Edexcel GCSE
Mathematics (Linear) – 1MA0

SIMILAR SHAPES

Materials required for examination	**Items included with question papers**
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser. Tracing paper may be used.	Nil

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.

Information

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 – you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.

Advice

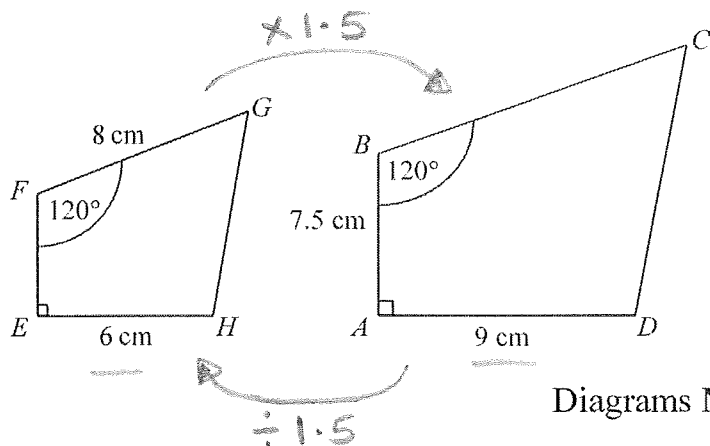Read each question carefully before you start to answer it.
Keep an eye on the time.
Try to answer every question.
Check your answers if you have time at the end.

1. Shapes *ABCD* and *EFGH* are mathematically similar.

* find a pair of
corresponding sides

× 1.5

Scale factor = $\frac{Big}{Small}$

= $\frac{9}{6}$

= 1.5

÷ 1.5

Diagrams **NOT** accurately drawn

(a) Calculate the length of *BC*.

$BC = FG \times 1.5$

$= 8 \times 1.5$

$= 12 \ cm$

..............12.............. cm

(2)

(b) Calculate the length of *EF*.

$EF = AB \div 1.5$

$= 7.5 \div 1.5$

$= 5 cm$

..............5.............. cm

(2)

(Total 4 marks)

2.

×1.5

Q

Diagrams **NOT** accurately drawn

÷1.5

B

15 cm

12 cm

A 4 cm C P 6 cm R
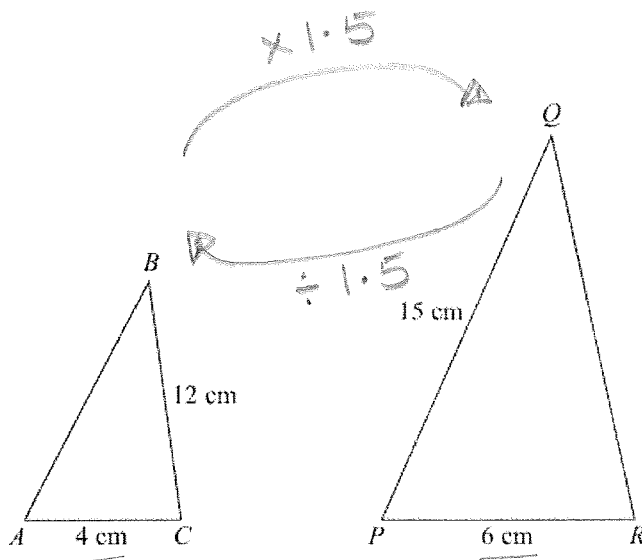
Triangles ABC and PQR are mathematically similar.

Angle A = angle P.
Angle B = angle Q.
Angle C = angle R.
AC = 4 cm.
BC = 12 cm.
PR = 6 cm.
PQ = 15 cm.

* Scale factor = $\dfrac{\text{big}}{\text{small}}$

  = $\dfrac{6}{4}$

  = 1.5

(a) Work out the length of QR.

QR = BC × 1.5

= 12 × 1.5

.............................18.............................cm

(2)

(b) Work out the length of AB.

AB = PQ ÷ 1.5

= 15 ÷ 1.5

.............................10.............................cm

(2)

(Total 4 marks)

3.

$\times 1.5$

$\div 1.5$

Diagrams **NOT** accurately drawn

B

4 cm

A — 9 cm — C

E

6 cm — 10.5 cm

D — F
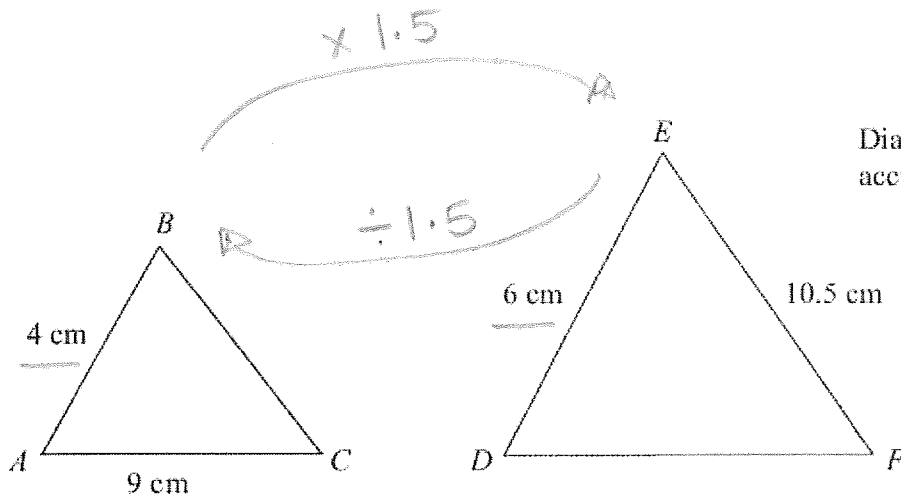
Triangles *ABC* and *DEF* are similar.

$AB = 4$ cm.
$AC = 9$ cm.
$DE = 6$ cm.
$EF = 10.5$ cm.

✳ Scale factor $= \dfrac{\text{big}}{\text{small}}$

$= \dfrac{6}{4}$

$= 1.5$

(a) Work out the length of *DF*.

(2)

$DF = AC \times 1.5$

$= 9 \times 1.5$

.... 13.5 .... cm

(b) Work out the length of *BC*.

(2)

$BC = EF \div 1.5$

$= 10.5 \div 1.5$

.... 7 .... cm

(Total 4 marks)

4. The diagram shows two similar triangles.

$\div \frac{5}{3}$

10 cm

A ———————— B

Diagram NOT accurately drawn

18 cm

C

6 cm

P ———— Q

12 cm

R

$\times \frac{5}{3}$
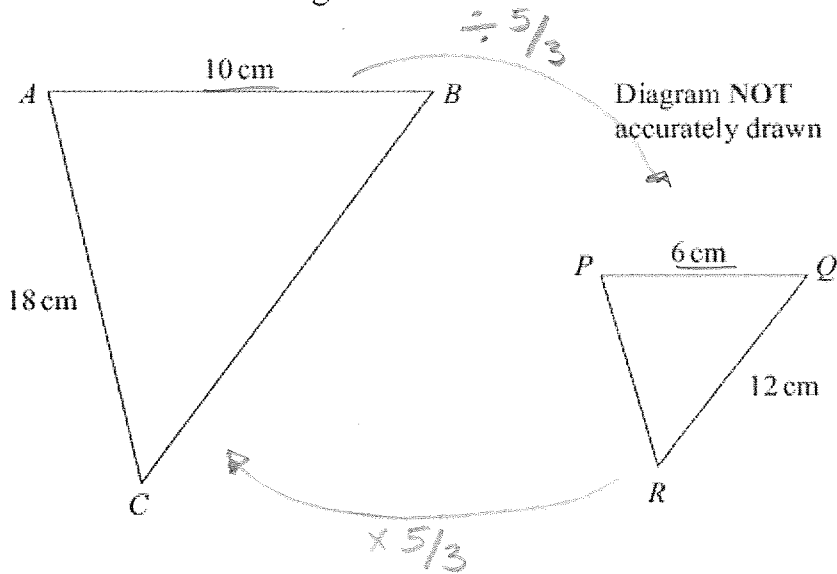
In triangle *ABC*, *AB* = 10 cm and *AC* = 18 cm.
In triangle *PQR*, *PQ* = 6 cm and *QR* = 12 cm.

Angle *ABC* = angle *PQR*.
Angle *CAB* = angle *RPQ*.

(a) Calculate the length of *BC*.

$SP = \frac{big}{small}$

$= \frac{10}{6}$

$= \frac{5}{3}$

$BC = QR \times \frac{5}{3}$

$= 12 \times \frac{5}{3}$

...............20............... cm

(2)

(b) Calculate the length of *PR*.

$PR = AC \div \frac{5}{3}$

$= 18 \div \frac{5}{3}$

...............10.8............... cm

(2)

(Total 4 marks)

5.

Diagram NOT accurately drawn

15 cm

12.5 cm

21 cm

6 cm
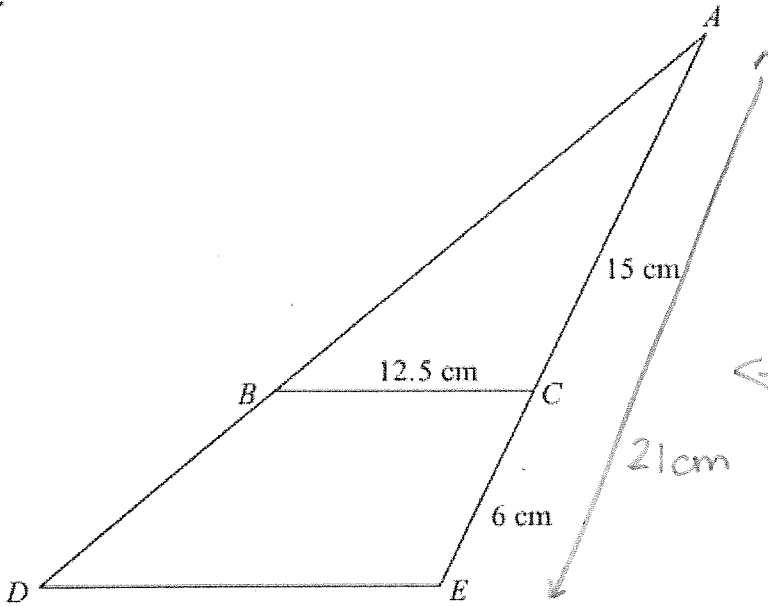
← This is 2 triangles and can be drawn as such to help

Scale factor = $\frac{21}{15}$ = 1·4

Triangle *ABC* is similar to triangle *ADE*.
AC = 15 cm.
CE = 6 cm.
BC = 12.5 cm.

Work out the length of *DE*.

DE = BC × 1·4

= 12·5 × 1·4

........17·5........ cm

(Total 3 marks)

*6.
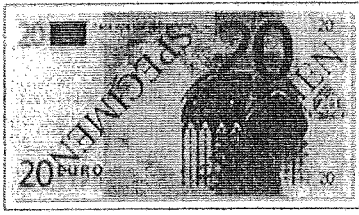
Pictures **NOT**
accurately drawn

A 20 Euro note is a rectangle 133 mm long and 72 mm wide.

A 500 Euro Note is a rectangle 165 mm long and 82 mm wide.

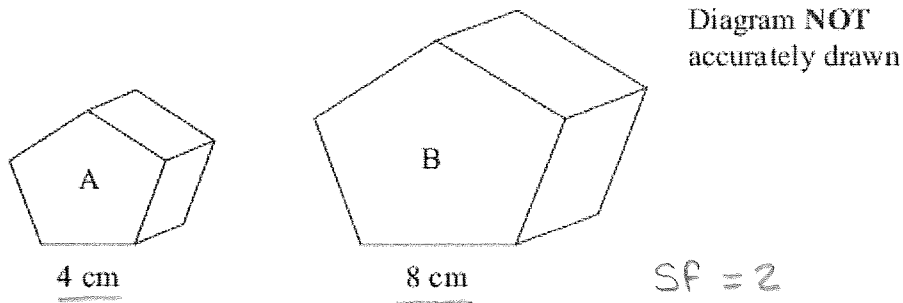Show that the two rectangles are not mathematically similar.

Mathematically similar would mean that length and width scale factors would be equal...

Length

$SF = \dfrac{big}{small}$

$= \dfrac{165}{133}$

$= 1.2406015...$

Width

$SF = \dfrac{82}{72}$

$= 1.138888...$

(Total 3 marks)

SF not equal so not similar.

7. The diagram shows two similar solids, A and B.

Diagram **NOT** accurately drawn

A 4 cm

B 8 cm

SF = 2

Solid A has a volume of 80 cm^3.

(a) Work out the volume of solid B.

Volume SF = (Length SF)^3

Volume SF = 2^3
          = 8

B's Volume = 80 × 8

.................640.................cm^3

(2)

Solid B has a total surface area of 160 cm^2.

(b) Work out the total surface area of solid A.

Area SF = (Length SF)^2

Area SF = 2^2
        = 4

A's Area = 160 ÷ 4
         = 40

.................40.................cm^2

(2)

(Total 4 marks)