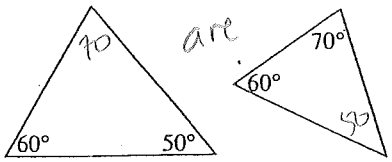
SIMILAR POLYGONS

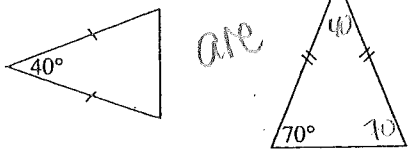
1. State why the two polygons are or are not similar.

a) Y



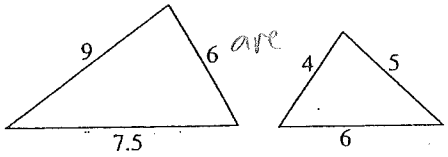
same angles

b) Y



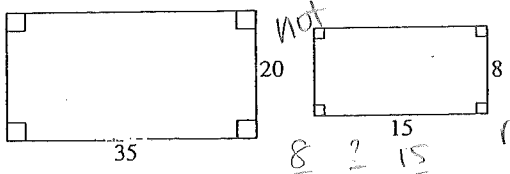
same angles

c) Y



$\frac{4}{6} = \frac{6}{9} = \frac{5}{7.5}$

d) N

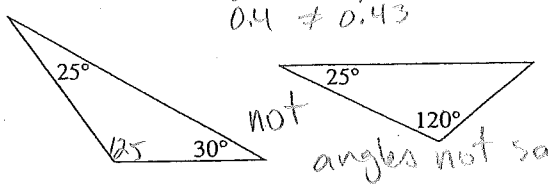


$\frac{8}{20} \stackrel{?}{=} \frac{15}{35}$

$0.4 \neq 0.43$

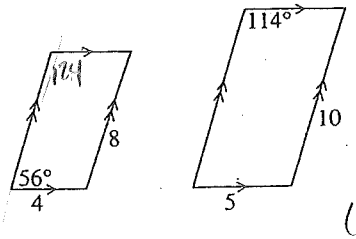
ratios not equal

e) N



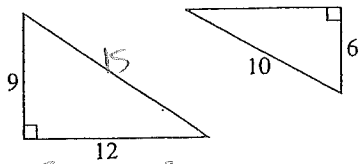
angles not same

f) N



not, angles not = (ratios are, but still not similar)

g) N

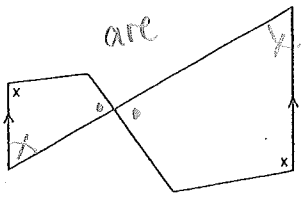


$c^2 = 9^2 + 12^2$

ratios =

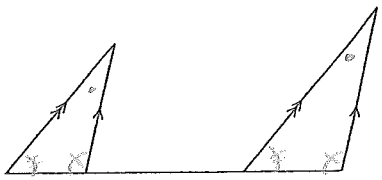
$\frac{6}{9} = \frac{8}{12} = \frac{10}{15}$

h) Y



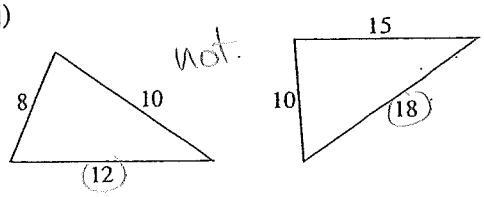
angles =

i) Y



are angles =

j) N

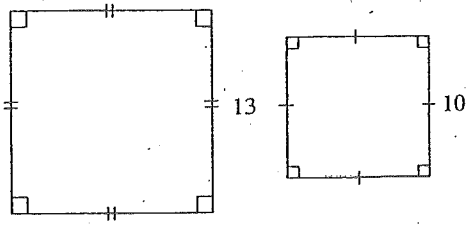


$\frac{18}{12} \stackrel{?}{=} \frac{10}{8} \stackrel{?}{=} \frac{15}{10}$

$1.5 \neq 1.25$

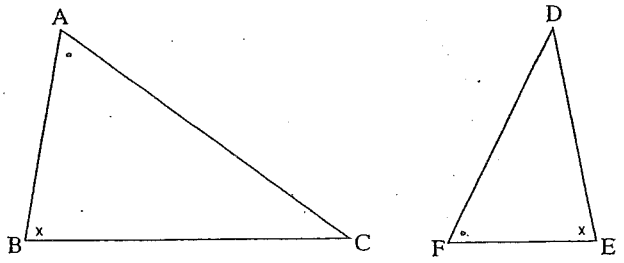
ratios not =

k) Y ratios are =, angles are =



2. Complete each statement for the following pairs of similar figures.

a)

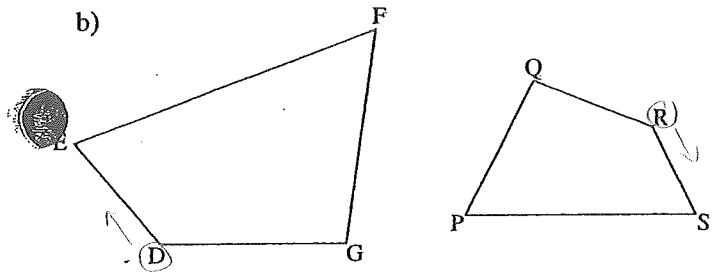


$\Delta ABC \sim \Delta$ FED

$\frac{AB}{?} = \frac{BC}{?} = \frac{AC}{?}$

$\frac{AB}{FE} = \frac{BC}{ED} = \frac{AC}{FD}$

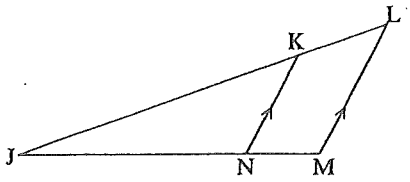
b)



DEFG ~ RSPQ

$\frac{FG}{PQ} = \frac{GD}{QR} = \frac{DF}{RS} = \frac{FE}{PS}$

c)



$\Delta JKN \sim \Delta$ JLM

$\frac{JK}{JL} = \frac{KN}{LM} = \frac{JN}{JM}$

3. Complete the following statement.

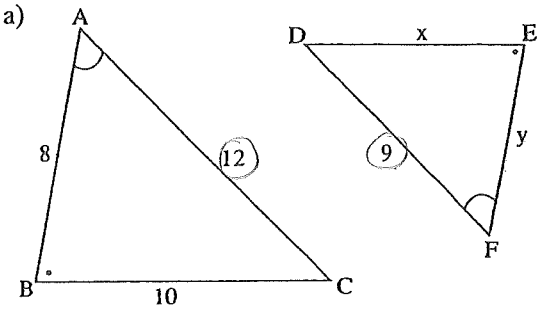
If $\Delta DHG \sim \Delta MPT$, then

$\frac{HG}{PT} = \frac{DG}{MT} = \frac{DH}{MP}$

4. Use the ratios of the corresponding sides to calculate the unknown lengths in the following similar figures. (All measurements are in cm.)

Work in your notebook.

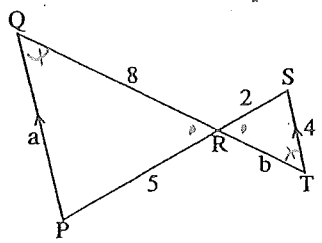
a)



$\frac{9}{12} = \frac{x}{10}$ $x = 7.5$ cm

$\frac{9}{12} = \frac{y}{8}$ $y = 6$ cm

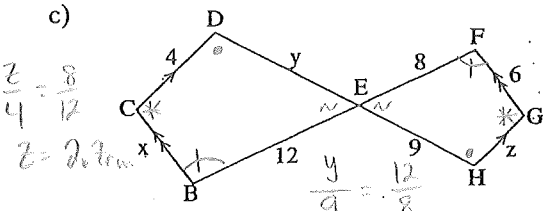
b)



$\frac{b}{8} = \frac{2}{5}$ $b = 3.2$ cm

$\frac{a}{4} = \frac{5}{2}$ $a = 10$ cm

c)

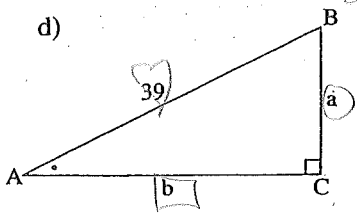


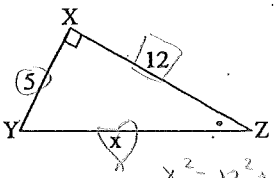
$\frac{2}{4} = \frac{8}{12}$ $2 = 2.7$ cm

$\frac{y}{9} = \frac{12}{8}$ $y = 13.5$ cm

$\frac{x}{6} = \frac{12}{8}$ $x = 9$ cm

d)



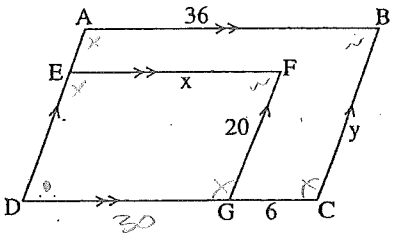


$\frac{9}{5} = \frac{39}{13}$ $a = 15$ cm

$\frac{b}{12} = \frac{39}{13}$ $b = 36$ cm

$x^2 = 12^2 + 5^2$ $x = 13$

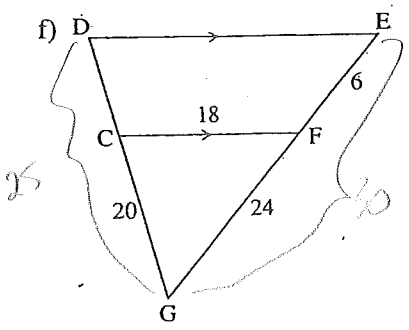
e)



$x = 30$ cm

$\frac{y}{20} = \frac{36}{30}$

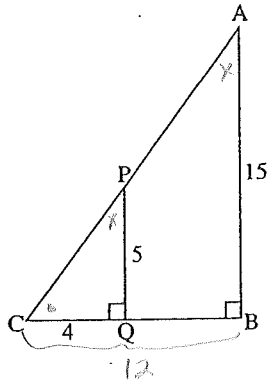
$y = 24$ cm

f) 

$\frac{DE}{18} = \frac{30}{24}$ $DE = 22.5$cm

$\frac{DG}{20} = \frac{30}{24}$ $DG = 25$cm

$DC = 5$cm

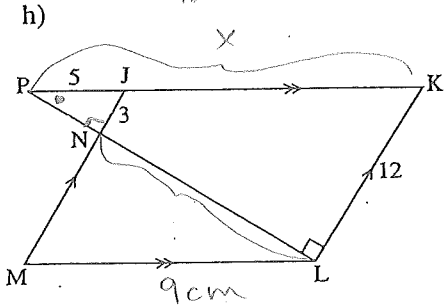
g) 

$\frac{CB}{9} = \frac{15}{5}$ $CB = 12$cm

$QB = 8$cm

$CP^2 = 4^2 + 5^2$

$CP = 6.4$cm

h) 

$JK = 15$cm

$ML = 15$cm

$MN = 9$cm

$NL = 19.3$cm

$\frac{12}{3} = \frac{x}{5}$ $x = 20$ $JK = 20 - 5 = 15$

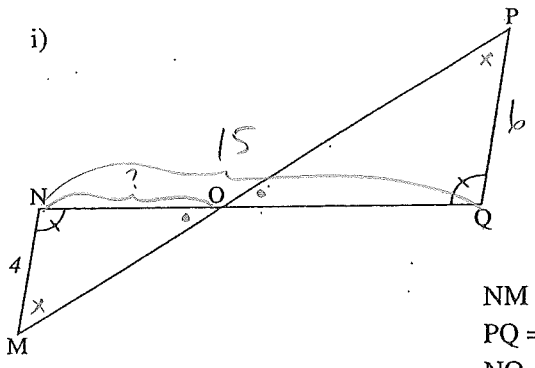
$JK = ML$

$MN = 12 - 3$

$\sqrt{PL^2} = \sqrt{x^2 + 12^2} = \sqrt{400 + 144} = 23.3$

$PN = 4$ (3.45)

$NL = PL - PN = 19.3$

i) 

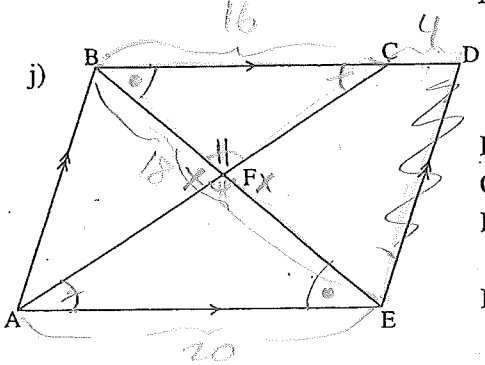
$NM = 4$

$PQ = 6$

$NQ = 15$

$NO = 10$cm

$\frac{4}{6} = \frac{?}{15}$ $? = 10 = NO$

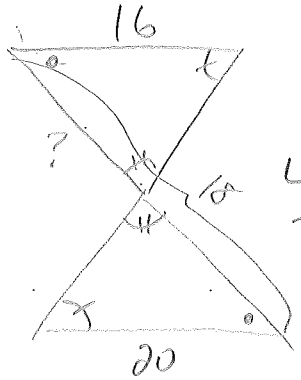
j) 

$BC = 16$

$CD = 4$

$BE = 18$

$BF = 8$cm



$\frac{16}{20} = \frac{?}{18 - ?}$

$4(18 - ?) = 5?$

$72 - 4? = 5?$

$72 = 9?$

$8 = ?$

PERIMETER, AREA, AND VOLUME OF SIMILAR FIGURES

Objective: To discover the relationship between the lengths of corresponding sides and the perimeters, areas, and volumes of similar figures.

Complete the following tables. (All units are in cm.)

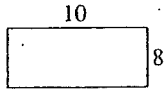
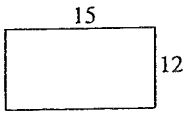
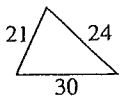
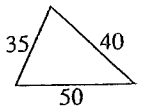
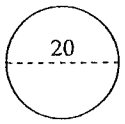
Figure	Perimeter	Similar figure	Perimeter	Ratio of corresponding sides	Ratio of perimeters
	36 cm		54 cm	$\frac{15}{10} = \frac{3}{2}$ $= 1.5$	$\frac{54}{36} = 1.5$
	75 cm		125 cm	$\frac{30}{50} = \frac{21}{40} = \frac{21}{35}$ $= 0.6$	$\frac{75}{125} = 0.6$ (K)
	$C = \pi d$ $= 62.83$ cm		$C = \pi d$ $= 6.283$ cm	$\frac{20}{2} = 10$	$\frac{62.83}{6.283} = 10$

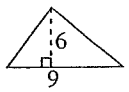
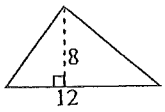
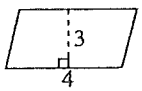
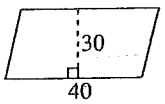
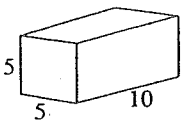
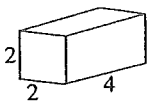
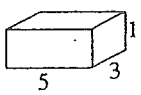
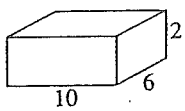
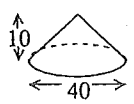
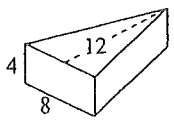
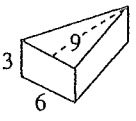
Figure	Area	Similar figure	Area	Ratio of corresponding sides	Ratio of areas
	$A = \frac{1}{2}bh$ $= \frac{1}{2}(9)(6)$ $= 27 cm^2$		$\frac{1}{2}(12)(8)$ $= 48 cm^2$	$\frac{9}{12} = \frac{6}{8}$ $= 0.75$	$\frac{27}{48} = 0.5625$ $= 0.75^2$
	$A = bh$ $= 3 \times 4$ $= 12 cm^2$		30×40 $= 1200 cm^2$	$\frac{30}{3} = \frac{40}{4}$ $= 10$	$\frac{1200}{12} = 100$ $= 10^2$ (K^2)
	surface area $5^2 \times 2 + 50 \times 4$ $= 250 cm^2$		surface area $2^2 \times 2 + 8 \times 4$ $= 40 cm^2$	$\frac{5}{2} = \frac{10}{4}$ $= 2.5$	$\frac{250}{40} = 6.25$ $= 2.5^2$

Figure	Volume	Similar figure	Volume	Ratio of corresponding sides	Ratio of volumes
	$V = lwh$ $= 1 \times 3 \times 5$ $= 15 cm^3$		$V = 2 \times 6 \times 10$ $= 120 cm^3$	$\frac{2}{1} = \frac{6}{3} = \frac{10}{5}$ $= 2$	$\frac{120}{15} = 8$ $= 2^3$ (K^3)
	$V = \frac{1}{3}(A_{base})h$ $= \frac{1}{3}(\pi 20^2)(10)$ $= 4188.8 cm^3$		$V = \frac{1}{3}(\pi 2^2)(1)$ $= 4.1888 cm^3$	$\frac{40}{4} = \frac{10}{1}$ $= 10$	$\frac{4188.8}{4.1888} = 1000$ $= 10^3$
	$V = A_{base} \times h$ $= \frac{1}{2}(8 \times 12) \times 4$ $= 192 cm^3$		$V = \frac{1}{2}(6 \times 9)(3)$ $= 81 cm^3$	$\frac{12}{9} = \frac{4}{3} = \frac{8}{6}$ $= 1.\overline{3}$	$\frac{192}{81} = 2.37$ $= (1.\overline{3})^3$