by a scale factor of 3 with centre of enlargement (0, 0).
Label the image B.



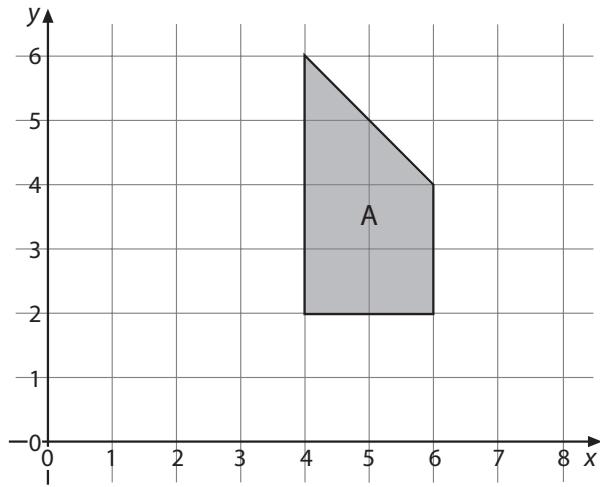
- (c) Enlarge X by a scale factor of 3 with centre of enlargement (12, 2).
Label the image Y.



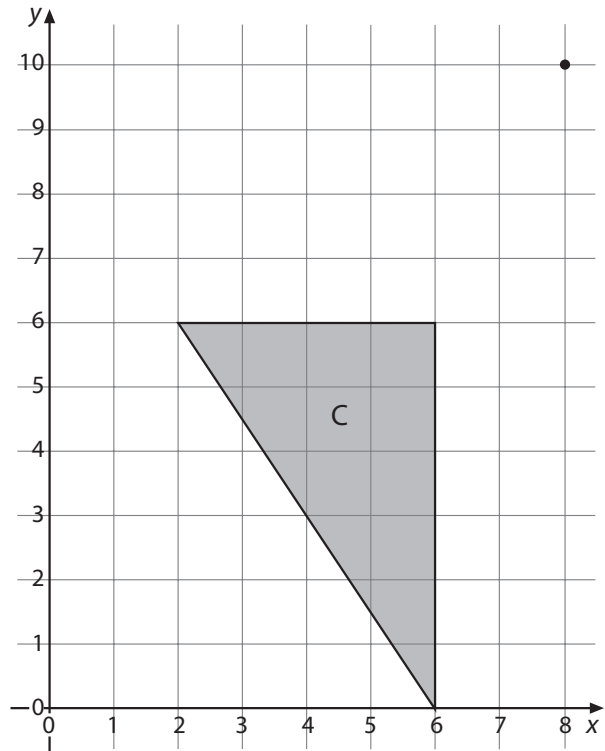
- (d) Enlarge M by a scale factor of 2 with centre of enlargement (3, 1).
Label the image N.



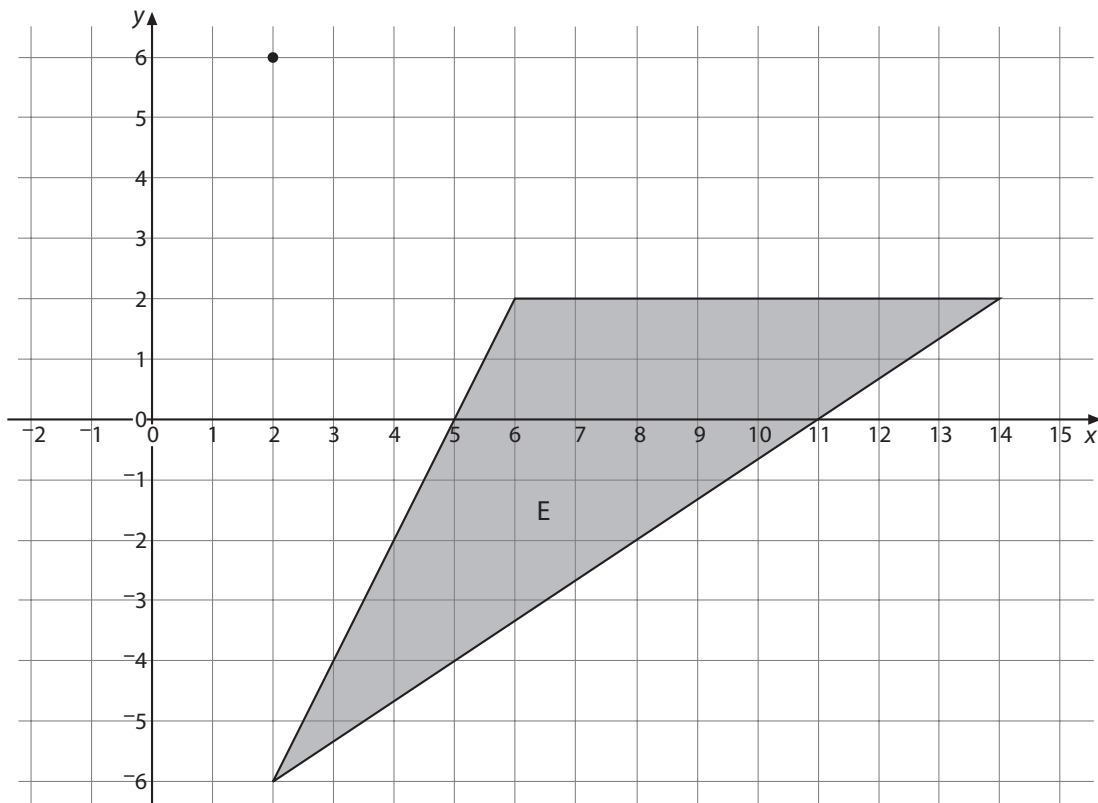
- (a) Enlarge A by a scale factor of $\frac{1}{2}$ with centre of enlargement (0, 0).
Label the image B.



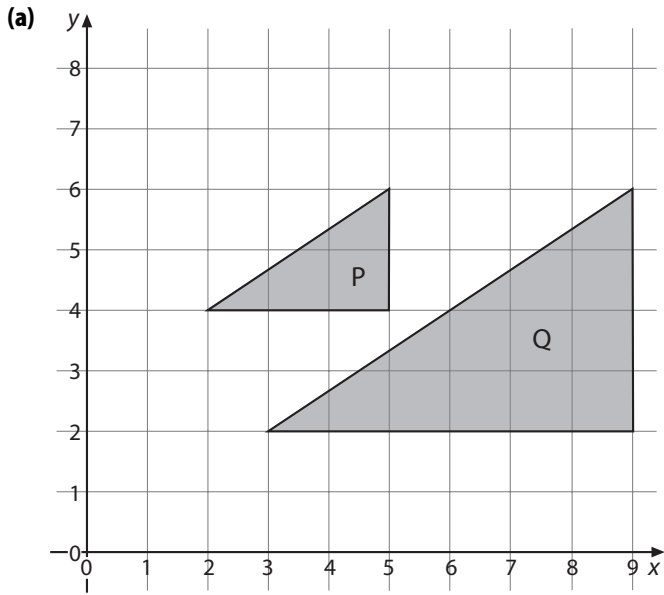
- (b) Enlarge C by a scale factor of $\frac{1}{2}$ with centre of enlargement (8, 10).
Label the image D.



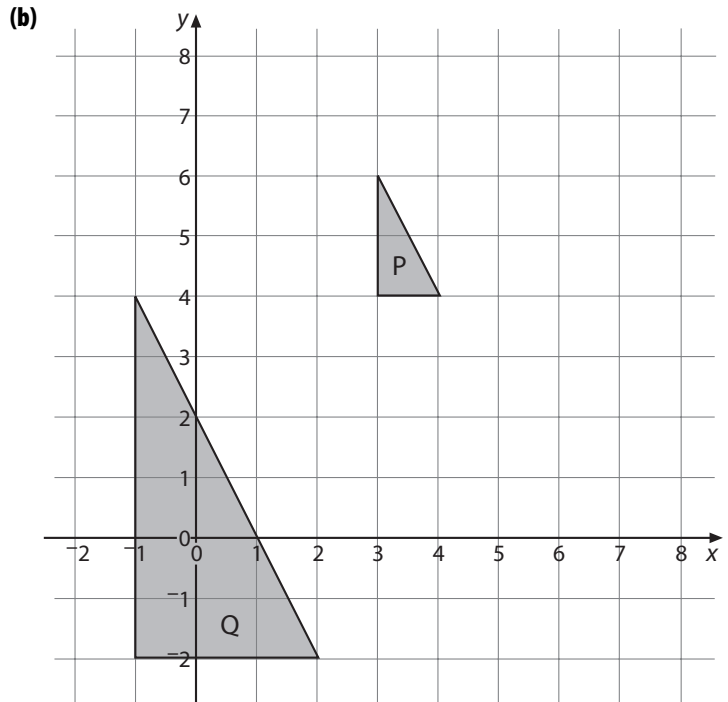
- (c) Enlarge E by a scale factor of $\frac{1}{4}$ with centre of enlargement (2, 6).
Label the image F.



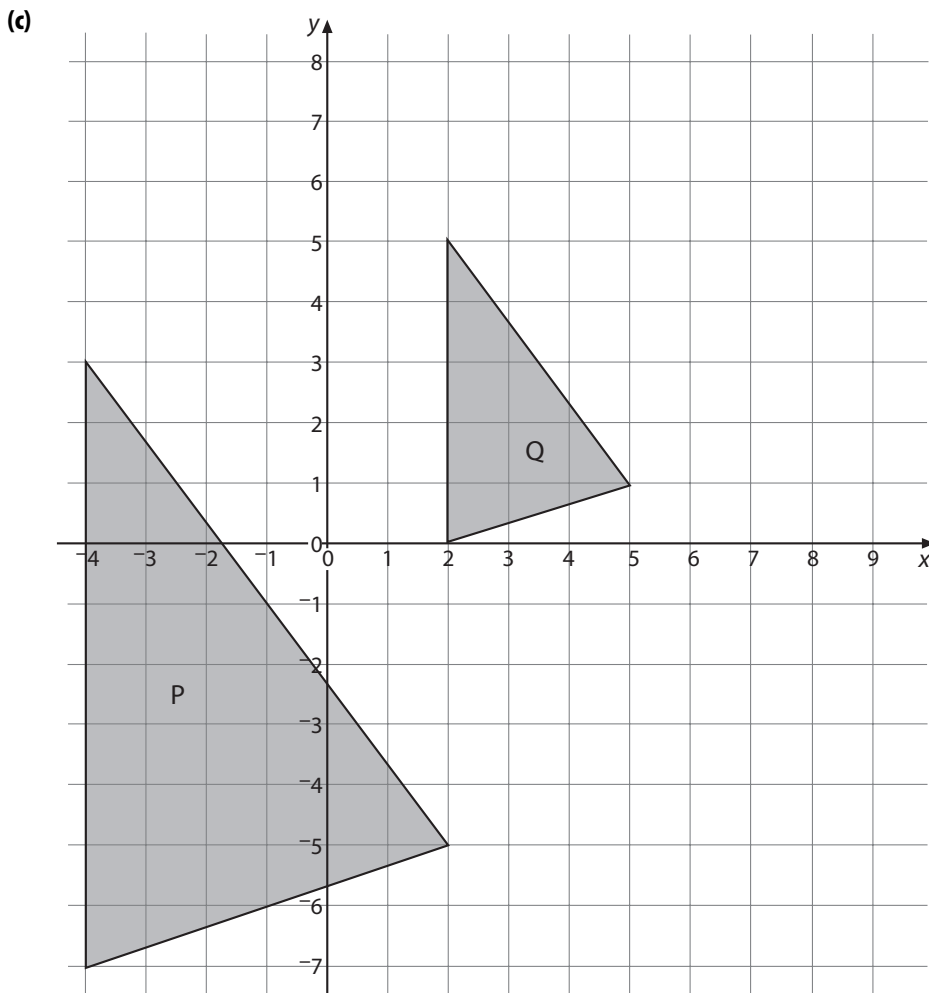
In each diagram, shape P has been enlarged to give shape Q.
Complete the description for each one.



Shape Q is an enlargement of shape P with
scale factor
and centre of enlargement (.....,)

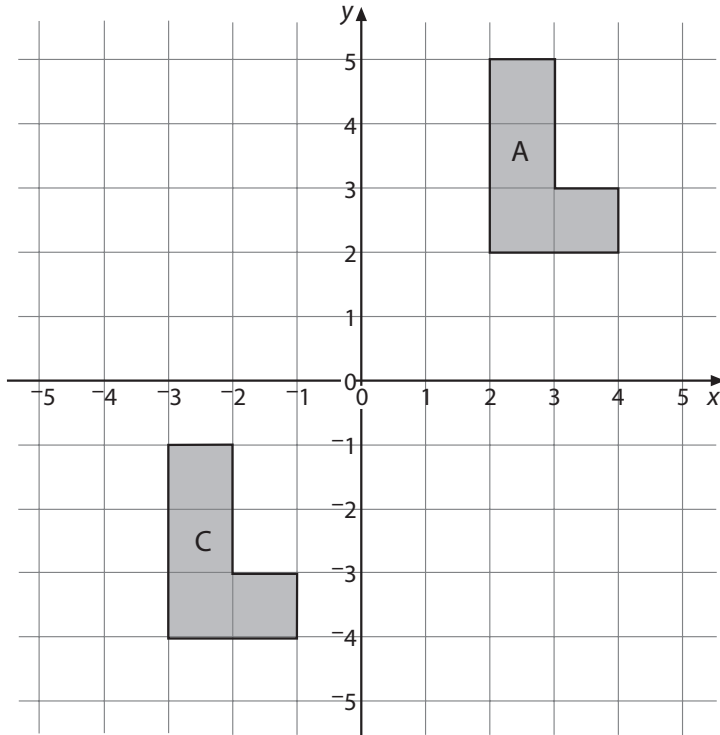


Shape Q is an enlargement of shape P with
scale factor
and centre of enlargement (.....,)

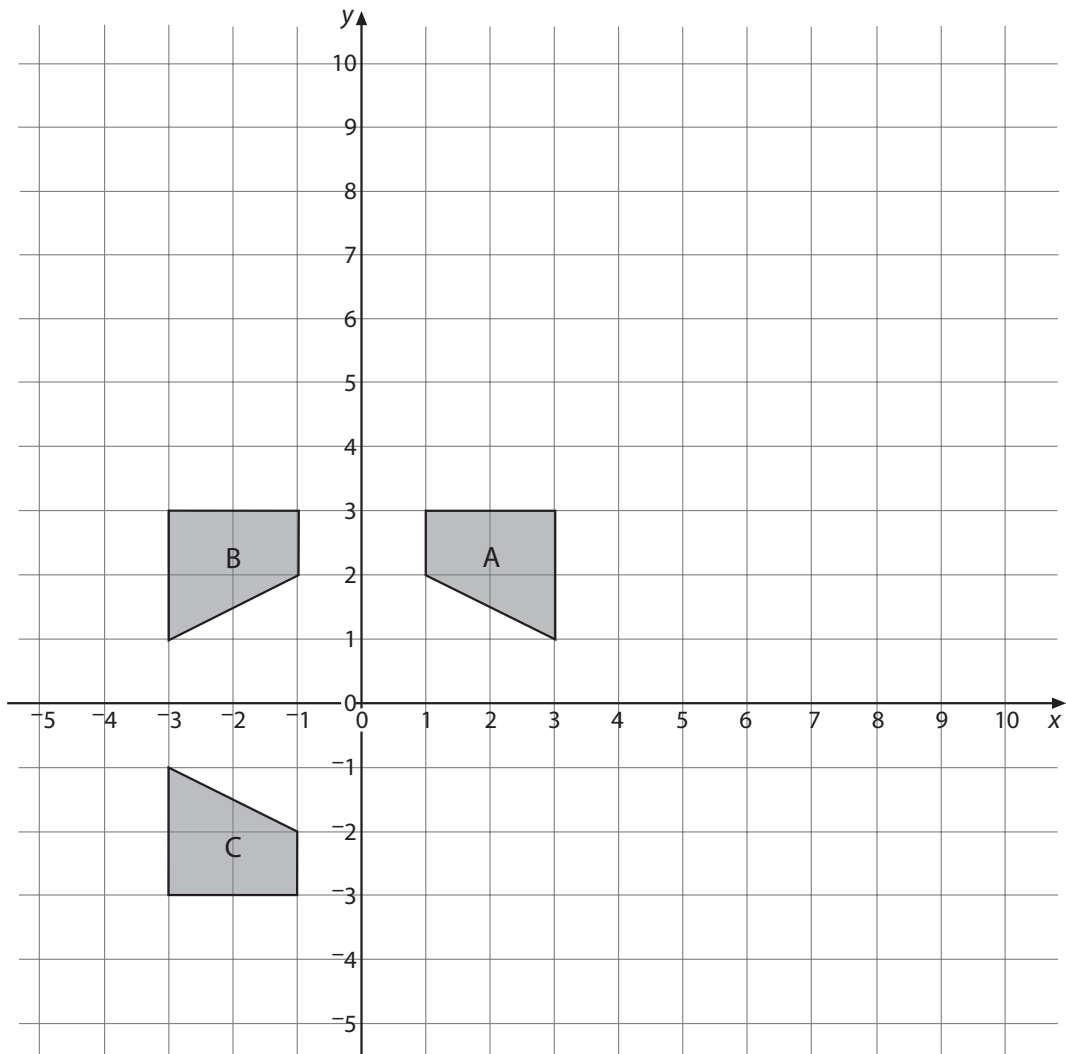


Shape Q is an enlargement of
shape P with
scale factor
and centre of enlargement
(.....,)

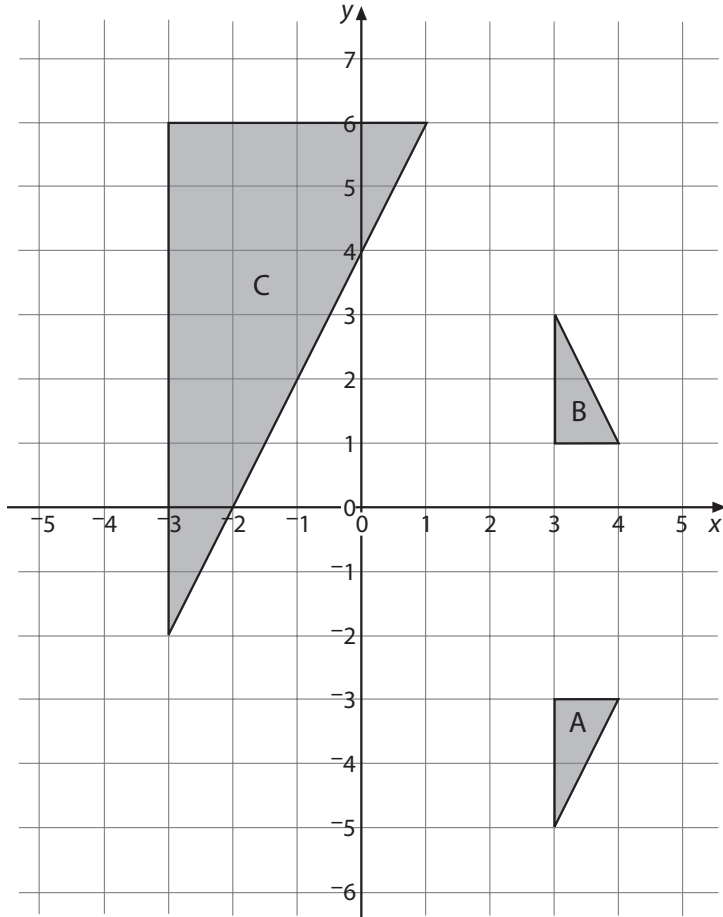
E2



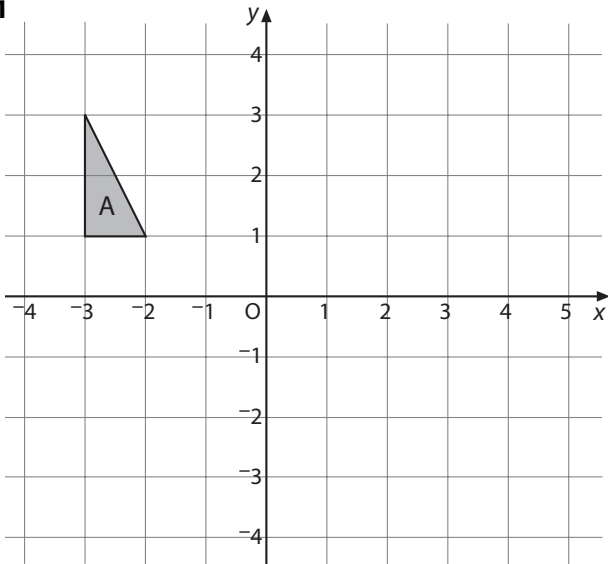
E3



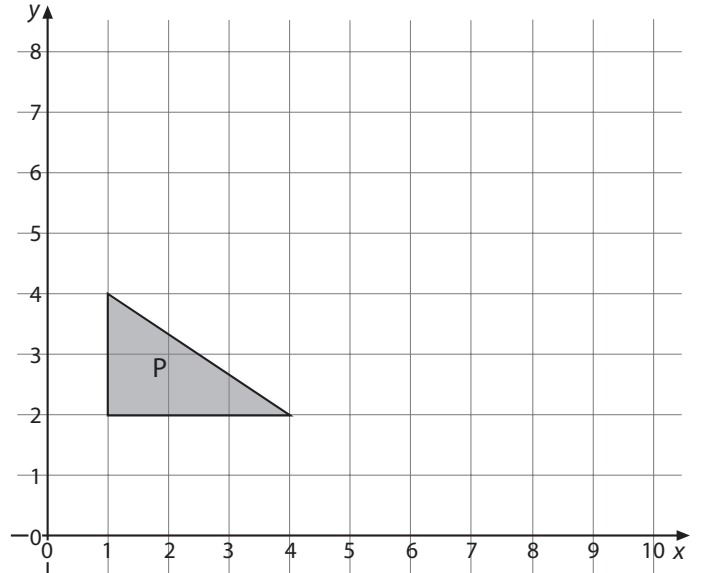
E4



T1



T2



For each puzzle...

- Do each calculation, showing any working clearly.
- Shade in your answers on the diagram on the right.
- Your answers should make a path across the board from S to F.

Puzzle 1
 $a = 2, b = -3$

A B

C D

E F

G

Puzzle 2
 $p = 3, q = 5$

A B

C D

E F

G

Puzzle 3
 $x = -2, y = 4$

A B

C D



E F

G

Cover-up

- Cut out the eight cover-up pieces below.
- On each board, put on the pieces so that each piece covers a pair of expressions which **multiply** to give the expression on the piece.

For example, 2^4 may cover 2^2 and 2^2 , or it may cover 2^3 and 2 .

The pieces can be put this way  or this way .

- How many pieces can you put on each board?
- Can you find a way to completely cover each board?

Cover-up board 1

| | | | |
|-------|-------|-------|-------|
| 2^2 | 2^2 | 2^2 | 2^7 |
| 2^6 | 2 | 2^5 | 2^4 |
| 2 | 2 | 2^2 | 2 |
| 2^3 | 2^3 | 2^3 | 2 |

Cover-up board 2

| | | | |
|-------|-------|-------|-------|
| 2^2 | 2^2 | 2^5 | 2^6 |
| 2^3 | 2 | 2^3 | 2^2 |
| 2^3 | 2 | 2^3 | 2^2 |
| 2 | 2^2 | 2 | 2^7 |

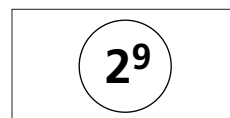
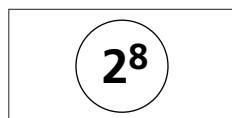
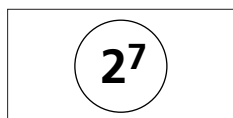
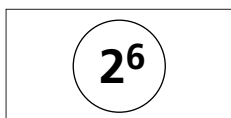
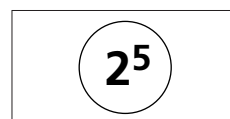
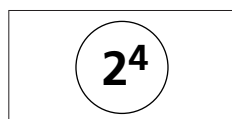
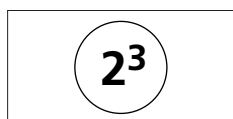
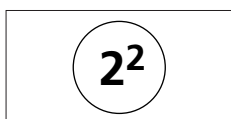
Cover-up board 3

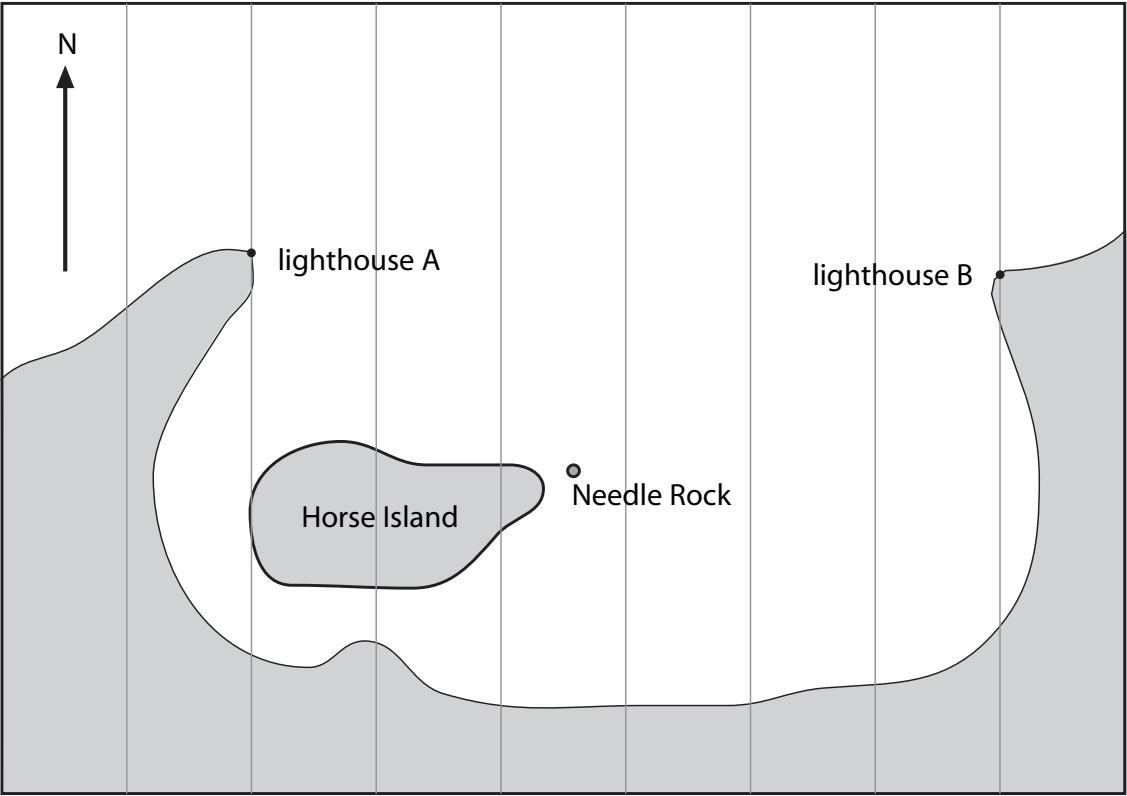
| | | | |
|-------|-------|-------|-------|
| 2^4 | 2 | 2 | 2 |
| 2^3 | 2^7 | 2^2 | 2^2 |
| 2^3 | 2^4 | 2^3 | 2^4 |
| 2 | 2^4 | 2^3 | 2 |

Cover-up board 4

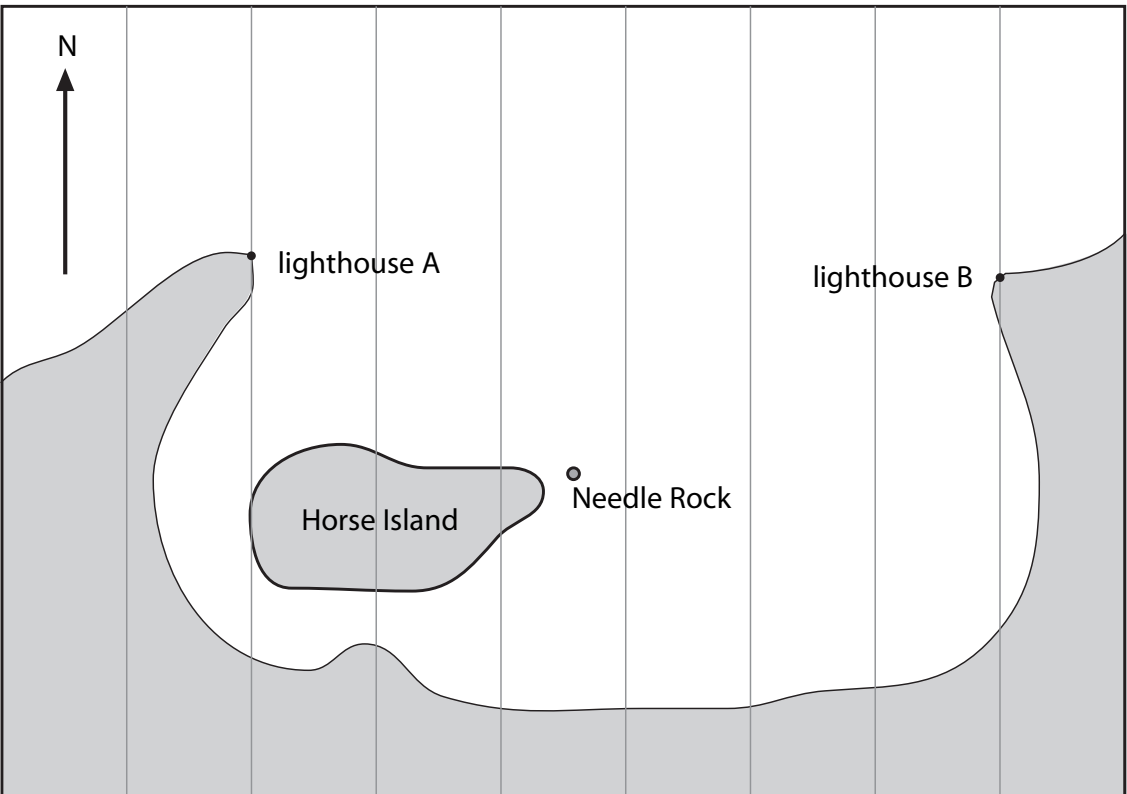
| | | | |
|-------|-------|-------|-------|
| 2^3 | 2^7 | 2^2 | 2^2 |
| 2^4 | 2 | 2^3 | 2 |
| 2^4 | 2 | 2^2 | 2^2 |
| 2^2 | 2^6 | 2^2 | 2^2 |

Cover-up pieces



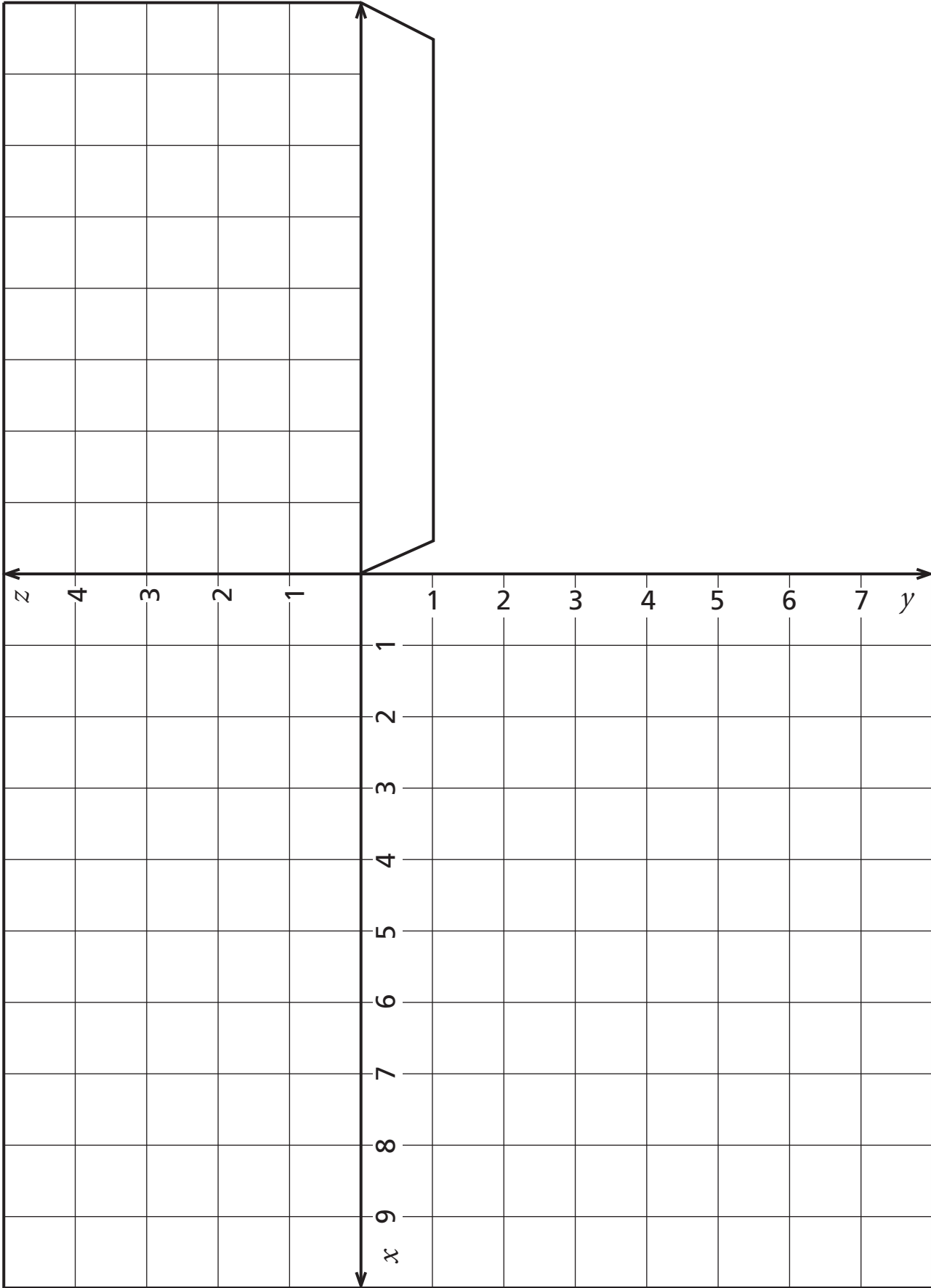


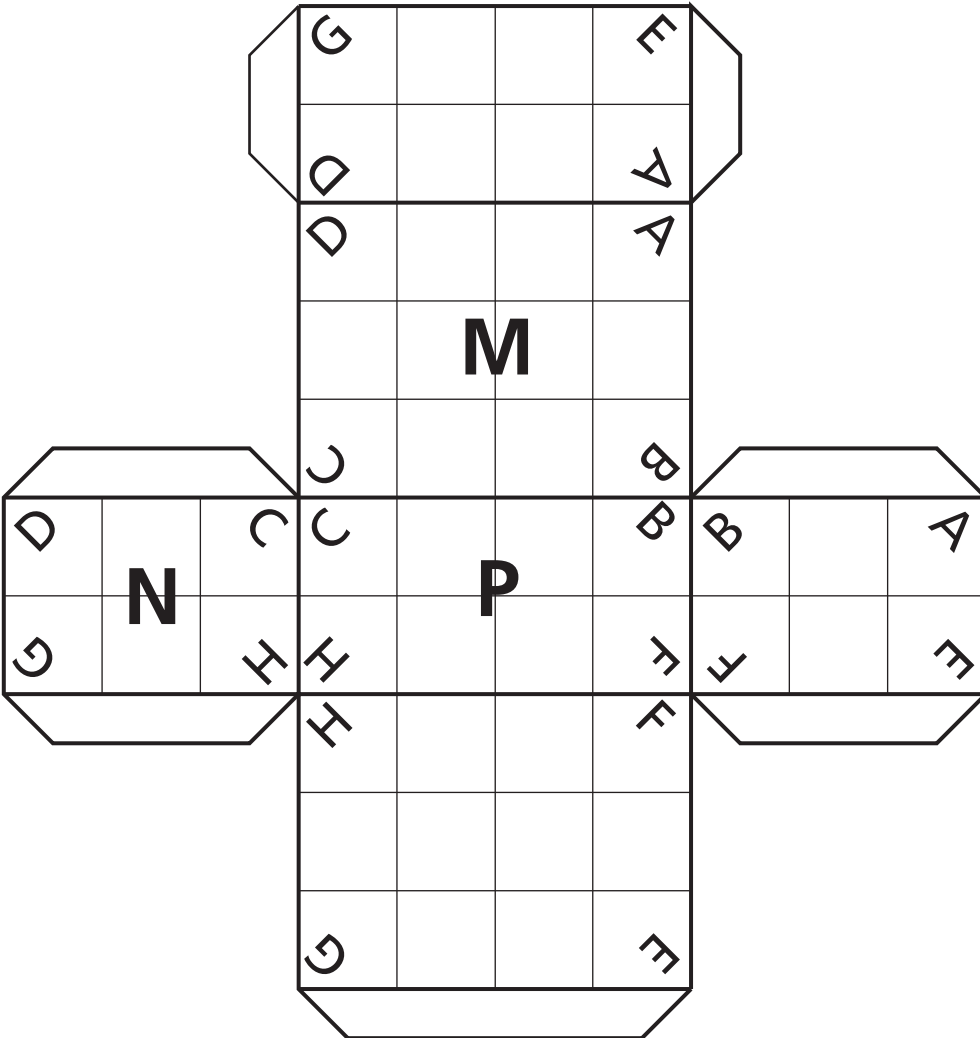
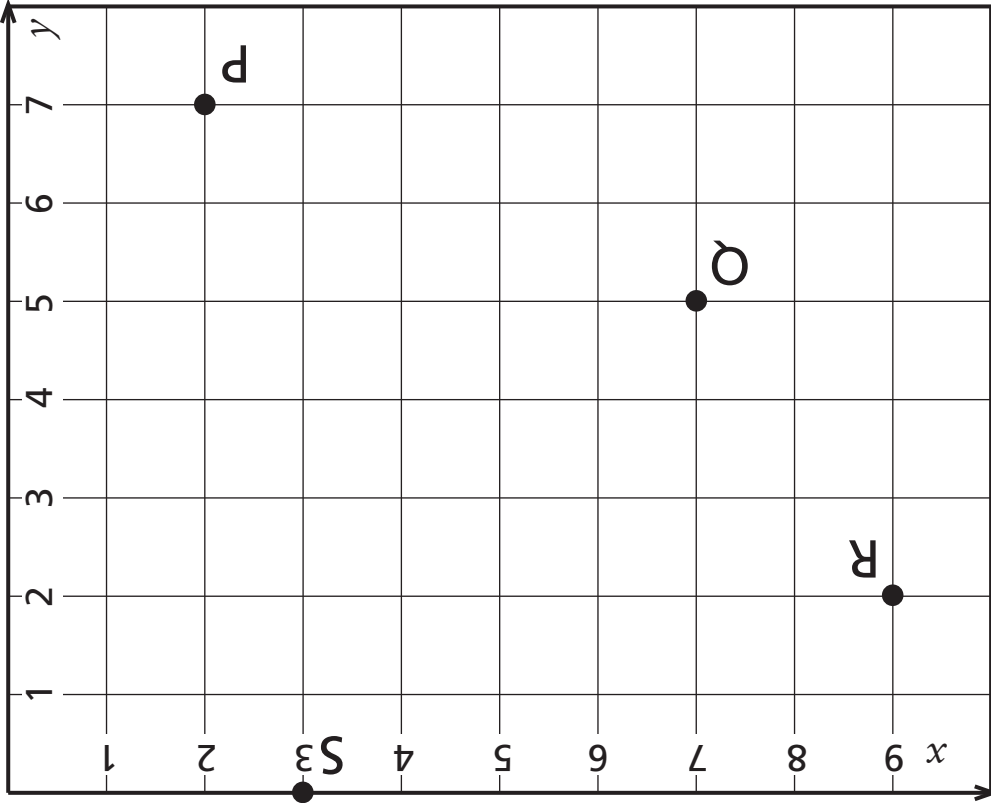
Scale is 1 cm to 1 km



Scale is 1 cm to 1 km

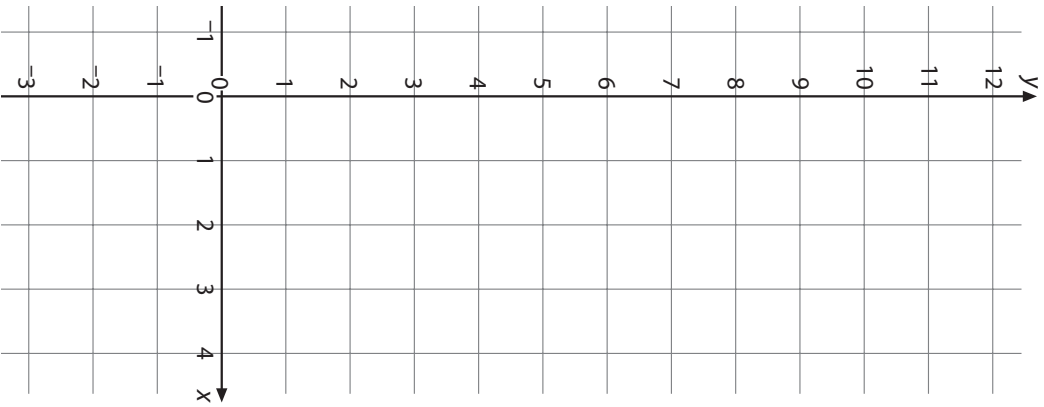
Check that this line is 100 mm long and if not adjust print scaling before using sheet.





A

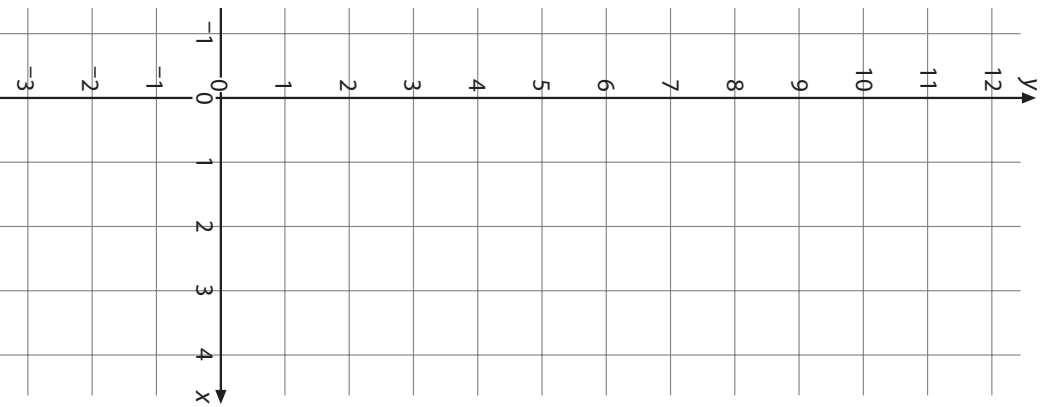
$y = 2x$



Gradient

B

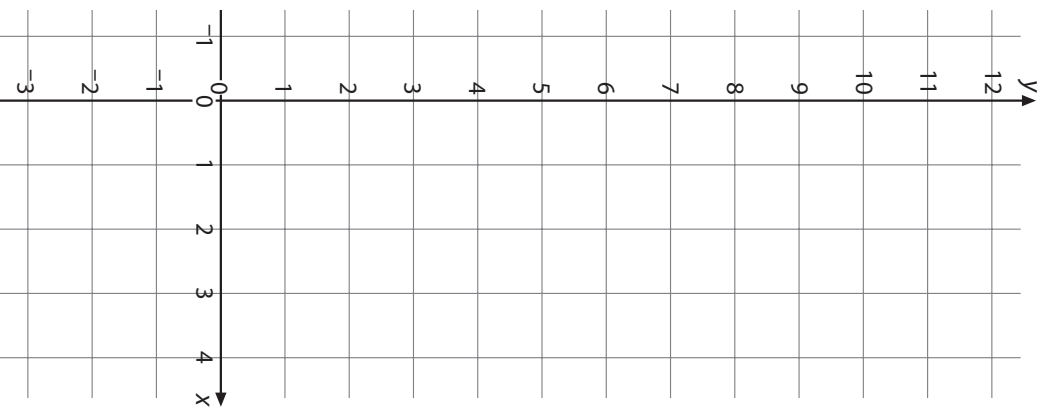
$y = 3x$



Gradient

C

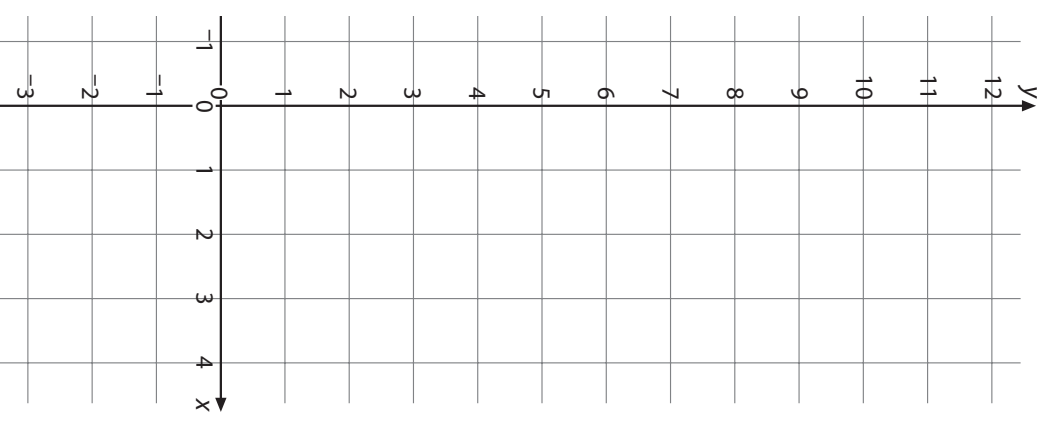
$y = x$



Gradient

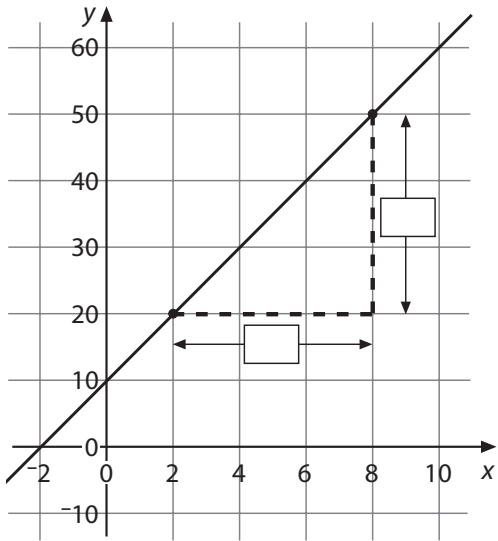
D

$y = \frac{1}{2}x$



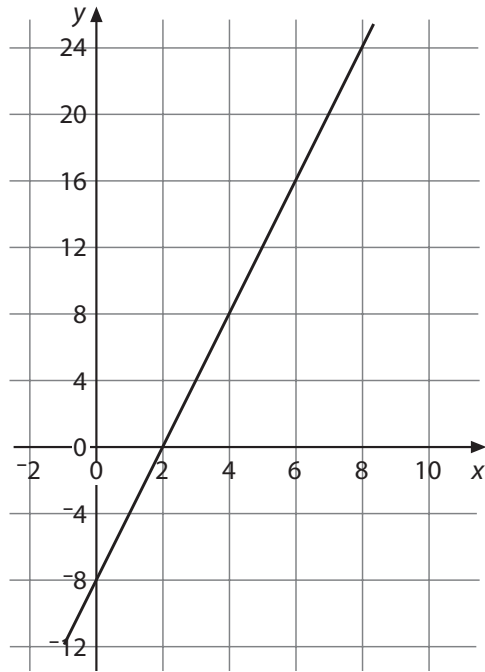
Gradient

(a) A triangle has been drawn under two points on this line.



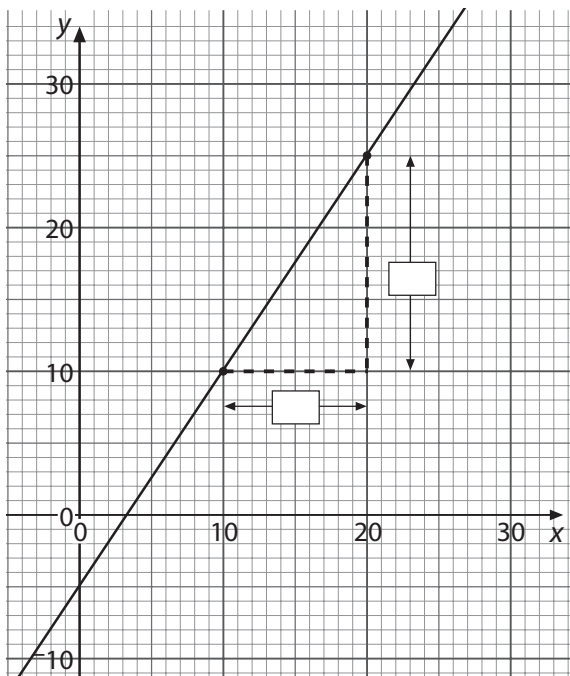
- (i) Fill in the boxes to show the height and length of the base.
- (ii) Work out the gradient of this line.
- (iii) Write down the equation of the line.

(b)



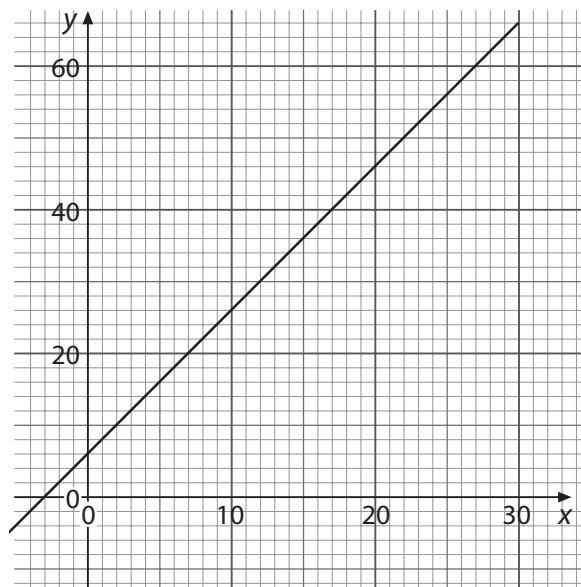
- (i) Pick two points on this line and draw your own triangle.
- (ii) Work out the gradient of this line.
- (iii) Write down the equation of the line.

(c) A triangle has been drawn under two points on this line.



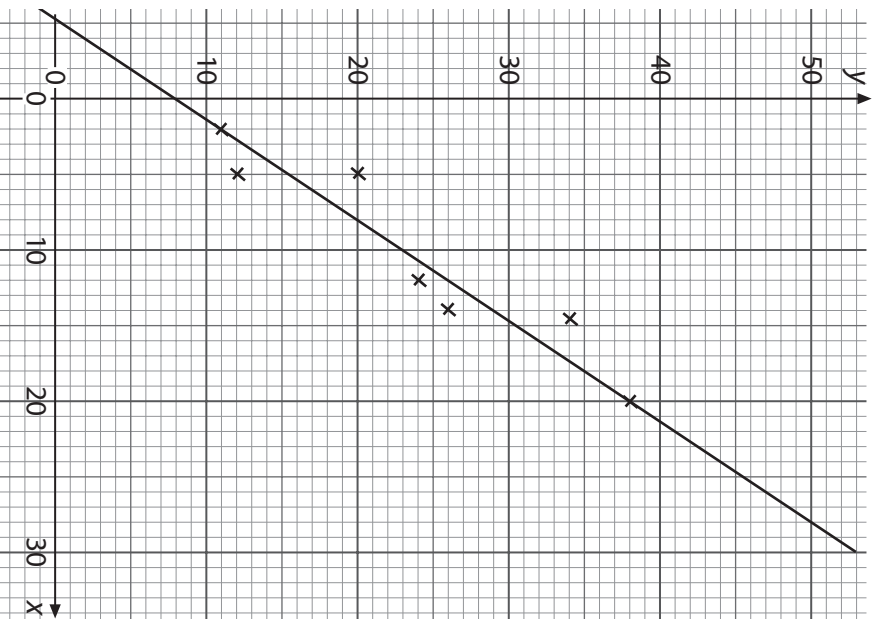
- (i) Fill in the boxes to show the height and length of the base.
- (ii) Work out the gradient of this line and write it as a decimal.
- (iii) Write down the equation of the line.

(d)



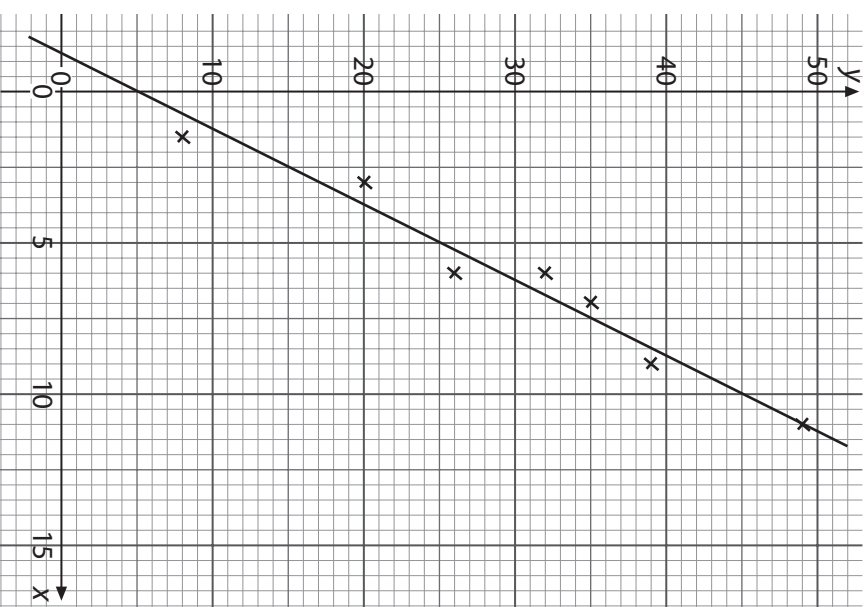
- (i) Pick two points on this line and draw your own triangle.
- (ii) Work out the gradient of this line.
- (iii) Write down the equation of the line.

(a) A line of best fit has been drawn on the diagram below.

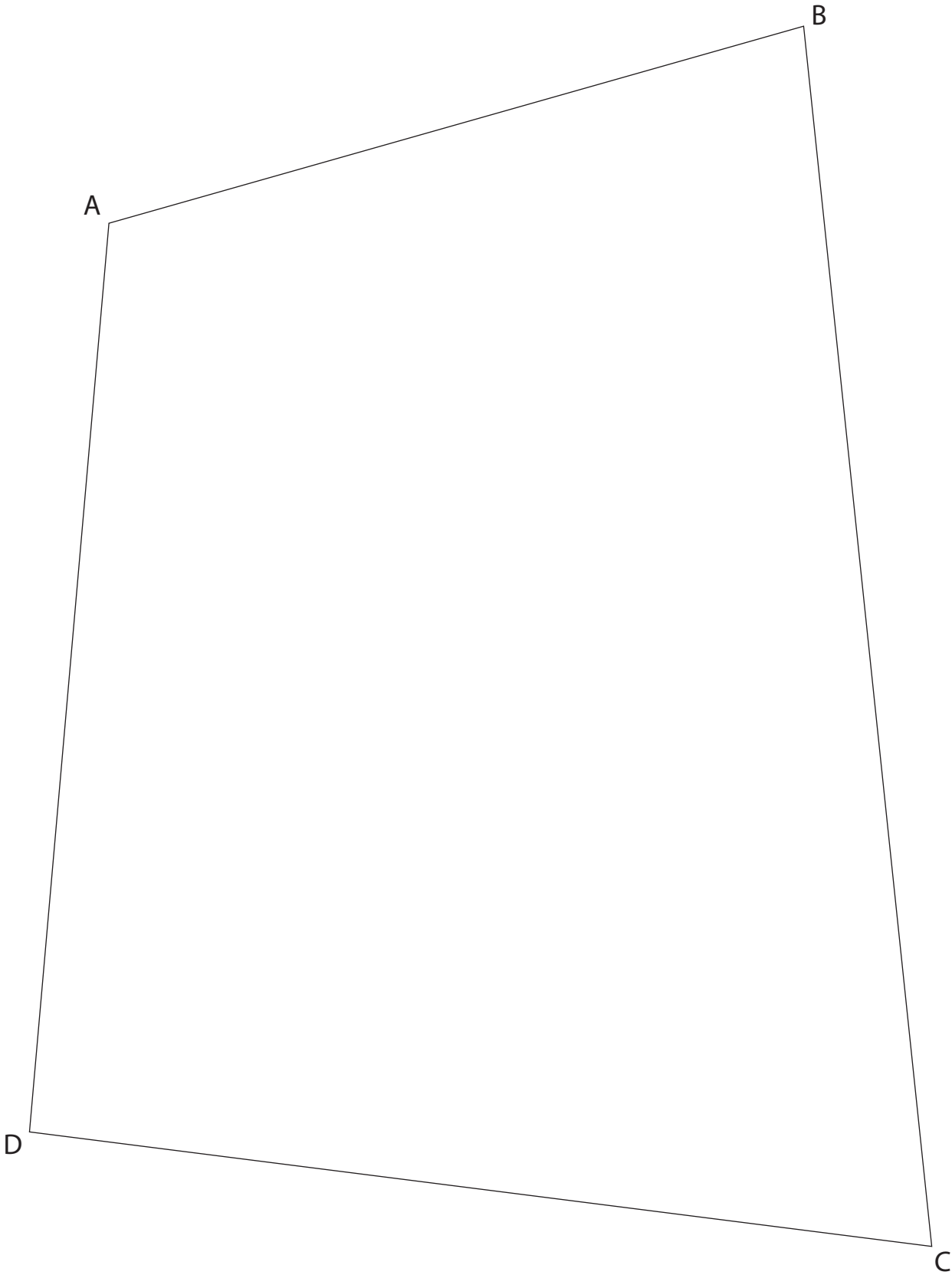


- (i) Use the line to estimate the value of y when $x = 10$.
- (ii) Find the gradient of the line.
- (iii) Where does the line cross the y -axis?
- (iv) Write down the equation of the line.

(b) A line of best fit has been drawn on the diagram below.



- (i) Use the line to estimate the value of x when $y = 25$.
- (ii) Find the equation of the line.



Scale: 1 cm represents 1 metre

Check that this line is 100 mm long and if not adjust print scaling before using sheet.



| | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
| 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 |
| 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 |
| 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 |
| 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 109 | 110 |
| 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 |
| 121 | 122 | 123 | 124 | 125 | 126 | 127 | 128 | 129 | 130 |
| 131 | 132 | 133 | 134 | 135 | 136 | 137 | 138 | 139 | 140 |
| 141 | 142 | 143 | 144 | 145 | 146 | 147 | 148 | 149 | 150 |
| 151 | 152 | 153 | 154 | 155 | 156 | 157 | 158 | 159 | 160 |
| 161 | 162 | 163 | 164 | 165 | 166 | 167 | 168 | 169 | 170 |
| 171 | 172 | 173 | 174 | 175 | 176 | 177 | 178 | 179 | 180 |
| 181 | 182 | 183 | 184 | 185 | 186 | 187 | 188 | 189 | 190 |
| 191 | 192 | 193 | 194 | 195 | 196 | 197 | 198 | 199 | 200 |
| 201 | 202 | 203 | 204 | 205 | 206 | 207 | 208 | 209 | 210 |
| 211 | 212 | 213 | 214 | 215 | 216 | 217 | 218 | 219 | 220 |