Write your name, centre number and candidate number in the boxes below.

Surname	Other names

Centre number | | | | | |

Candidate number | | | | |

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Similarity

Time allowed: 50 minutes

Subject code **0580**

Mathematics

Questions from Paper 1, Paper 2 and Paper 4

You must have: a ruler marked in centimetres and millimetres, a protractor, compasses, a pen, an HB pencil and an eraser.
You may use a calculator.

Total marks

/ 39

Instructions

- Answer every question in the space provided on this paper.
- Write in black or dark blue ink. Pencil may be used for diagrams and graphs.
- Fill in your name, centre number and candidate number above.
- Show your working: a correct method can earn marks even if the answer is wrong.
- Unless a question says otherwise, give answers that are not exact to 3 significant figures, and angles in degrees to 1 decimal place.

Information

- This paper has 10 questions worth 39 marks in total.
- The marks for each question or part are shown in brackets, for example [3].

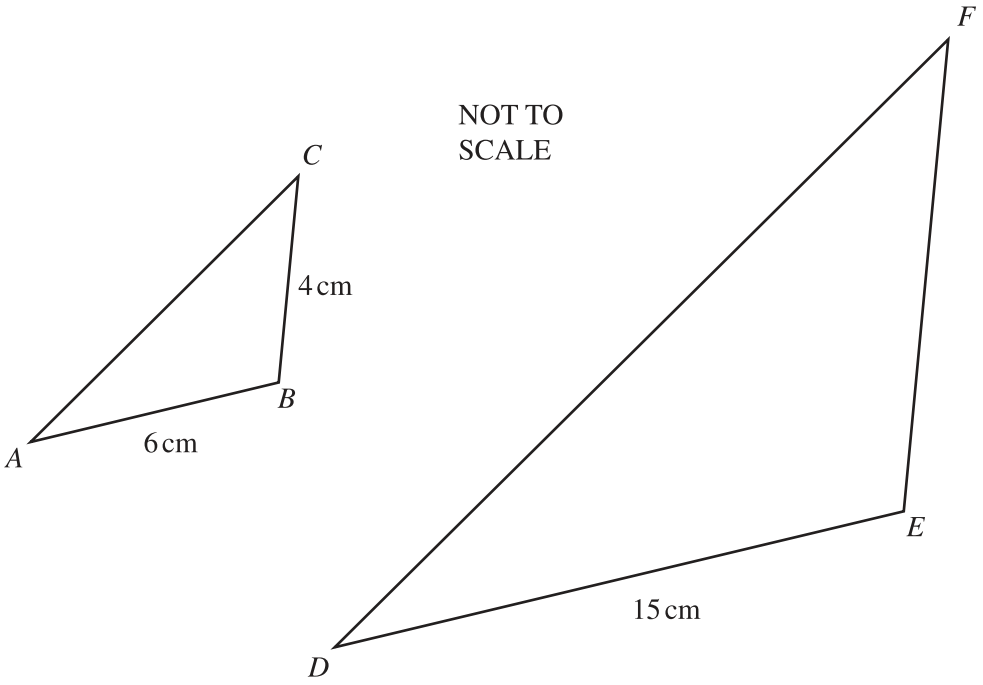
Advice

- Read every question through once before you write anything.
- Use the marks in brackets to judge how long to spend on each part.
- If you finish early, go back and check your working.

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Print at 100% (Actual size) so diagrams keep their real measurements.

1



The triangles ABC and DEF are similar.
$AB = 6$ cm, $BC = 4$ cm and $DE = 15$ cm.

Calculate EF.

Answer EF = ... cm [2]

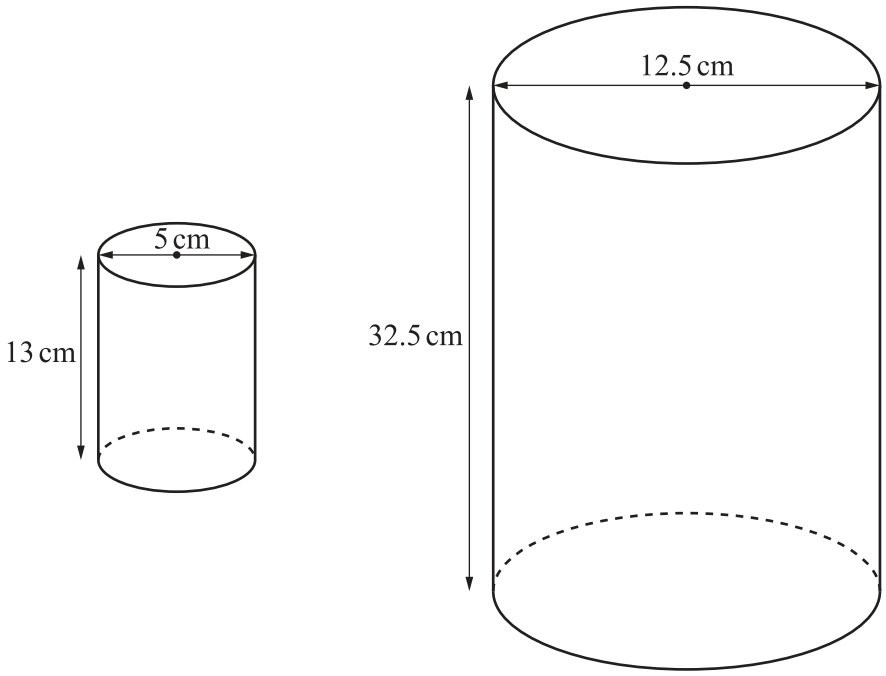
Similar lengths Click for more variations

1	10 www	2	**M1** for $15 \div 6$ soi or **B1** for $\frac{6}{4} = \frac{15}{EF}$ oe or better

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2

NOT TO SCALE



The diagram shows two cylinders.

Show that the two cylinders are mathematically similar.

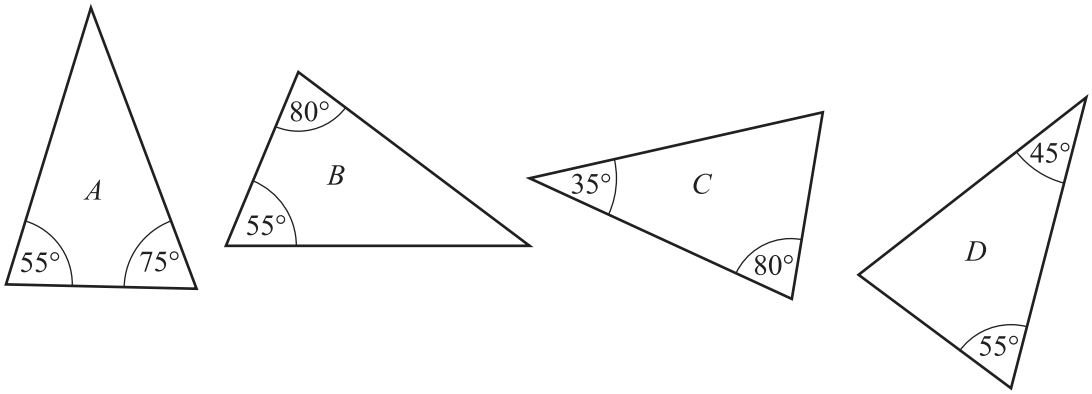
[2]

Similarity Click for more variations

2	13 ÷ 5 = 2.6 and 32.5 ÷ 12.5 = 2.6 or 32.5 ÷ 13 = 2.5 and 12.5 ÷ 5 = 2.5 All are oe	**2**	**M1** for 13 ÷ 5 = 2.6 or 32.5 ÷ 12.5 = 2.6 or 32.5 ÷ 13 = 2.5 or 12.5 ÷ 5 = 2.5 All are oe or a correct pair of calculations without 2.6 or 2.5

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3 **(a)**



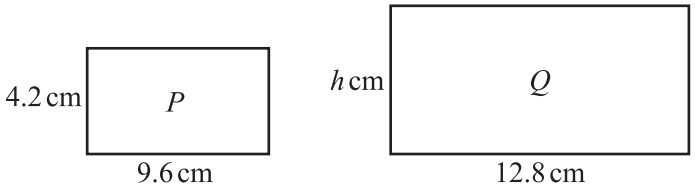
NOT TO SCALE

Two of these triangles are similar.

Write down the letters of these two triangles.

..... and ..... [1]

(b)



NOT TO SCALE

Rectangle P is similar to rectangle Q.

Work out the value of h.

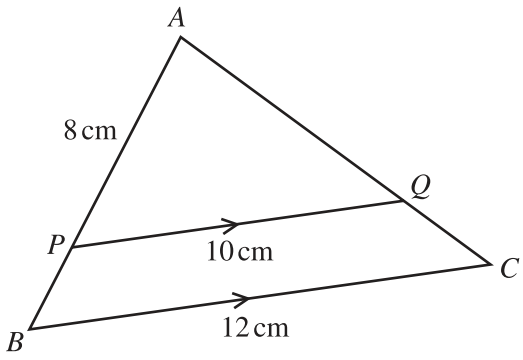
h = ... [2]

(a) Similarity (b) Similar lengths Click for more variations

3	**(a)**	B and D	**1**	
	(b)	5.6	**2**	**M1** for $\frac{h}{4.2}=\frac{12.8}{9.6}$ oe or correct scale factor

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4



NOT TO SCALE

APB and *AQC* are straight lines. *PQ* is parallel to *BC*.
AP = 8 cm, *PQ* = 10 cm and *BC* = 12 cm.
Calculate the length of *AB*.

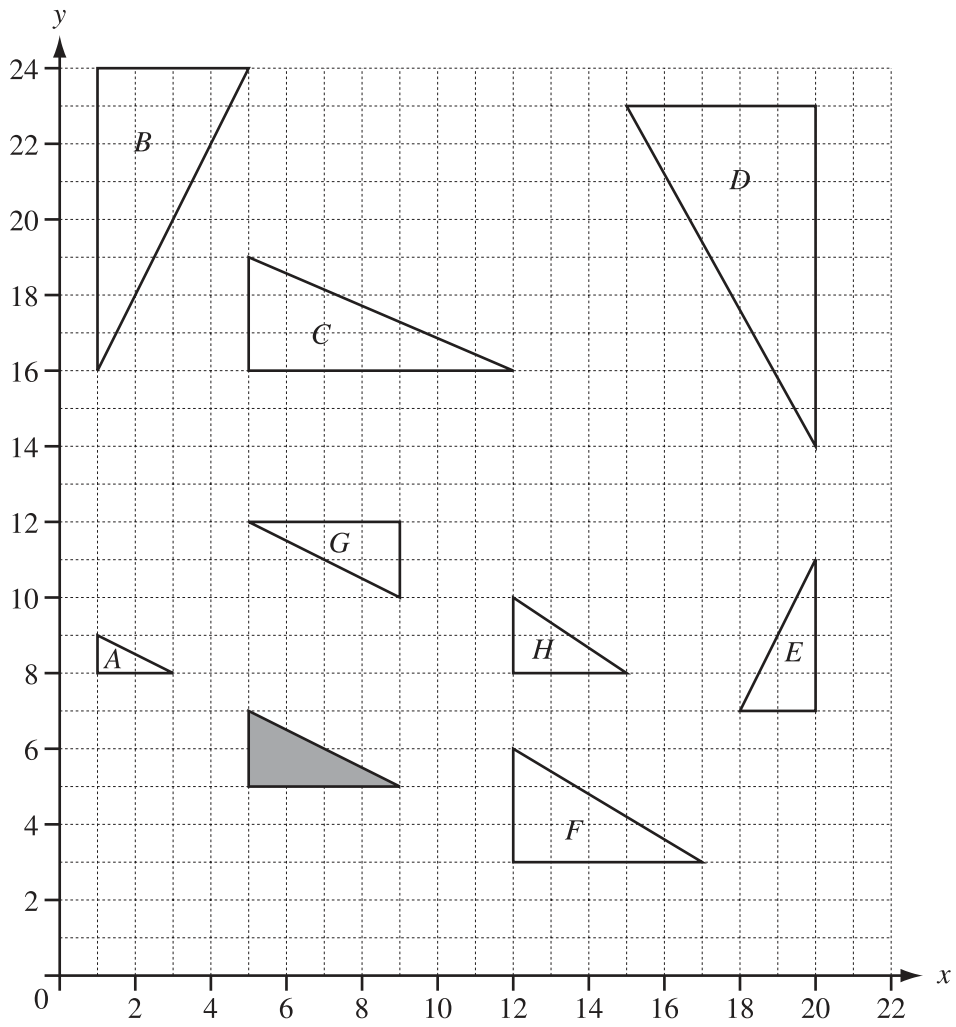
Answer AB = ... cm [2]

Similar lengths Click for more variations

4	9.6 cao	2	**M1** $\frac{x}{8} = \frac{12}{10}$ oe

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5



Write down the letters of all the triangles which are

(a) congruent to the shaded triangle,

Answer(a) ..... [2]

(b) similar, but not congruent, to the shaded triangle.

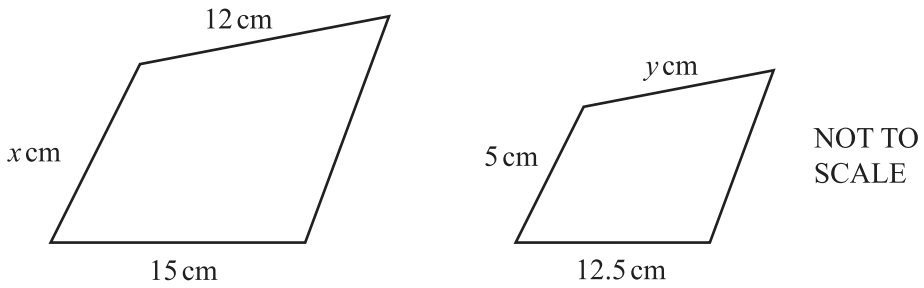
Answer(b) ..... [2]

(a) Congruence (b) Similarity Click for more variations

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5	**(a)** *E*, *G*	1, 1	
	(b) *A*, *B*	1, 1	

6



The two shapes are mathematically similar.

Find the value of

(a) x,

$x =$ ..... [2]

(b) y.

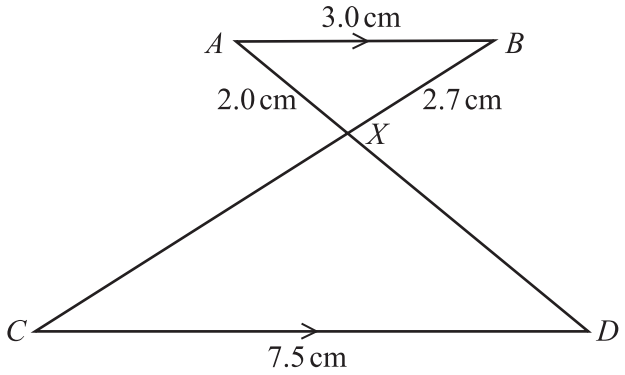
$y =$ ..... [2]

(a) Similar lengths (b) Similar lengths Click for more variations

6(a)	6	**2**	**M1** for $\frac{15}{12.5}$ or $\frac{12.5}{15}$ or $\frac{12.5}{5}$ or $\frac{5}{12.5}$ soi
6(b)	10	**2**	**M1** for $\frac{12.5}{15}\times 12$ or $12\div\frac{15}{12}$ soi

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7



NOT TO SCALE

In the diagram, AB and CD are parallel.
The lines CB and AD intersect at X.
$AB = 3.0$ cm, $AX = 2.0$ cm, $BX = 2.7$ cm and $CD = 7.5$ cm.

Find the length of BC.

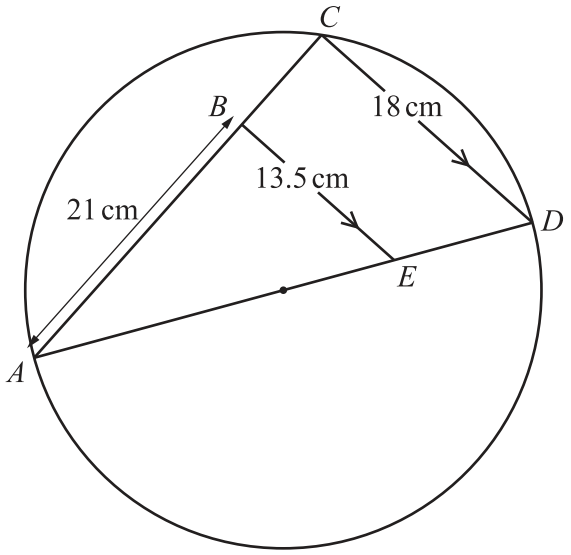
$BC =$ ..... cm [3]

Similar lengths Click for more variations

7	9.45	**3**	**M2** for $\frac{2.7\times7.5}{3}+2.7$ oe OR **B2** for 6.75 oe or **M1** for $\frac{3}{7.5}=\frac{2.7}{XC}$ oe If 0 scored **SC1** for answer 7.7

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8



NOT TO SCALE

C lies on a circle with diameter AD.
B lies on AC and E lies on AD such that BE is parallel to CD.
$AB = 21$ cm, $CD = 18$ cm and $BE = 13.5$ cm.

Work out the radius of the circle.

..... cm [5]

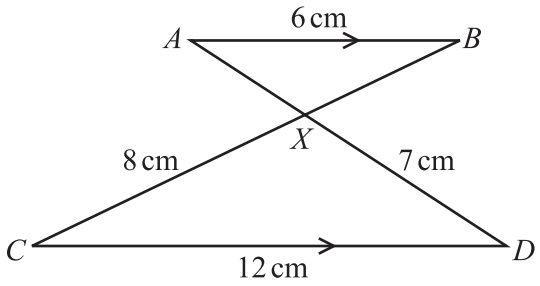
Pythagoras' theorem Click for more variations

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8	16.6 or 16.64…	**5**	**M2** for $21\times\frac{18}{13.5}=[AC]$ oe or **M1** for scale factor $\frac{13.5}{18}$ or $\frac{18}{13.5}$ oe soi Then Pythagoras method: and **M2** for $\sqrt{28^2+18^2}$ [÷ 2] or $\sqrt{(theirAC)^2+18^2}$ [÷ 2] or **M1** for $AD^2=28^2+18^2$ or $AD^2=(theirAC)^2+18^2$ OR alternative trigonometry method e.g. **M1** for $\tan E=\frac{21}{13.5}$ and **M1** for $AD=\frac{18}{\cos their\,57.3}$

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9



NOT TO SCALE

In the diagram, AB is parallel to CD.
AD and BC intersect at X.
$AB = 6\,\text{cm}$, $CD = 12\,\text{cm}$, $CX = 8\,\text{cm}$ and $DX = 7\,\text{cm}$.

(a) Complete the statement.

Triangle ABX is ..... to triangle DCX. [1]

(b) Work out the length of BX.

$BX =$ ..... cm [2]

(c) The area of triangle DCX is $26.906\,\text{cm}^2$.

Use this value to find the area of

(i) triangle ABX,

..... cm^2 [2]

(ii) triangle ACX.

..... cm^2 [1]

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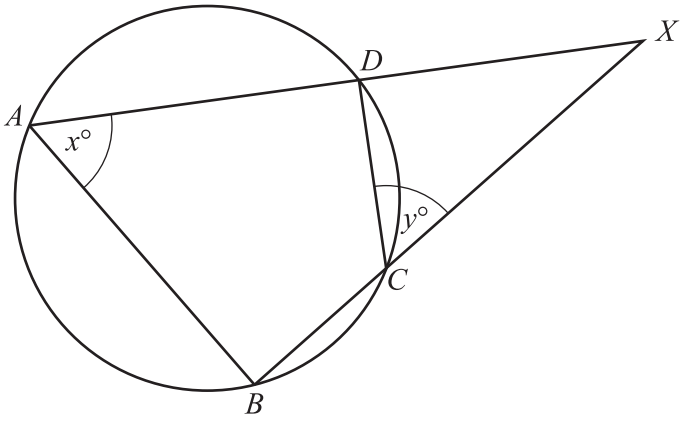
(a) Similarity (b) Similar lengths (c)(i) Similar areas and volumes (c)(ii) Similar areas and volumes

Click for more variations

9(a)	Similar	**1**	
9(b)	4	**2**	**M1** for $\frac{12}{6}=\frac{8}{BX}$ oe or better If **0** scored **SC1** for answer 3.5
9(c)(i)	6.7265 or 6.73 or 6.726 to 6.727	**2**	**M1** for scale factor 2^2 or $\left(\frac{1}{2}\right)^2$ oe soi
9(c)(ii)	13.453 or 13.5 or 13.45 to 13.46	**1**	**FT** *their* **(c)(i)** $\times 2$

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10



NOT TO SCALE

A, B, C and D are points on a circle.
ADX and BCX are straight lines.
Angle $BAD = x°$ and angle $DCX = y°$.

(a) Explain why $x = y$.
Give a geometrical reason for each statement you make.

[2]

(b) Show that triangle ABX is similar to triangle CDX.

[2]

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(c) $AD = 15\,\text{cm}$, $DX = 9\,\text{cm}$ and $CX = 12\,\text{cm}$.

(i) Find BC.

$BC =$ ..... cm [3]

(ii) Complete the statement.

The ratio area of triangle ABX : area of triangle CDX = ... : 1. [1]

(a) Circle theorems (b) Similarity (c)(i) Similar lengths (c)(ii) Similar areas and volumes

Click for more variations

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10(a)	$y + \text{angle } BCD = 180$ oe AND angles on a straight line AND $x + \text{angle } BCD = 180$ oe AND opposite angles of a cyclic quadrilateral are supplementary OR angles in opposite segments are supplementary leading to $x = y$ with no errors	**B2**	**B1** for angles on a straight line OR opposite angles of a cyclic quadrilateral are supplementary OR angles in opposite segments are supplementary

10(b)	Allow any two statements from: CXD is common angle or angle AXB = angle CXD $x = y$ or angle BAX = angle DCX angle ABX = angle CDX	**M1**	
	States all three equal pairs of angles OR 2/all angles equal so triangles similar	**A1**	
10(c)(i)	6 nfww	**3**	**B2** for $BX = 18$ nfww or **M2** for $\frac{24}{12} = \frac{BC+12}{9}$ oe or **M1** for $\frac{24}{12} = \frac{BX}{9}$ oe If 0 scored, **SC1** for answer 18
10(c)(ii)	4	**1**	

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