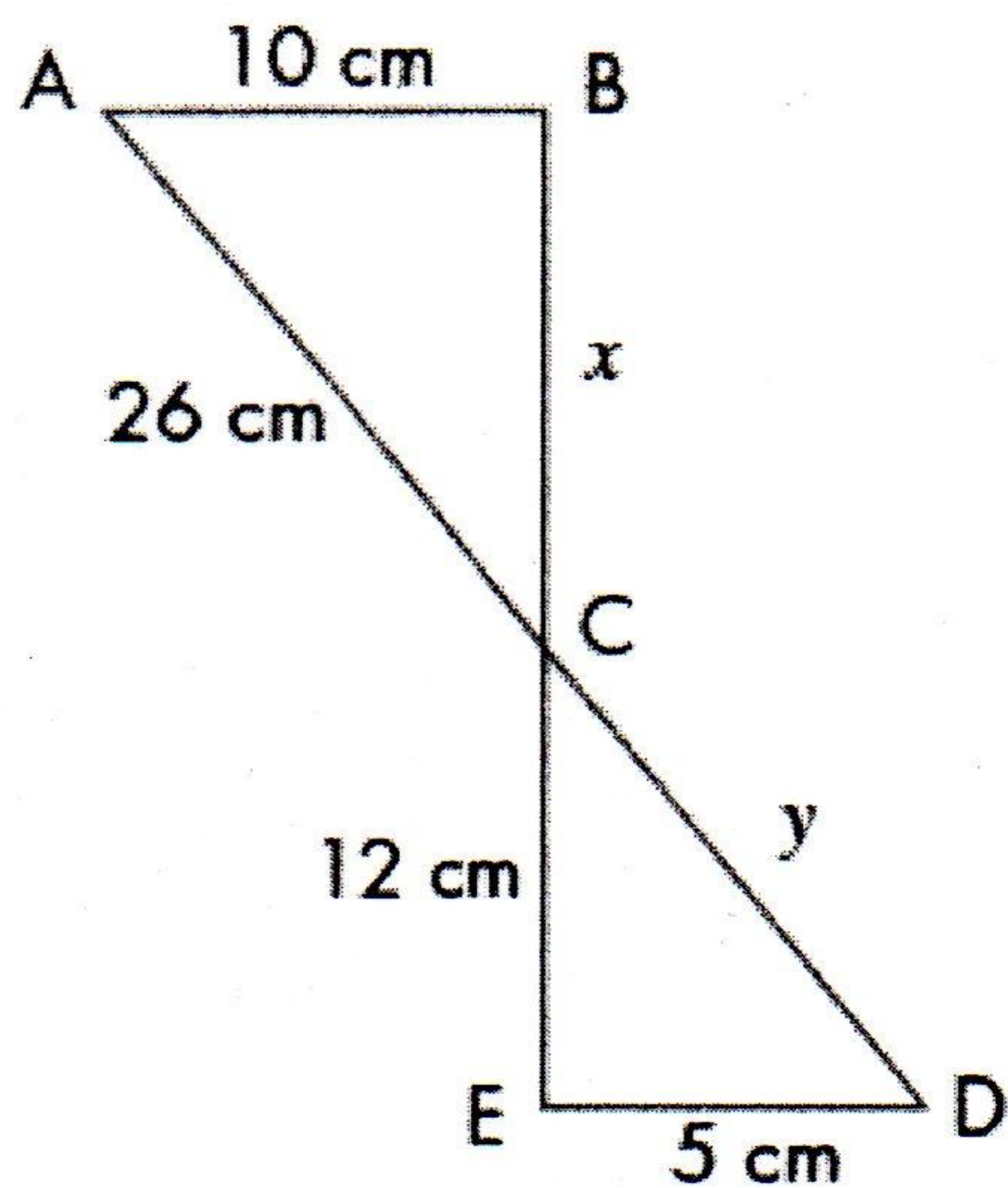


# Similar shapes

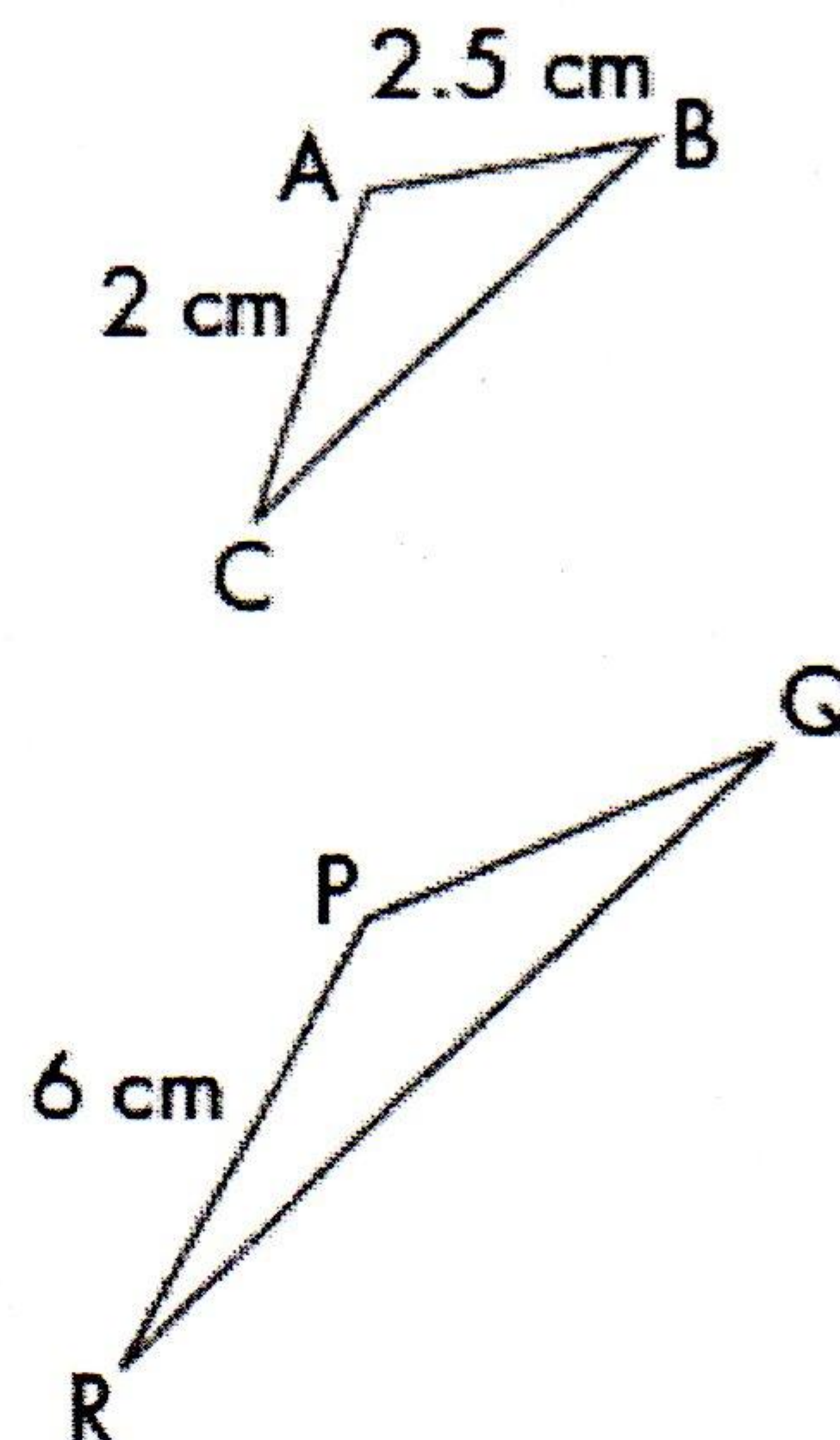
1) In the diagrams a to f, each pair of shapes are similar but not drawn to scale.  
Find the lengths of the sides as requested.

a)



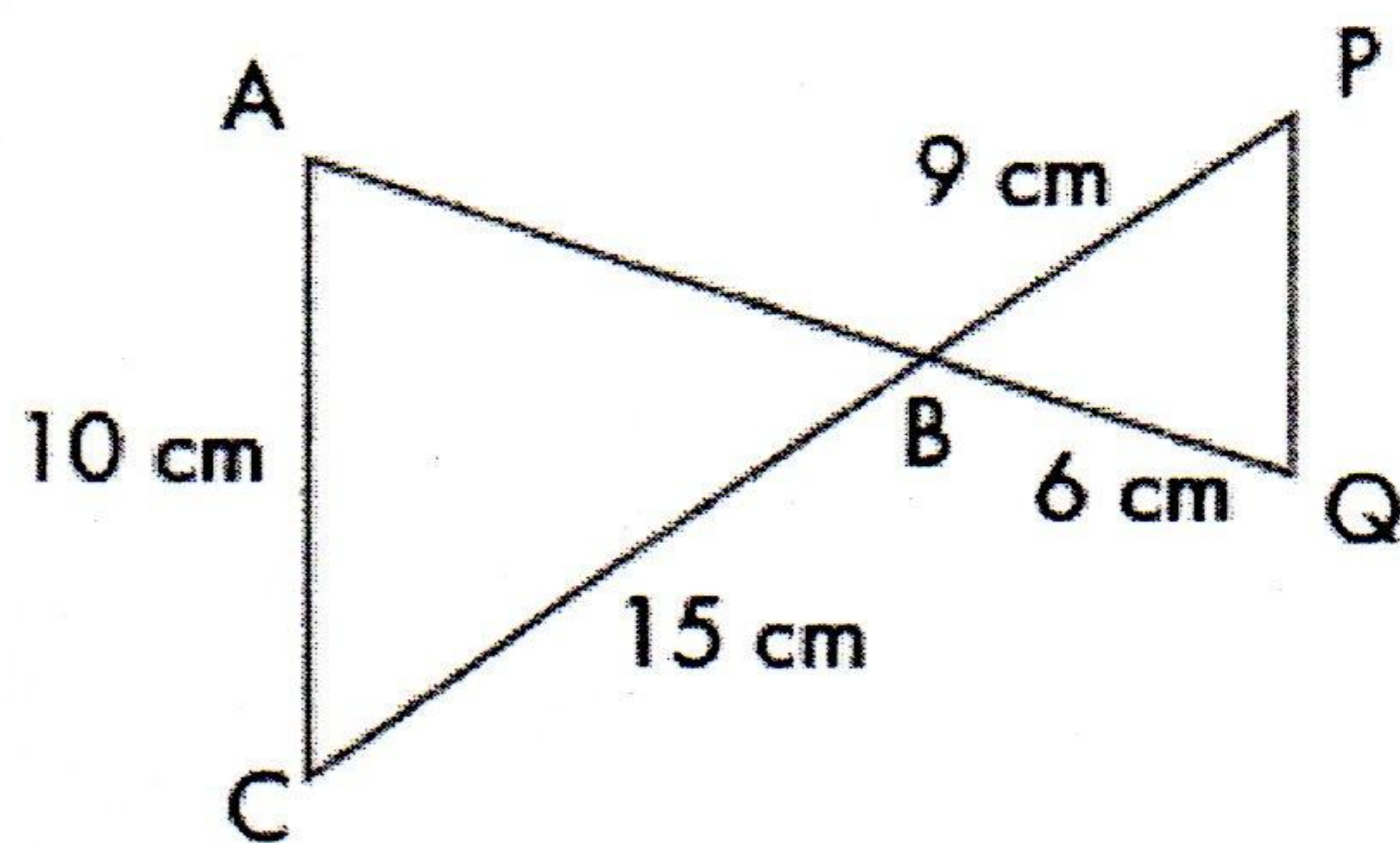
Find the value of  $x$  and  $y$

b)



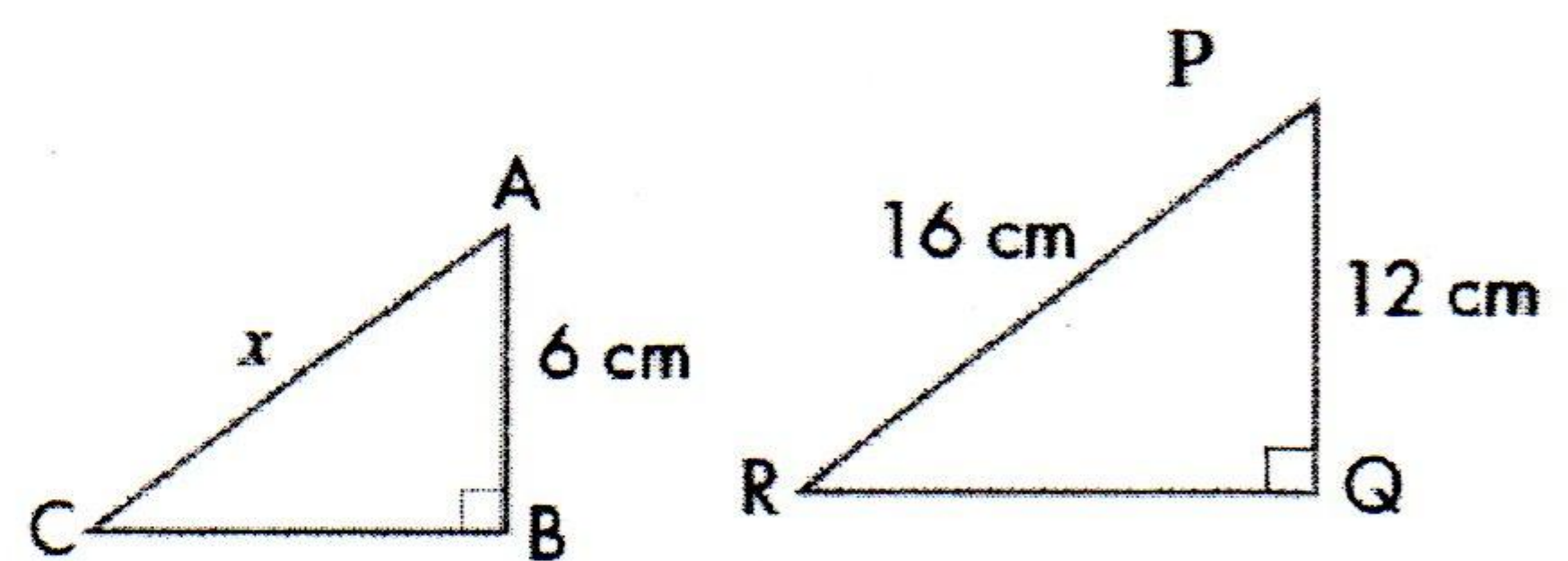
Find the size of  $PQ$

c)



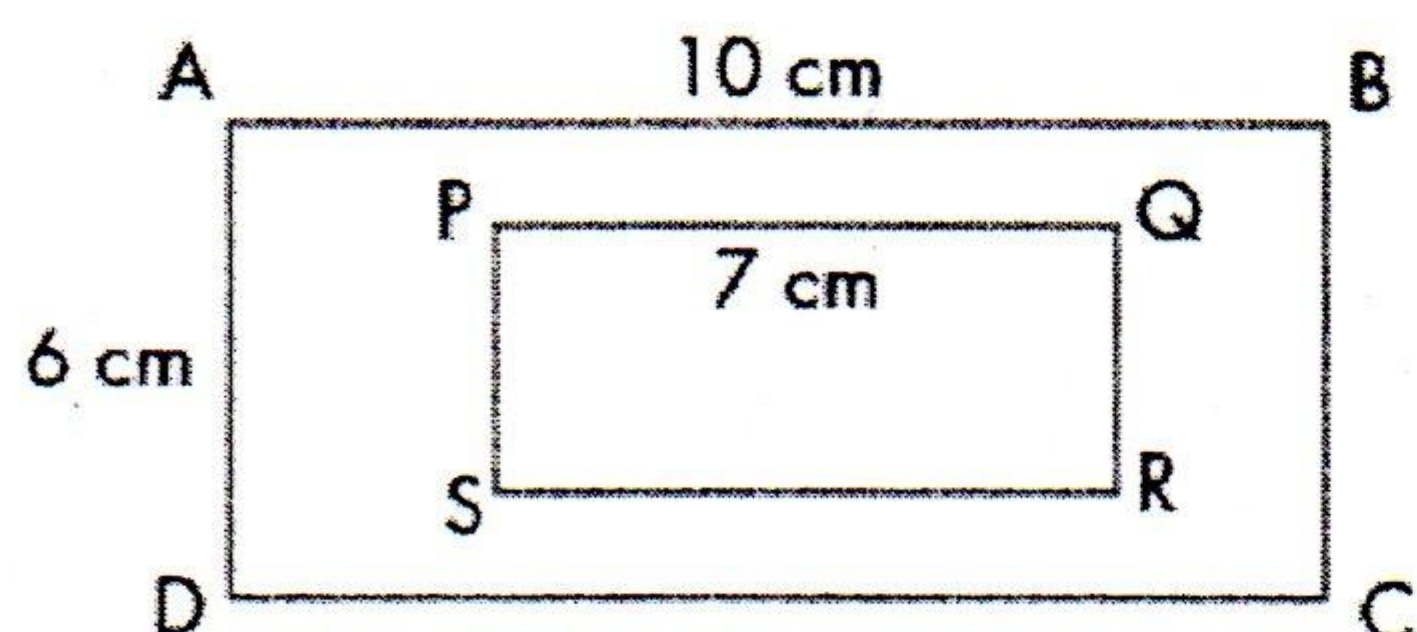
Find the size of  $AQ$ .

d)



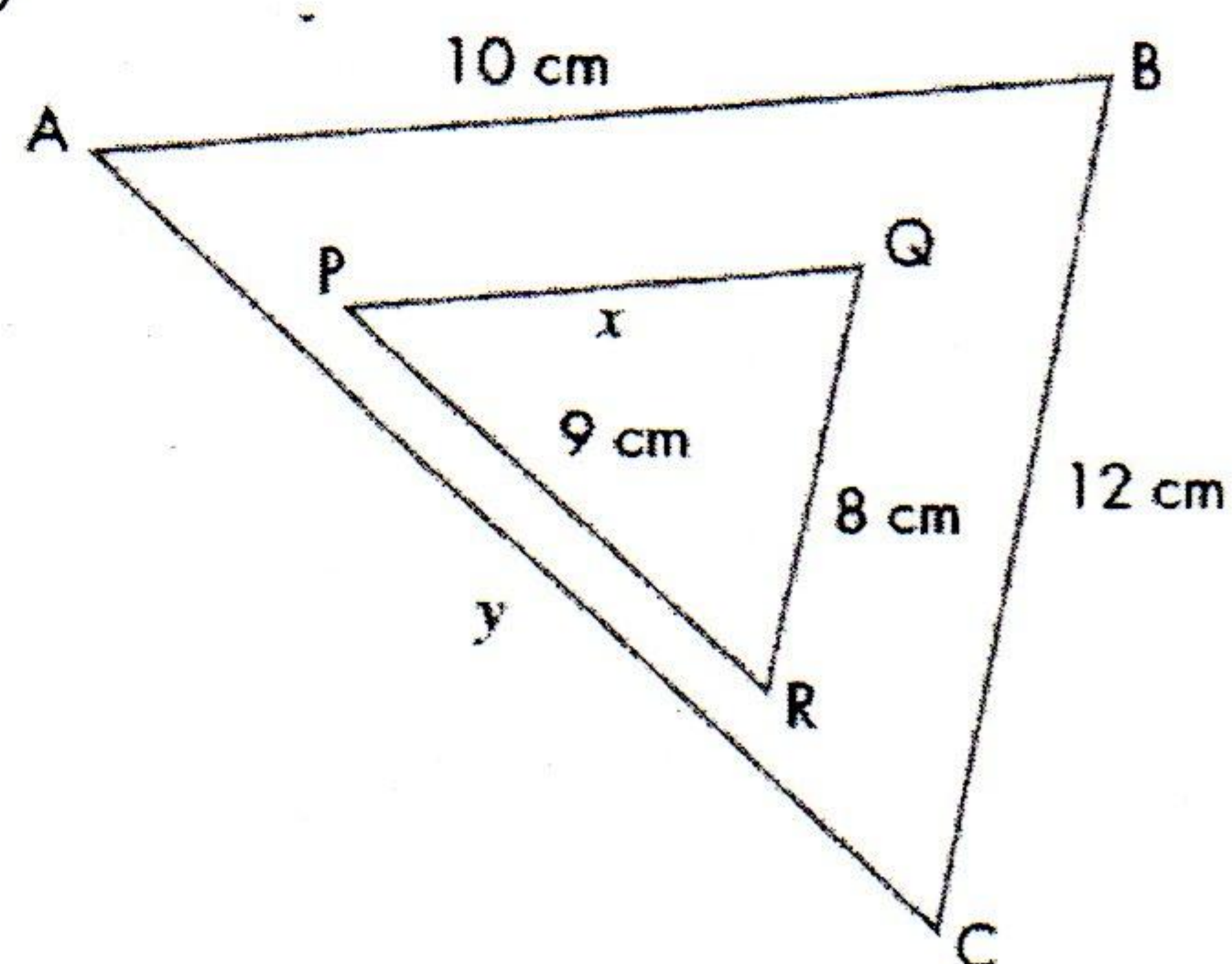
Find the value of  $x$ .

e)



Find the size of  $SR$

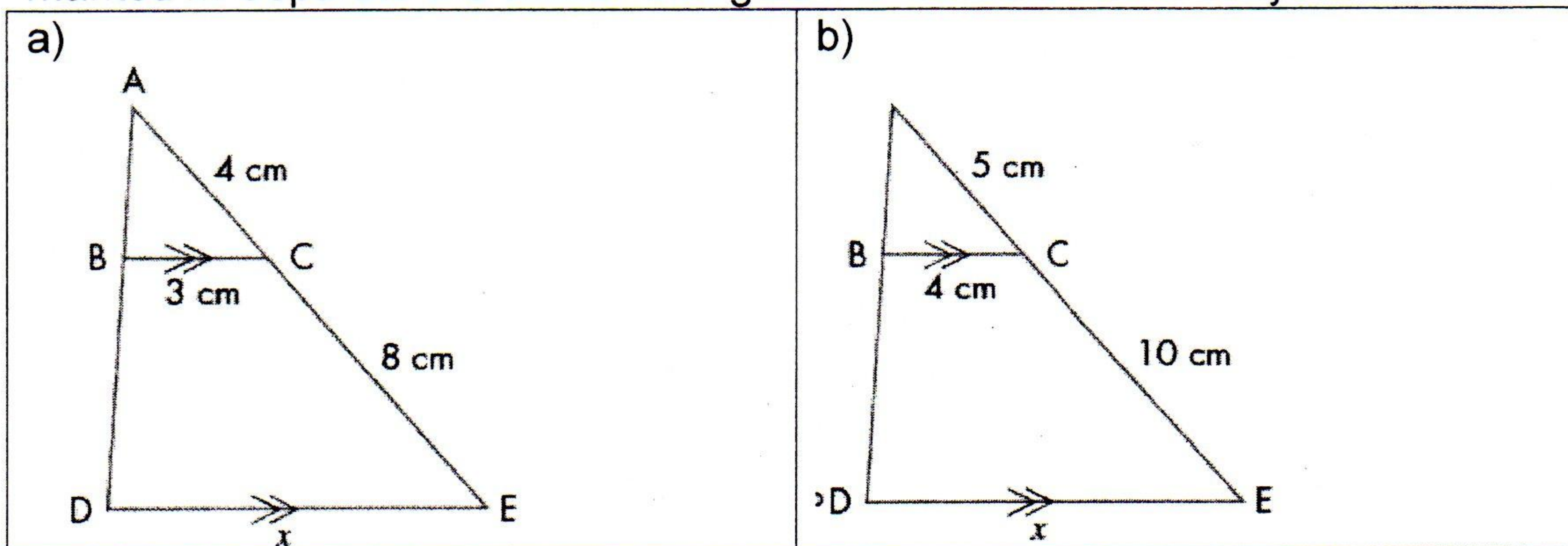
f)



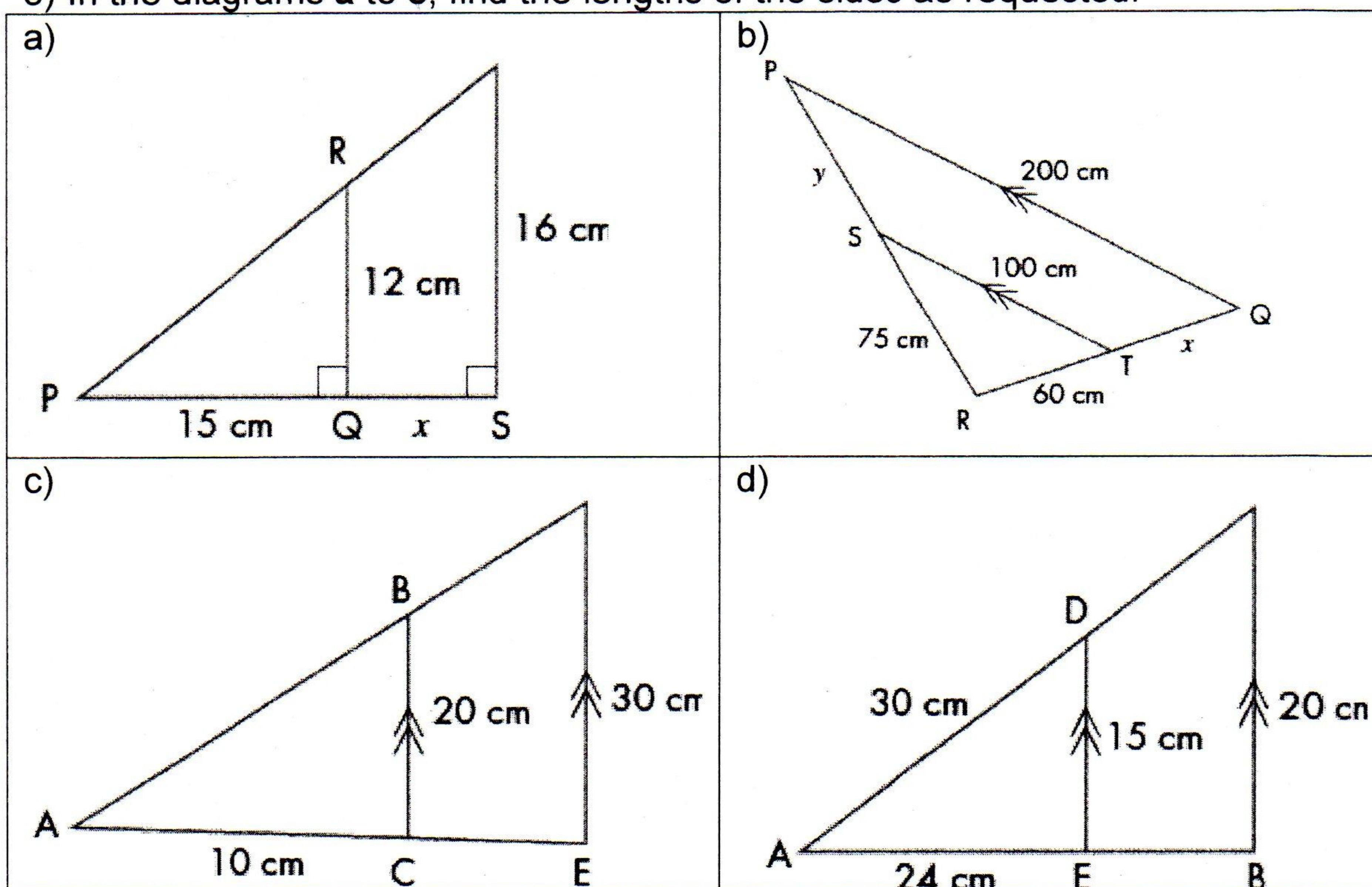
Find the size of  $x$ .



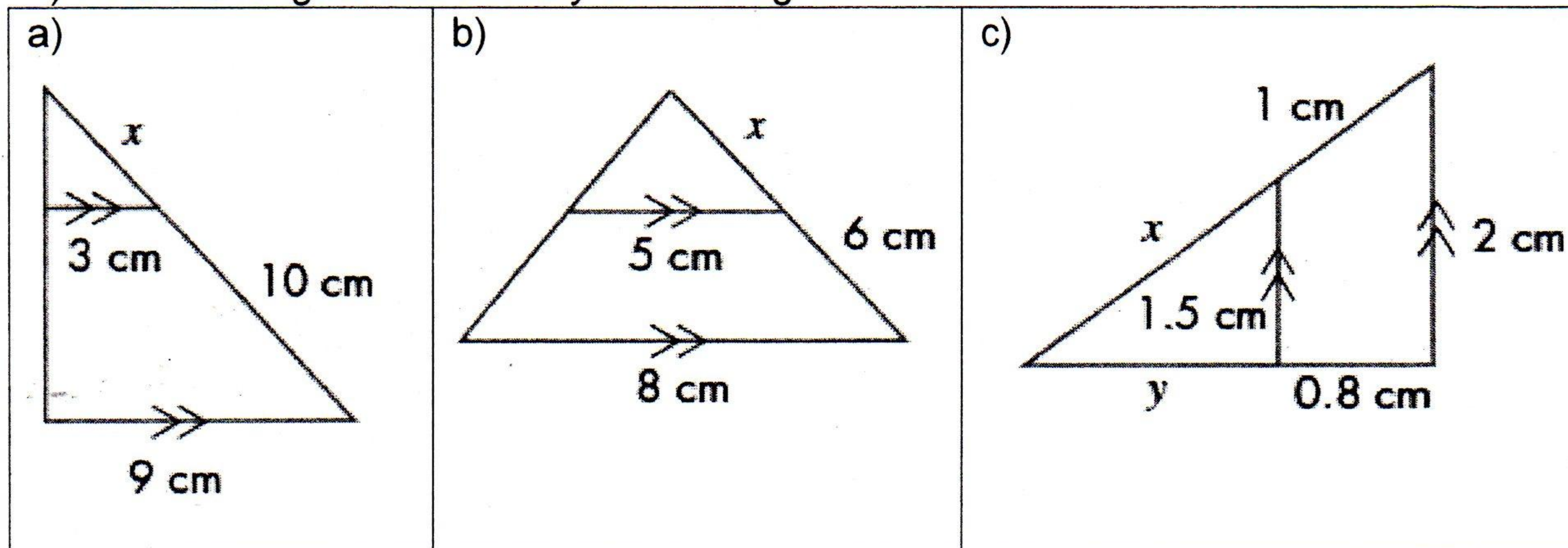
2) In each of the cases below, state a pair of similar triangles and find the length marked  $x$ . Separate the similar triangles if it makes it easier for you.



3) In the diagrams a to e, find the lengths of the sides as requested.



4) Find the lengths  $x$  or  $x$  and  $y$  in the diagrams a to c





## Scale factor in Area and Volume

5) X and Y are two geometrically similar solid shapes.

The length of shape X is 4cm.

The length of shape Y is 12cm.

The volume of shape X is  $1350 \text{ cm}^3$ .

Calculate the volume of shape Y.

---

6) X and Y are two geometrically similar solid shapes.

The total surface area of shape X is  $450 \text{ cm}^2$ .

The total surface area of shape Y is  $800 \text{ cm}^2$ .

The volume of shape X is  $1350 \text{ cm}^3$ .

Calculate the volume of shape Y.

---

7) John makes a model of his school.

He uses a scale of 1: 50

The area of the door on his model is  $8 \text{ cm}^2$ .

Work out the area of the door on the real school.

---

8) Two cylinders, A and B, are mathematically similar.

The height of cylinder B is twice the height of cylinder A.

The total surface area of cylinder A is  $180 \text{ cm}^2$ .

Work out the total surface area of cylinder B.

---

9) A Cylinder, height 8 cm, can be made from a piece of card with an area of  $140 \text{ cm}^2$ . What is the height of a similar Cylinder made from a similar piece of card with an area of  $200 \text{ cm}^2$ ?

---

10) A piece of card,  $1200 \text{ cm}^2$  in area, will make a tube 15 cm long. What is the length of a similar tube made from a similar piece of card with an area of  $500 \text{ cm}^2$ ?

---

11) Two similar bottles are 20 cm and 14 cm high. The smaller bottle holds 850 ml. Find the capacity of the larger one.

---

12) Two similar models have volumes  $12 \text{ m}^3$  and  $30 \text{ m}^3$ . If the surface area of one of them is  $2.4 \text{ m}^2$ , what are the possible surface areas of the other model?

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13) Two cones, A and B, are mathematically similar.

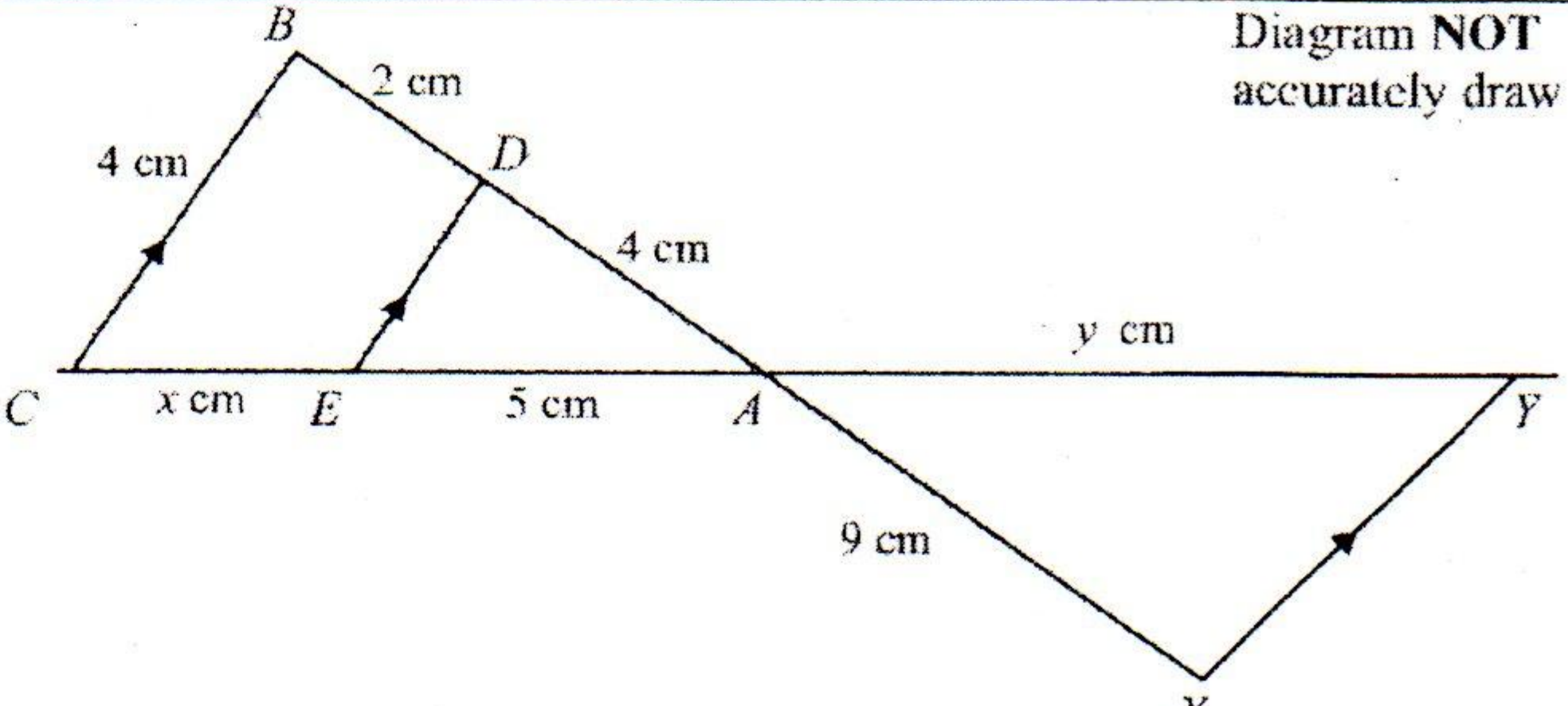
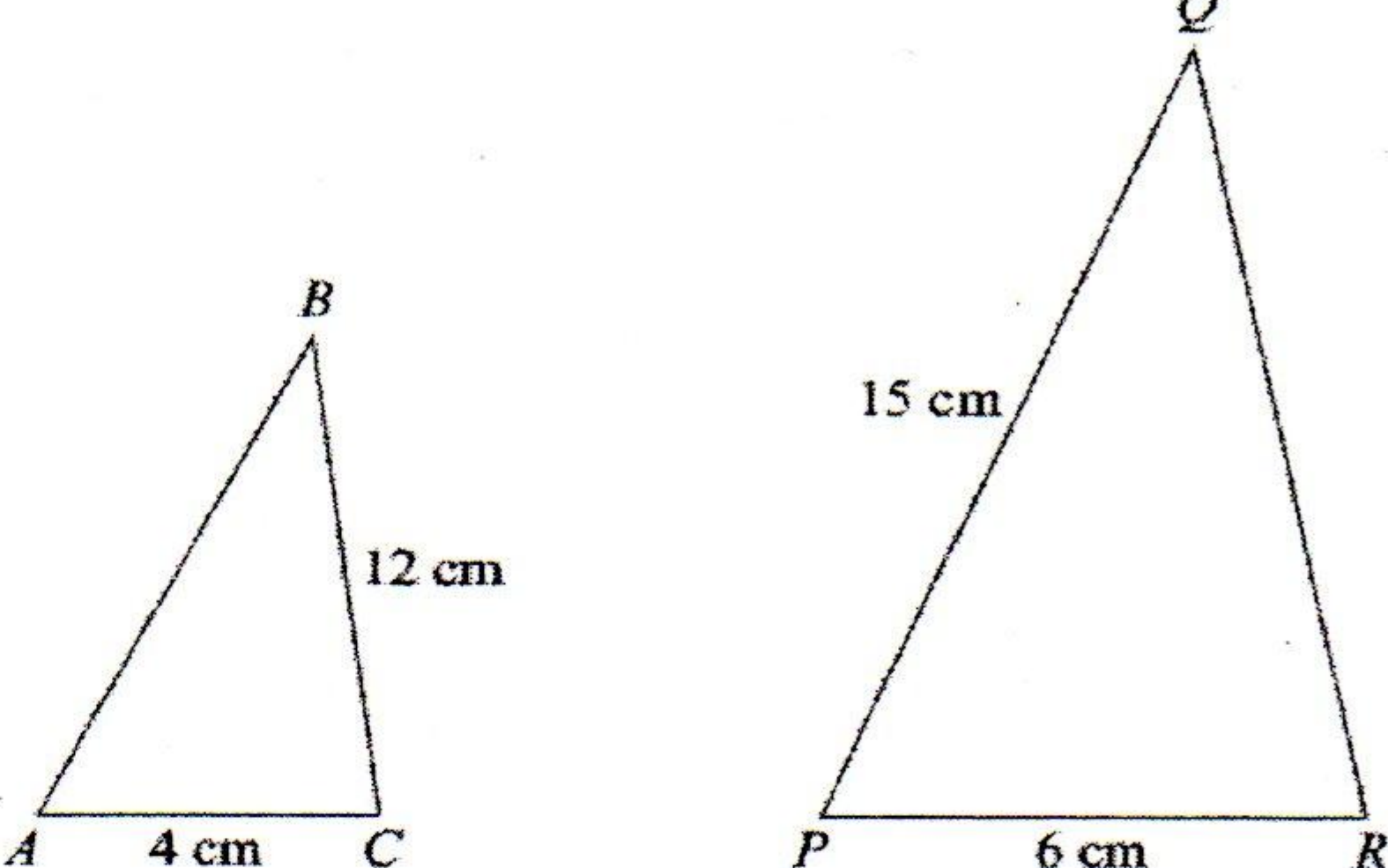
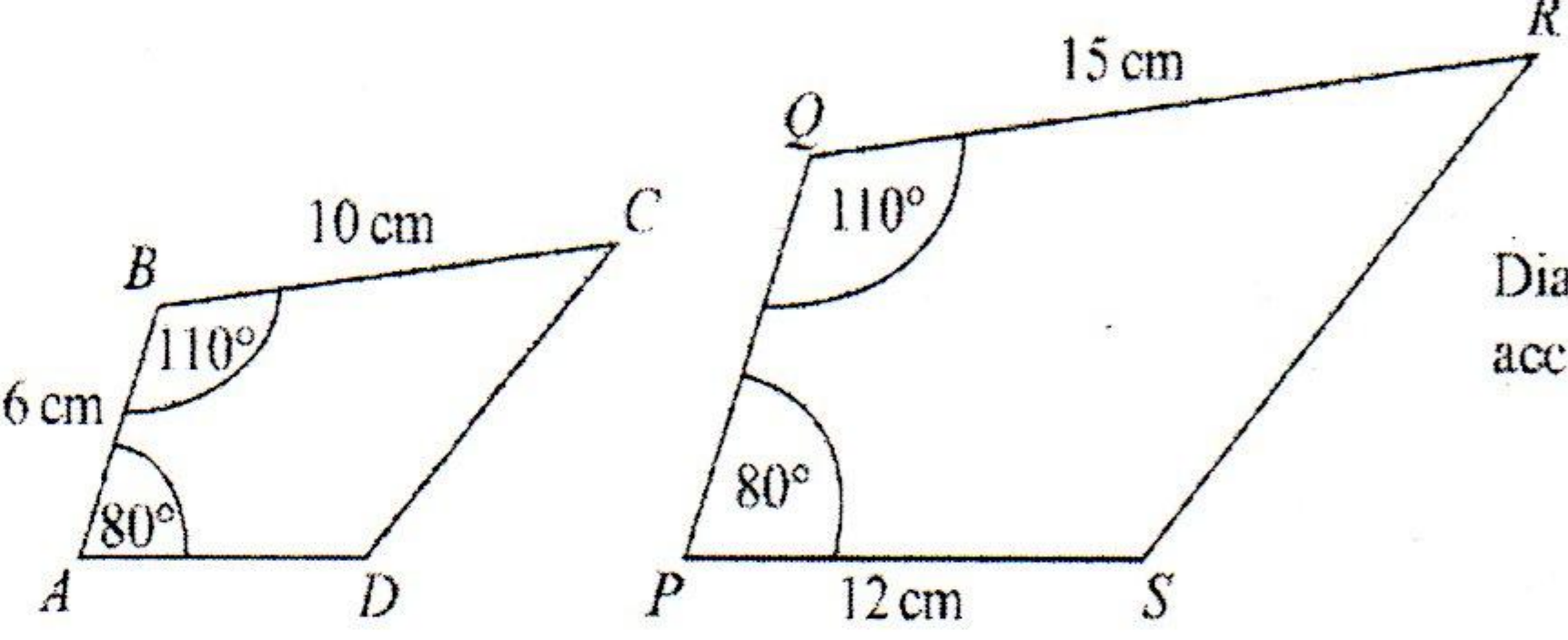
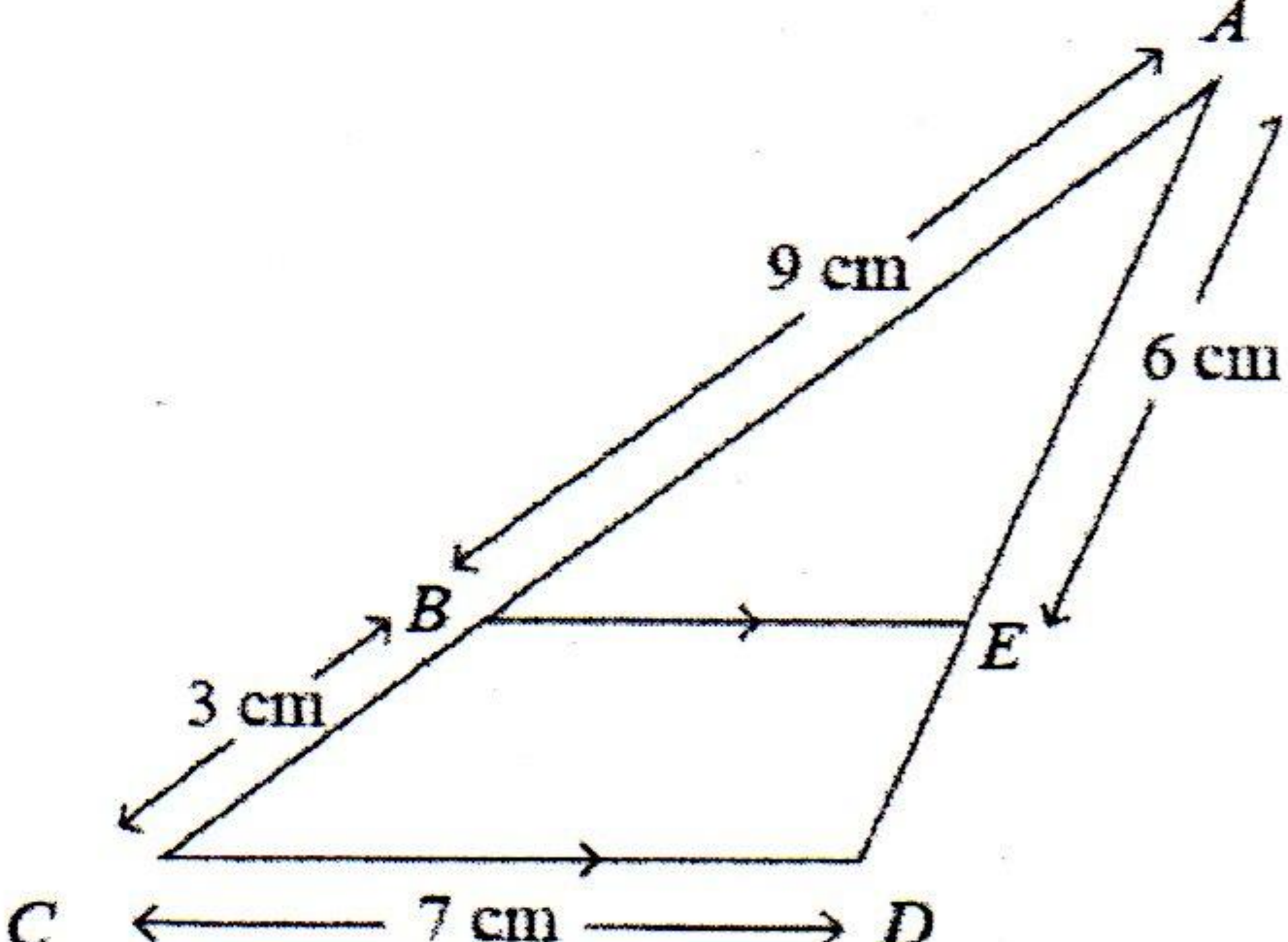
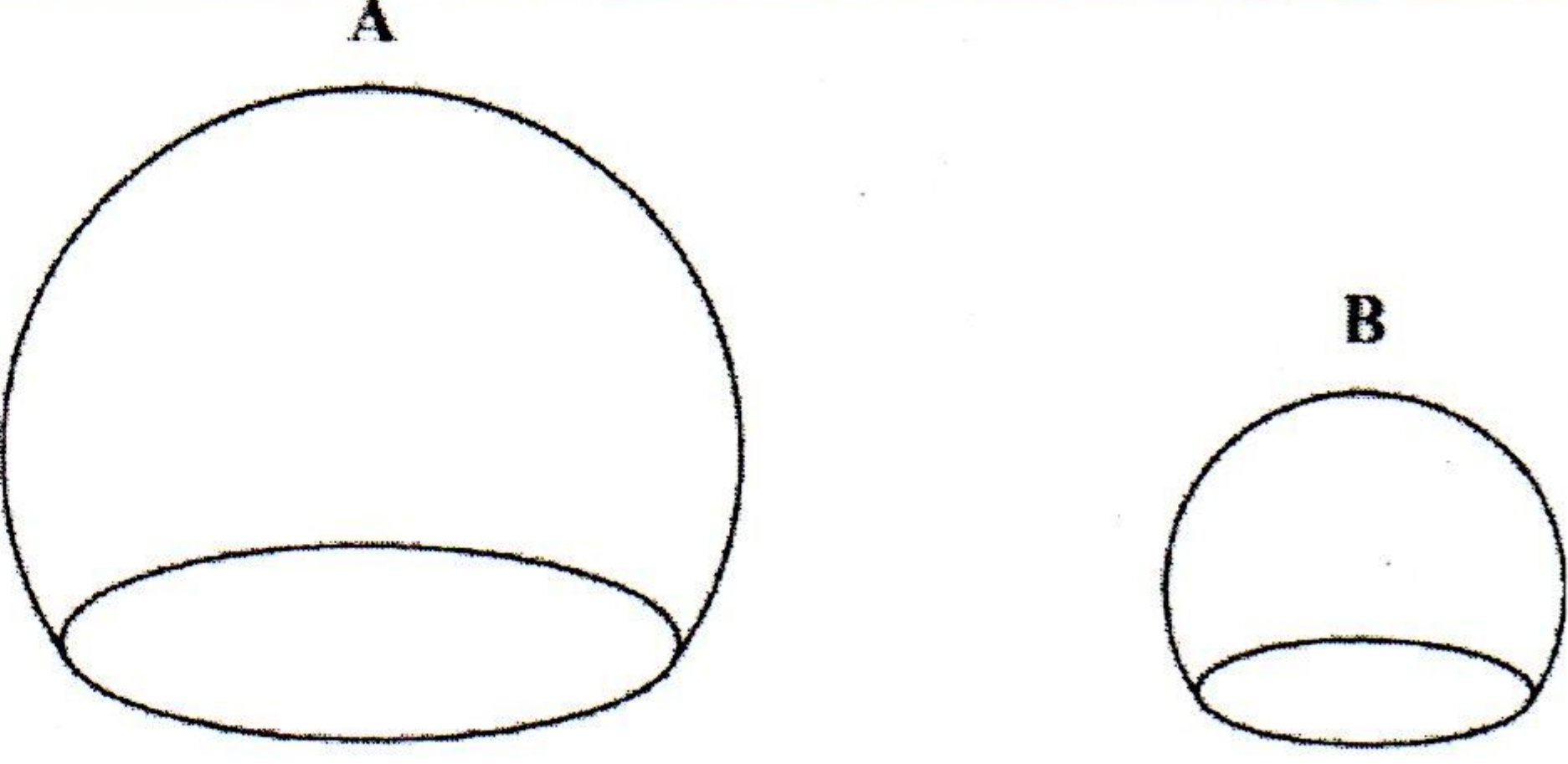
The radius of cone B is twice the radius of cone A.

The volume of A is  $64 \text{ cm}^3$ .

Work out the volume of cone B.

---



<p>1) <math>CEAY</math> and <math>BDAX</math> are straight lines.  <math>XY</math>, <math>ED</math> and <math>CB</math> are parallel.  <math>AE = 5</math> cm. <math>AX = 9</math> cm. <math>AD = 4</math> cm.  <math>BC = 4</math> cm. <math>BD = 2</math> cm. <math>CE = x</math> cm.  <math>XY = y</math> cm.  Find the value of <math>x</math> and the value of <math>y</math>.</p>	
<p>2) Triangles <math>ABC</math> and <math>PQR</math> are mathematically similar.  Angle <math>A =</math> angle <math>P</math>. Angle <math>B =</math> angle <math>Q</math>.  Angle <math>C =</math> angle <math>R</math>.  <math>AC = 4</math> cm. <math>BC = 12</math> cm.  <math>PR = 6</math> cm. <math>PQ = 15</math> cm.  (a) Work out the length of <math>QR</math>.  .....cm  (b) Work out the length of <math>AB</math>.  .....cm</p>	
<p>3) <math>ABCD</math> and <math>PQRS</math> are mathematically similar.  (a) Find the length of <math>PQ</math>.  ..... cm  (b) Find the length of <math>AD</math>.  ..... cm</p>	
<p>4) <math>BE</math> is parallel to <math>CD</math>.  <math>AB = 9</math> cm, <math>BC = 3</math> cm, <math>CD = 7</math> cm, <math>AE = 6</math> cm.  (a) Calculate the length of <math>ED</math>.  ..... cm  (b) Calculate the length of <math>BE</math>.  ..... cm</p>	
<p>5) <b>A</b> and <b>B</b> are two solid shapes which are mathematically similar.  The shapes are made from the same material.  The surface area of <b>A</b> is <math>50</math> cm<sup>2</sup>.  The surface area of <b>B</b> is <math>18</math> cm<sup>2</sup>.  The mass of <b>A</b> is <math>500</math> grams.  Calculate the mass of <b>B</b>.  ..... grams</p>	



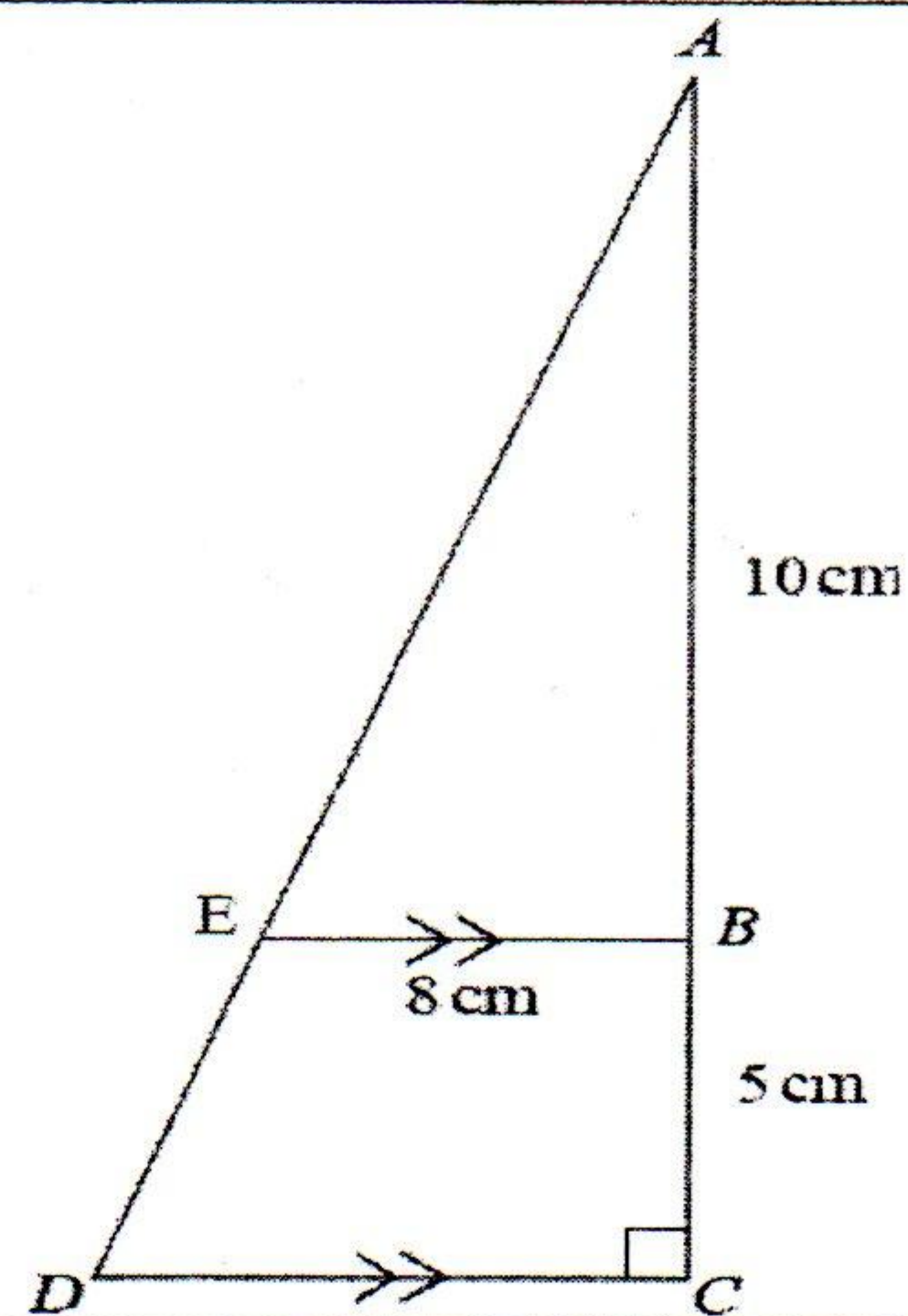
6)  $ABC$  and  $AED$  are straight lines.  
 $EB$  is parallel to  $DC$ .  
 Angle  $ACD = 90^\circ$ .  
 $AB = 10$  cm.  
 $BC = 5$  cm.  
 $EB = 8$  cm.

(a) Work out the length of  $DC$ .

.....cm

(b) Work out the area of the trapezium  $EBCD$ .

.....cm<sup>2</sup>



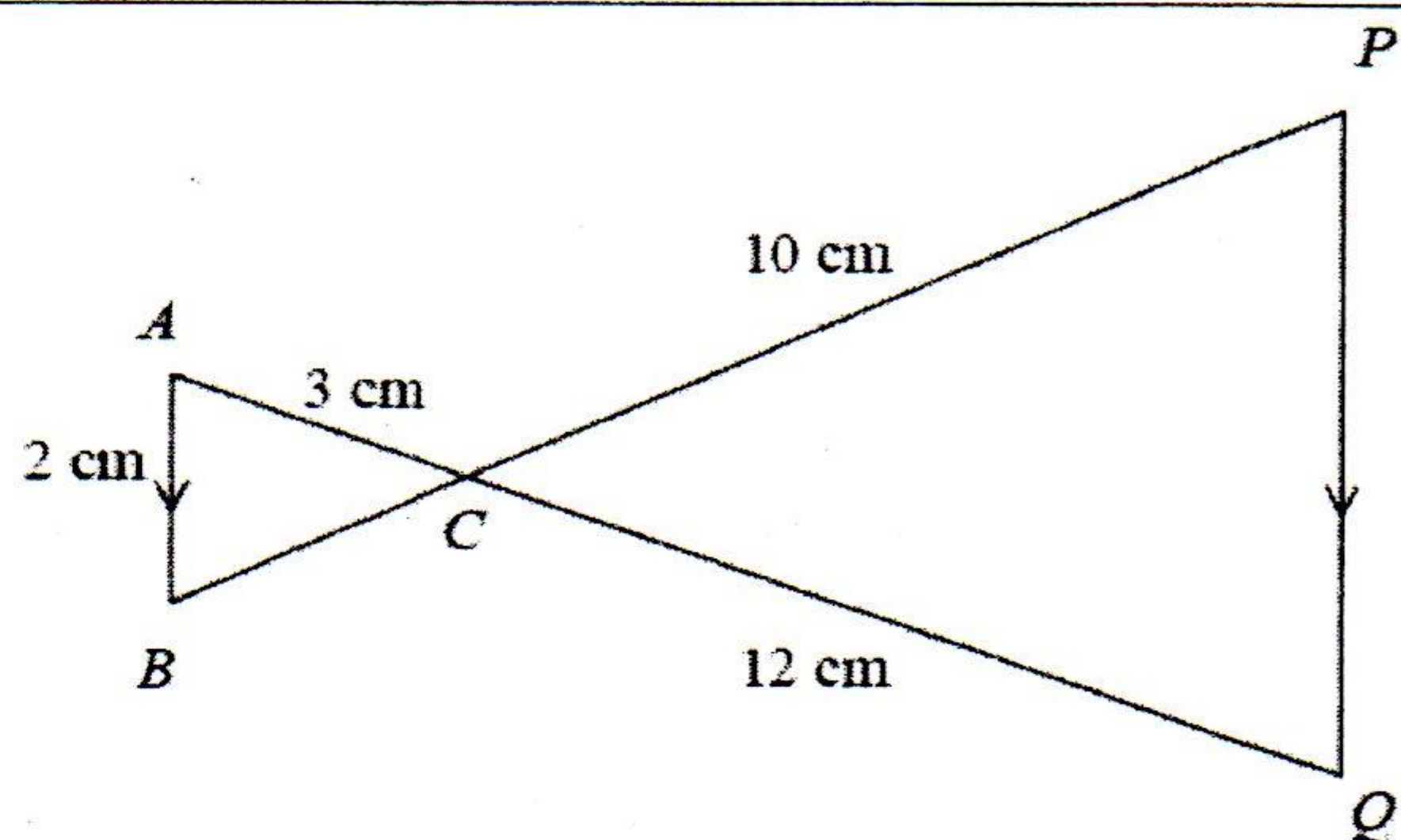
7)  $ACQ$  and  $BCP$  are straight lines.  
 $AB$  is parallel to  $PQ$ .  
 $AB = 2$  cm.  $AC = 3$  cm.  
 $CQ = 12$  cm.  $CP = 10$  cm.

(a) Work out the length of  $PQ$ .

..... cm

(b) Work out the length of  $BP$ .

..... cm



8) Two cylinders, P and Q, are mathematically similar.

The total surface area of cylinder P is  $90\pi$  cm<sup>2</sup>.

The total surface area of cylinder Q is  $810\pi$  cm<sup>2</sup>.

The length of cylinder P is 4 cm.

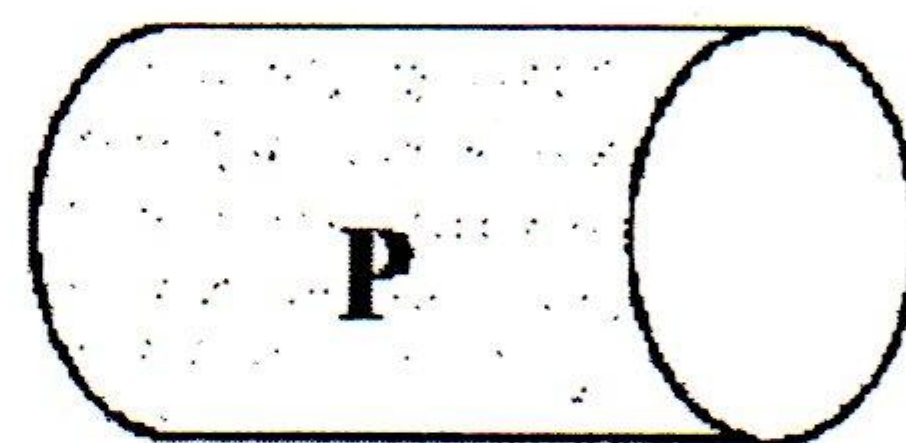
**a** Work out the length of cylinder Q.

The volume of cylinder P is  $100\pi$  cm<sup>3</sup>.

**b** Work out the volume of cylinder Q.

Give your

answer as a multiple of  $\pi$



4 cm

