

Sydney Girls High School Mathematics Department

Year 10 Class Test – Similarity.

Time Allowed: 40 minutes

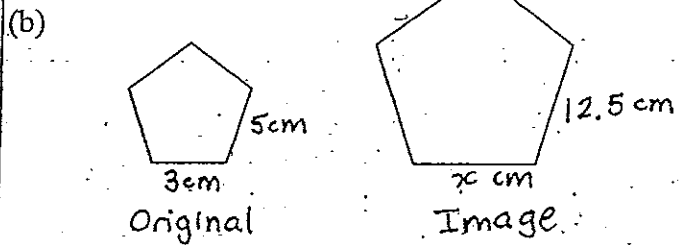
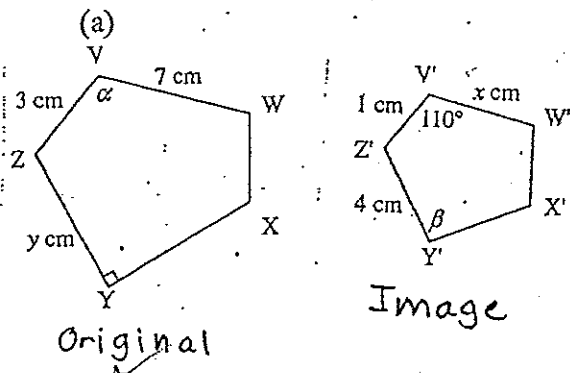
Instructions: • Show all necessary working

• Write answers in the space provided

Question 1

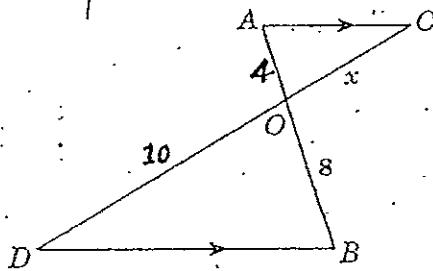
In each part the figures are similar.

- (i) Find the value of each pronumeral
- (ii) Find the scale factor



Question 2

(a)

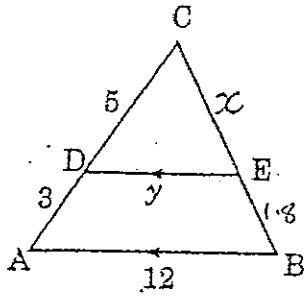


(i) Prove that $\triangle AOC \parallel \triangle DOB$

(ii) Find x

Question 2(cont)

(b)



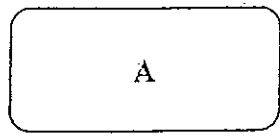
(i) Given that $DE \parallel AB$, prove that $\triangle ABC \sim \triangle DEC$

(ii) Find the value of y

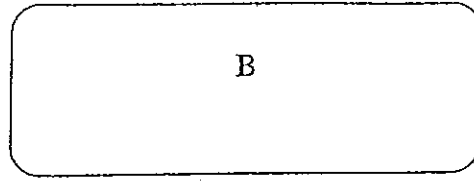
(iii) If $EB = 1.8$, find the value of x

Question 3

(a)



3m



7m

(i) Find the ratio of the area of Figure A to the area of Figure B.

(ii) If the area of Figure B is 54 m^2 , find the area of Figure A (correct to 1 decimal place).

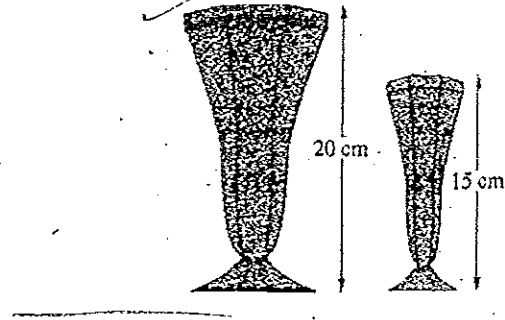
(b) Two similar polygons have areas of 49 cm^2 and 121 cm^2 ,

(i) Find the ratio of their sides

(ii) If a side of the smaller polygon is 21 cm, what is the length of the corresponding side of the larger polygon?

Question 4

(a) Two similar vases have heights 15 cm and 20 cm respectively. If the smaller vase has a volume of 135 cm^3 , what is the volume of the larger vase?



(b) Two similar cones have base areas in the ratio $25 : 9$.

(i) What is the ratio of their diameters?

(ii) What is the ratio of their heights?

(iii) If the volume of the larger cone is 160 cm^3 , find the volume of the smaller cone (correct to 1 decimal place)

SOLUTIONS

Name: Sarah Fong

Sydney Girls High School Mathematics Department

Year 10

Class Test – Similarity.

30
30

Time Allowed: 40 minutes

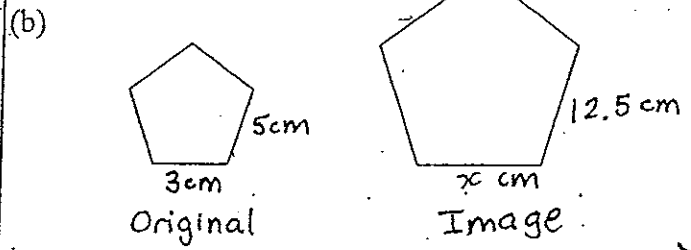
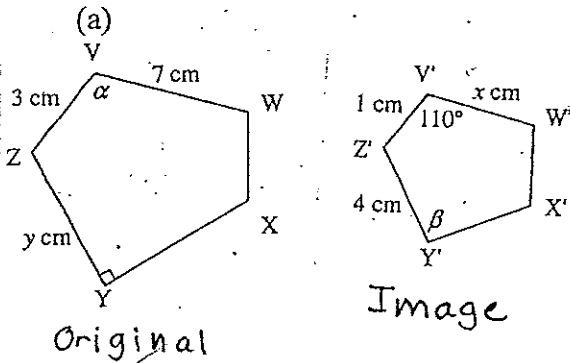
- Instructions:
- Show all necessary working
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Question 1

8

In each part the figures are similar.

- (i) Find the value of each pronumeral
- (ii) Find the scale factor

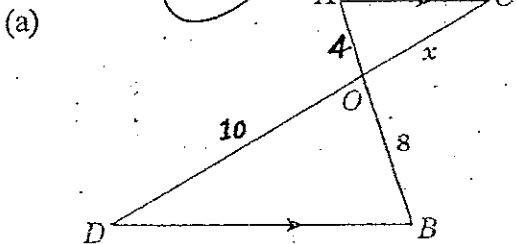


1. $\alpha = 110^\circ$ (corresp. \angle 's, similar figures).
 $\beta = 90^\circ$
 $\frac{3}{1} = \frac{4}{y} \therefore y = 12$
 $\frac{1}{3} = \frac{x}{7} \therefore x = 2\frac{1}{3}$
 Scale factor = 3:1

i. $\frac{12.5}{5} = \frac{x}{3}$ ii. Scale factor = 2:5
 $6x = 37.5$
 $x = 7.5$

Question 2

10



- (i) Prove that $\triangle AOC \parallel \triangle DOB$

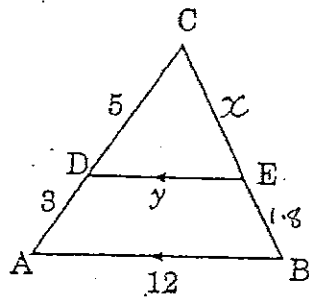
In $\triangle AOC$ and $\triangle DOB$:
 $\angle AOC = \angle DOB$ (vert. opp. \angle 's)
 $\angle CAO = \angle ODB$ (alt. \angle 's, $AC \parallel DB$)
 \therefore the remaining angles must be equal
 \therefore the triangles are equiangular
 $\therefore \triangle AOC \parallel \triangle DOB$.

- (ii) Find x

$\frac{AO}{OB} = \frac{OC}{OD} \Rightarrow \frac{4}{8} = \frac{x}{10}$ or $\frac{4}{8} = \frac{5}{10} \therefore x = 5$

Question 2(cont)

(b)



(i) Given that $DE \parallel AB$, prove that $\triangle ABC \sim \triangle DEC$

In \triangle 's ABC and DEC:

$\angle ACB$ is common. ✓

$\angle CDE = \angle CAB$ (alt \angle 's, $DE \parallel AB$) ✓

$\angle CED = \angle CBA$ (remaining \angle 's must be equal) ✓

$\therefore \triangle ABC \sim \triangle DEC$ ✓

(ii) Find the value of y

In the similar \triangle 's ABC and DEC:

$$\frac{5}{8} = \frac{y}{12}$$

$$8y = 60$$

$$y = 7.5$$

(iii) If $EB = 1.8$, find the value of x

In the similar \triangle 's ABC and DEC:

$$\frac{5}{8} = \frac{x}{x+1.8}$$
 ✓

$$5(x+1.8) = 8x$$

$$5x + 9 = 8x$$

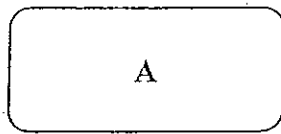
$$9 = 3x$$
 ✓

$$x = 3$$

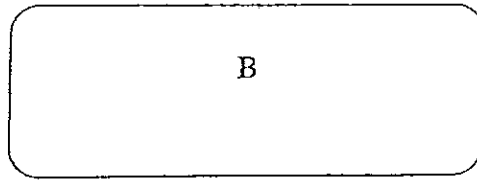
Question 3

(a)

6



3m



7m

(i) Find the ratio of the area of Figure A to the area of Figure B.

In Figures A and B:

Ratio of sides = 3:7 ✓

∴ Ratio of areas = 3²:7²

= 9:49 ✓

(ii) If the area of Figure B is 54 m², find the area of Figure A (correct to 1 decimal place).

Let the area of figure A be x.

$\frac{9}{49} = \frac{x}{54}$ ✓

49x = 486 ✓

∴ x = 9.9 (1dp) m² ✓

(b) Two similar polygons have areas of 49 cm² and 121 cm²,

(i) Find the ratio of their sides

Ratio of areas = 49 : 121 ✓

= 7² : 11²

∴ ratio of sides = 7 : 11 ✓

(ii) If a side of the smaller polygon is 21 cm, what is the length of the corresponding side of the larger polygon?

Let the ^{corresp. side} ~~area~~ of the larger polygon be x.

$\frac{7}{11} = \frac{21}{x}$ ✓

7x = 231 ✓

x = 33 cm.

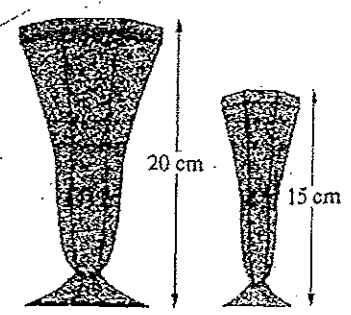
Question 4

6

(a) Two similar vases have heights 15 cm and 20 cm respectively. If the smaller vase has a volume of 135 cm^3 , what is the volume of the larger vase?

let the volume of the larger vase be x .

15:20
 Ratio of sides = 15:20 ✓
 \therefore Ratio of volumes = $15^3 : 20^3$ ✓
 $= 3375 : 8000$ ✓



$\rightarrow \frac{3375}{8000} = \frac{135}{x}$ ✓

$3375x = 1080000$ ✓

$\therefore x = 320 \text{ cm}^3$ ✓

(b) Two similar cones have base areas in the ratio 25 : 9.

(i) What is the ratio of their diameters?

$25:9 = 5^2:3^2$

ratio of diameters = 5:3 ✓

(ii) What is the ratio of their heights?

5:3 ✓

(iii) If the volume of the larger cone is 160 cm^3 , find the volume of the smaller cone (correct to 1 decimal place)

Ratio of ~~area~~ volumes = $6^3 : 5^3$
 $= 125 : 27$ ✓

let the volume of the smaller cone be x :
 $\frac{125}{27} = \frac{160}{x}$

$125x = 4320$
 $x = 34.6 \text{ cm}^3$ ✓