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

Surname	Other names

Centre number | | | | | |

Candidate number | | | | |

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Areas and volumes of similar shapes

Time allowed: 40 minutes

Subject code **0580**

Mathematics

Paper 2 (Extended)

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

/ 33

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 33 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 Hans draws a plan of a field using a scale of 1 centimetre to represent 15 metres.
The actual area of the field is 10 800 m^2.

Calculate the area of the field on the plan.

Answer ..... cm^2 [2]

Similar areas and volumes Click for more variations

2 On a map with scale 1 : 25 000, the area of a lake is 33.6 square centimetres.

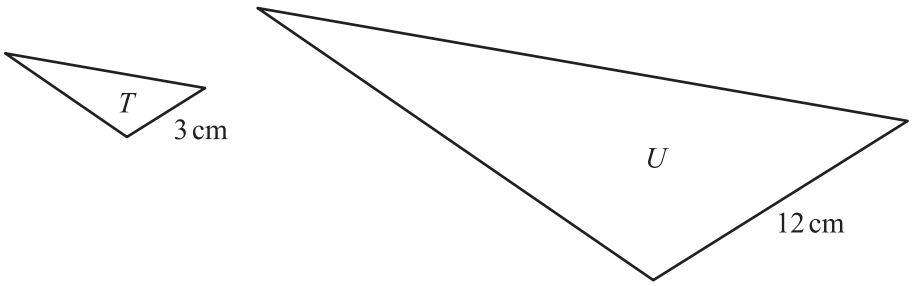
Calculate the actual area of the lake, giving your answer in square kilometres.

..... km^2 [2]

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3



NOT TO SCALE

The diagram shows two mathematically similar triangles, T and U.
Two corresponding side lengths are 3 cm and 12 cm.
The area of triangle T is 5 cm^2.

Find the area of triangle U.

..... cm^2 [2]

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4 Two cups are mathematically similar.
The larger cup has capacity 0.5 litres and height 8 cm.
The smaller cup has capacity 0.25 litres.

Find the height of the smaller cup.

..... cm [3]

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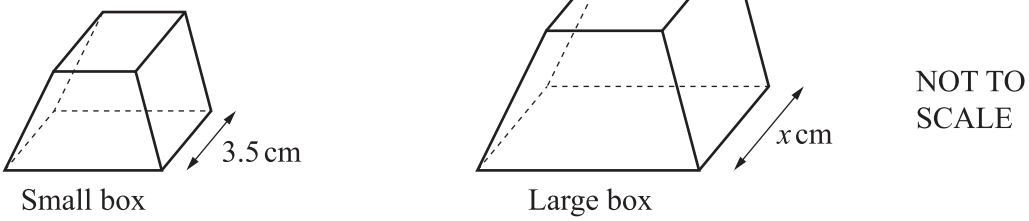
5 Two solids are mathematically similar and have volumes $81\,cm^3$ and $24\,cm^3$.
The surface area of the smaller solid is $44\,cm^2$.

Calculate the surface area of the larger solid.

..... cm^2 [3]

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6



Small box Large box

The small box is mathematically similar to the large box.
The volume of the large box is 72.8% greater than the volume of the small box.
The small box has length 3.5 cm and the large box has length x cm.

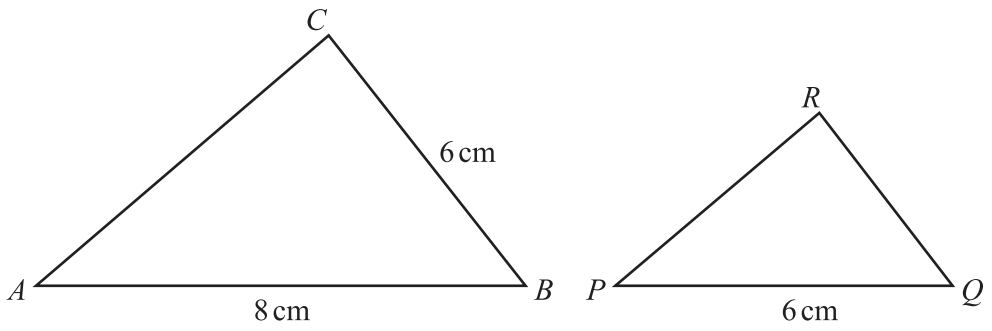
Calculate the value of x.

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$x =$ ..... [3]

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7



NOT TO SCALE

Triangle ABC is mathematically similar to triangle PQR.

(a) Calculate QR.

$QR =$ ..... cm [2]

(b) The two triangles are the cross-sections of two mathematically similar prisms.
The volume of the larger prism is $320\,cm^3$.

Calculate the volume of the smaller prism.

..... cm^3 [2]

(a) Similar lengths (b) Similar areas and volumes Click for more variations

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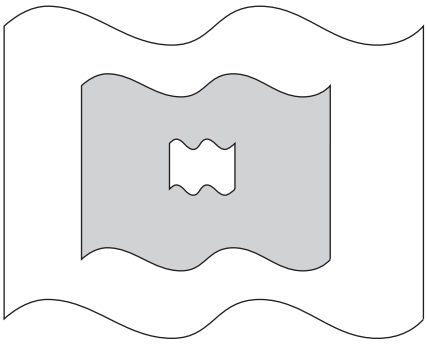
8 Two solid steel statues are mathematically similar.
The smaller statue has height 12 cm and the larger statue has height 15 cm.
The larger statue has a mass 2.5 kg.
The density of steel is 8 g/cm^3.

Calculate the volume of the smaller statue.
[Density = mass ÷ volume.]

..... cm^3 [4]

Similar areas and volumes Click for more variations

9



NOT TO SCALE

The diagram shows three shapes that are mathematically similar.
The heights of the shapes are in the ratio small : medium : large = 1 : 5 : 8.

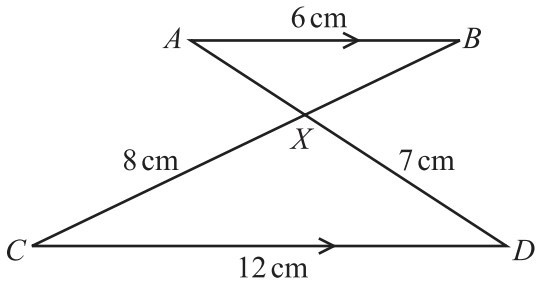
Find the ratio shaded area : total unshaded area.
Give your answer in its simplest form.

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..... : ..... [4]

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10



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