MASTER COACHING

NAME

SIMILAR TRIANGLES

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Edition 1

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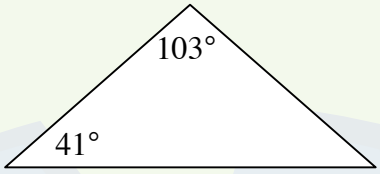
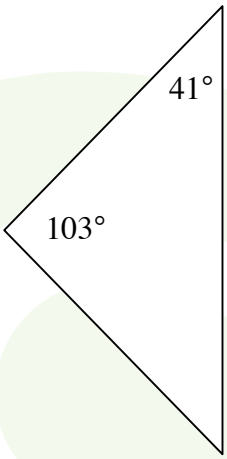
Similar triangles can be considered as *photographic enlargements* of each other.

i Two triangles are similar if two angles of one are equal to two angles of the other.
Obviously the third angles would then have to be equal.

So we know that these triangles are similar even though the second triangle has been rotated





Learn this: corresponding *sides* are opposite corresponding *angles*.

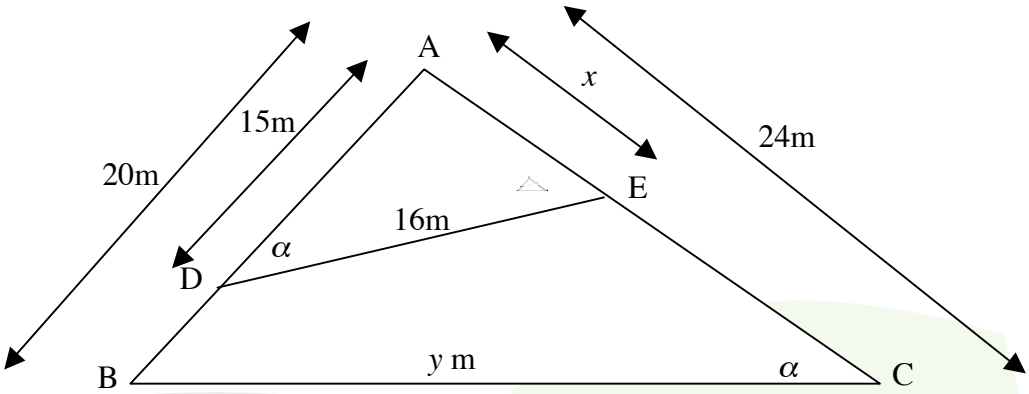
ii Two triangles are similar if the *three pairs* of corresponding sides are in the same ratio.
It is *not* sufficient to have only two pairs of sides having the same ratio.

iii Two triangles are similar if they have one angle equal, and the sides including that angle are in the same proportion in both triangles

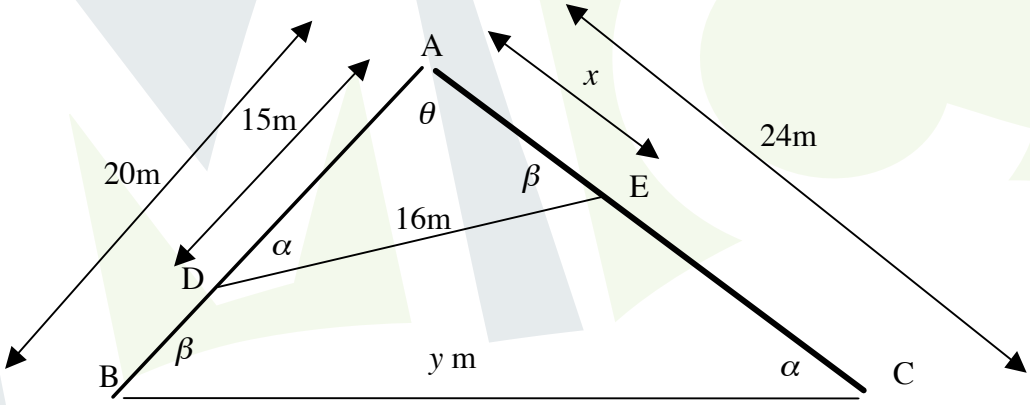
The main difficulties students have in solving similar triangles are:

1. **Deciding which sides correspond to each other**
2. **Finding the enlargement (or reduction) ratio between the two triangles or similar figures.**

These two triangles are similar, because angle A is common to both triangles, and that makes the remaining angle in each triangle equal



Given that these two triangles are similar, and given the value of the sides as shown, to solve for x and y, first name the equal angles with the same Greek letter.



Now draw a grid as shown below, in which the sides opposite the same angle are on the same line as that angle. From one of these lines (in this case β) we can determine the ration between the sides of the two triangles. The ratio is $24:15=\frac{8}{5}$, the small ratio is $\frac{5}{8}$, and then solve for x and y.

	$\frac{8}{5}$	$\frac{5}{8}$
Angle	Large	Small
α	20	x
β	24	15
θ	y	16

Thus x is a small side and its value is the small ratio times its corresponding side.

$$x=\frac{5}{8}\times 20m \qquad y=\frac{8}{5}\times 16m$$

and

$$=12\frac{1}{2}m \qquad =25\frac{3}{5}m$$

Set 1 Exercises

The diagrams are NOT DRAWN TO SCALE ... eg longest sides not opposite largest angles! Evaluate the pronumerals for the unknown side lengths:
You are given some help with these

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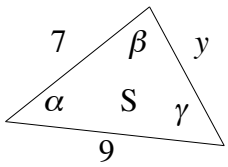
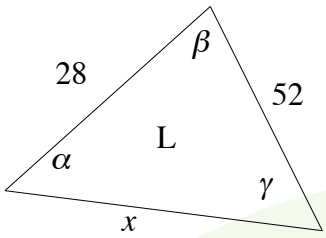
Q 1 :



enlarged



angle	L	S
α		y
β	x	
γ		

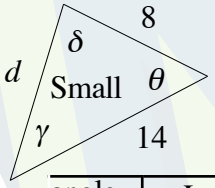
$\frac{L}{S} = \frac{\quad}{\quad}$

thus $x = \frac{\quad}{\quad} \times$ and $y = \frac{\quad}{\quad} \times$

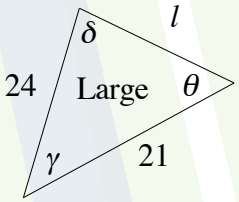
$= \qquad\qquad = $

.....

Q 2 :



enlarged



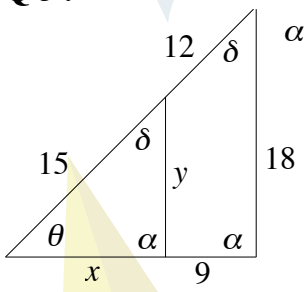
angle	L	S
γ		
δ		
θ		

thus $l = \frac{\quad}{\quad} \times$ and $d = \frac{\quad}{\quad} \times$

$= \qquad\qquad = $

.....

Q 3 :



$\alpha \neq 90°$ hence

angle	L	S
α		
δ		
θ		

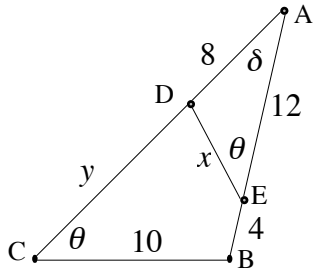
thus $x =$ and $y =$

.....

1. $\frac{L}{S} = \frac{4}{1}$ $x = 36,\ y = 13$. 2. $\frac{L}{S} = \frac{3}{2}$ $l = 12,\ d = 16$ 3. $\frac{L}{S} = \frac{9}{5}$, $x = \frac{5}{9}(9 + x) = 11\frac{1}{4}$

$y = \frac{5}{9} \times 18 = 10$

Q 4



angle	L	S
δ		x
θ		
	$y+8$	

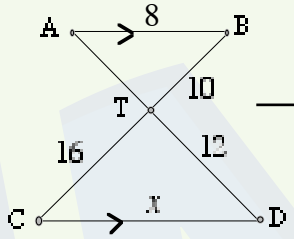
enlargement factor

$f =$ —

... evaluate x and y

.....

Q 5 :



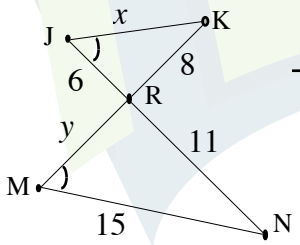
since
AB || DC
alternate angles are congruent

angle		
D=A		
T	x	
		y

calculate x and y

.....

Q 6 :



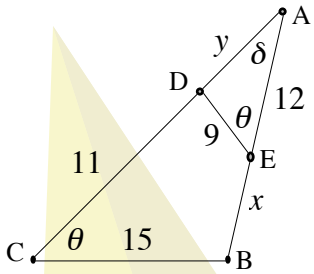
given
vert. opp.
supplementary

angle	L	S
M=J		
R		
N=K		

calculate x and y

.....

Q 7 :



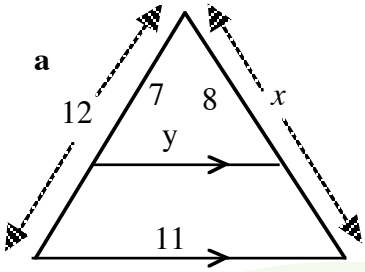
angle	L	S
δ		
θ		y

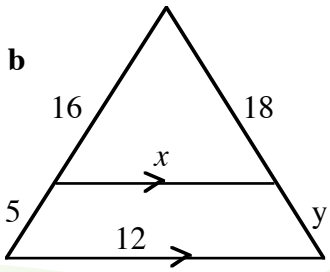
first calculate y , as you need it to get x

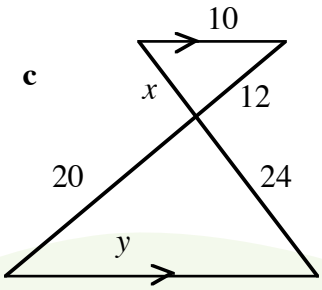
4. $x = 5,\ y = 16$ 5. $x = 12\frac{4}{5},\ y = 7\frac{1}{2}$ 6. $x = 10\frac{10}{11}\ y = 8\frac{1}{4}$ 7. $y = 9, x = 3$

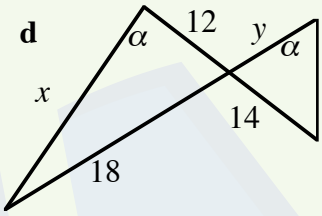
Similar Figures 903

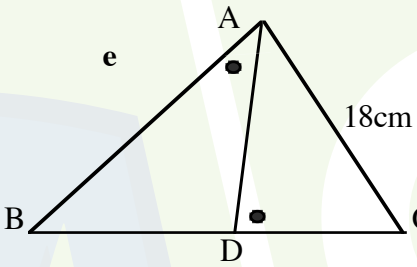
1 Similar Triangles...solve for all given pronumerals :





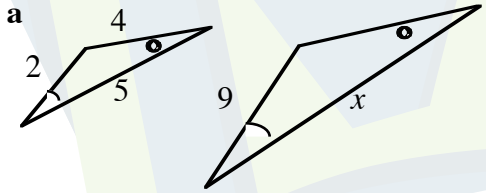


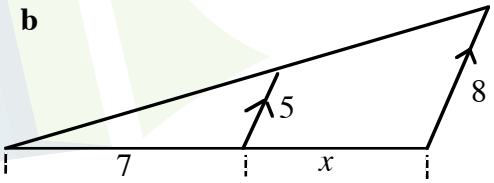




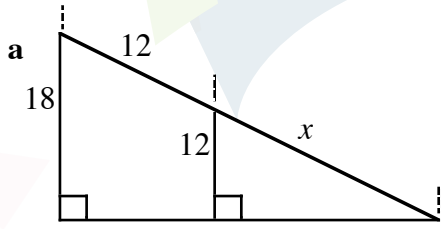
∠BAC = ∠ADC
BC=25cm.
Find DC and BD

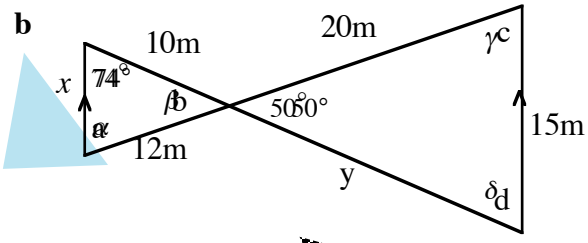
2 Find x to one decimal place (where appropriate) :

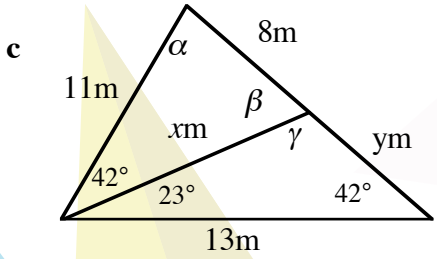


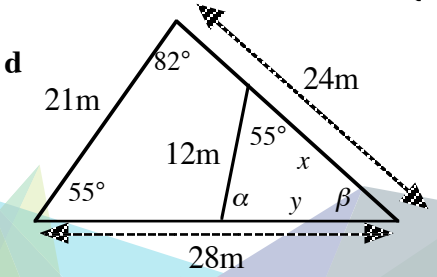


3 Similar Triangles...evaluate the pronumerals in the drawn diagrams









Similar Figures 903

Similar Triangles

Answers

1 **a** $x = 13\frac{5}{7}, y = 6\frac{5}{12}$ **b** $x = 9\frac{1}{7}, y = 5\frac{5}{8}$ **c** $x = 14\frac{2}{5}, y = 16\frac{2}{3}$

d $x = 12\frac{6}{7}, y = 9\frac{1}{3}$ **e** $\text{DC} = 12\frac{24}{25}, \text{BD} = 12\frac{1}{25}$

2 Similar Triangles : **a** $x : 5 = 9 : 2$

$x = 22 \cdot 5$

b $\frac{7+x}{7} = \frac{8}{5}$

$x = 4 \cdot 2$

3 Similar Triangles :

a $x = 24$

b $\alpha = 56°, \beta = 50°$

$\gamma = 56°, \delta = 74°$

$x = 9 \quad , \quad y = 16\frac{2}{3}$

c $\alpha = 73°, \beta = 65°, \gamma = 115°$

$x = 9\frac{5}{11}, y = 7\frac{1}{8}$

d $\alpha = 82°, \beta = 43°$

$x = 16, y = 13\frac{5}{7}$

Master Coaching Pledge

Master Coaching Keys to Learning:

The following charter has been produced to prepare you the pursuit of excellence that leads to a life-time of rewards and fulfillment. This is a partnership agreement that allows both parties to mutually benefit from your time at Master Coaching

At the coaching session:

1. Smile, relax, you are focused and in control
2. Concentrate, visualize, execute: claim the reward
3. Assume success. Our members should approach each test in life enthusiastically; every challenge presents an opportunity to demonstrate your prowess. Relish but don't underestimate the magnitude of the test, instead focus your thoughts towards a positive outcome, a chance to excel; a time to enjoy your moment in the sun.

Master Coaching Pledge

Master Coaching Pledge

- that your welfare is the paramount consideration in everything that we do
- to be diligent in our preparations which directs our actions in support of you
- show care and give encouragement to you in your striving for excellence
- to personalise all our efforts to your specific needs in all areas
- to encourage you to dare to dream, and to expect that dreams do come true

My Commitment to Master Coaching

- to be honest in all my dealings and
- to accept their accolades and focus my efforts on achieving the zenith in all my endeavours
- to appreciate my cohorts and support them in any way possible
- to live the dream, strive for excellence in everything that I do
- visualise my ultimate success

Christian Avent

CHRISTIAN AVENT
B.Ed. NCAS Principal

Robert A Ollis

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Founder, Master Coaching

Your complete satisfaction is the focus of everything we do.