APRIL 18, 2016

UNIT 7: SIMILARITY AND TRANSFORMATIONS

7.4: SIMILAR TRIANGLES

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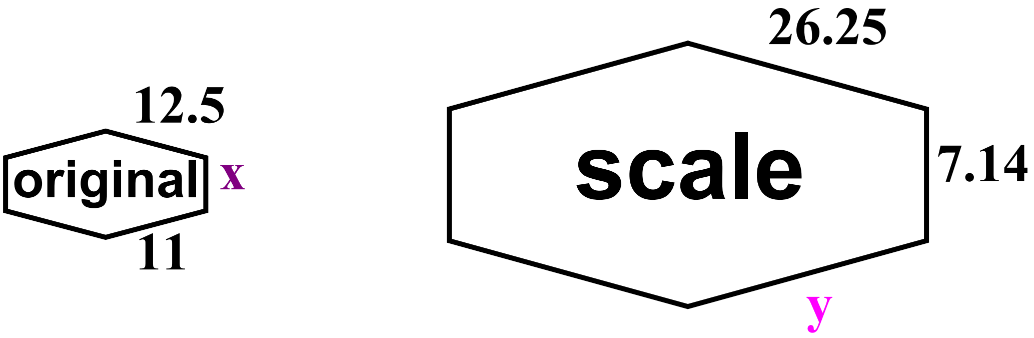
MATH 9

WHAT'S THE POINT OF TODAY'S LESSON?

We will begin working on the Math 9 Specific Curriculum Outcome (SCO) "Shape and Space 3" OR "SS3" which states:

"Demonstrate an understanding of similarity of polygons."



A SOLUTION:

Scale Factor = scale/original

= 26.25/12.5

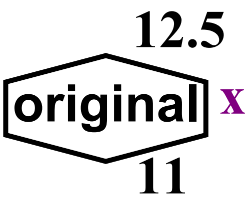
= 2.1

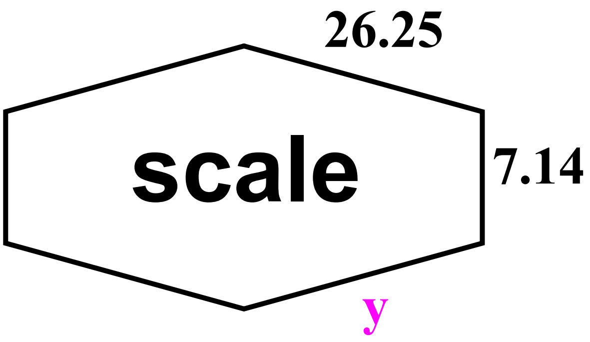
x = 7.14 / 2.1

x = 3.4

y = 11 x 2.1

y = 23.1





ANOTHER SOLUTION:

$$\frac{26.25}{12.5} = \frac{7.14}{x} = \frac{y}{11}$$

$$\frac{26.25}{12.5} = \frac{7.14}{x}$$

$$\frac{26.25x}{26.25} = \frac{89.25}{26.25}$$

$$x = 3.4$$

$$\frac{26.25}{12.5} = \frac{y}{11}$$

$$\frac{288.75}{12.5} = \frac{12.5y}{12.5}$$

$$23.1 = y$$

HOMEWORK QUESTIONS?

(pages 329 / 330 / 331, #4 to #6, #8 to #11 & #20)

9a 10 be

O S

9. A ε. B :

short $SF = \frac{S}{O}$

$= \frac{1}{3}$

long $SF = \frac{S}{O}$

$= \frac{2}{6}$

$= \frac{1}{3}$

∴ A ε. B are proportional.

O S

A ε. C :

short $SF = \frac{S}{O}$

$= \frac{1.5}{3}$

$= \frac{15}{30}$

$= \frac{1}{2}$ $\neq$

long $SF = \frac{S}{O}$

$= \frac{4}{6}$

$= \frac{2}{3}$

∴ A ε. C are <u>not</u> proportional.

O S

B ε. C :

short $SF = \frac{S}{O}$

$= \frac{1.5}{1}$

$= 1.5$ $\neq$

long $SF = \frac{S}{O}$

$= \frac{4}{2}$

$= 2$

∴ B ε. C are <u>not</u> proportional.

HOMEWORK QUESTIONS?

(pages 329 / 330 / 331, #4 to #6, #8 to #11 & #20)

11. b) $\frac{\overset{6}{\cancel{60}}}{1} \times \frac{3}{\cancel{50}}\ 5$

$= \frac{18}{5}$

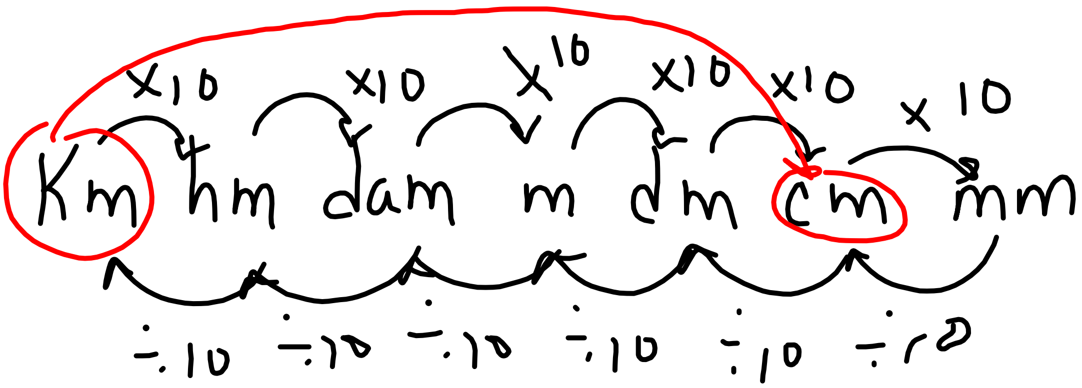
$= 3\frac{3}{5}$ cm

$= 3.6$cm

e) 12×0.00004

$= 0.\underbrace{00048}$ Km

$= 48$ cm



1cm = 10 mm

10mm = 1 cm

Km → cm

$= \times 10^5$

$= \times 100\ 000$

0.00048 Km × 100 000 cm|Km

= 48 cm

HOMEWORK QUESTIONS?

(pages 329 / 330 / 331, #4 to #6, #8 to #11 & #20)

20. a) $SF = \frac{s}{o}$

$= \frac{28}{7000}$

$= \frac{1}{250}$

$= 0.004$

70m 28cm

$\times 100$ cm/m

$= 7000$ cm

b) $24 \div 0.004$

$= 6000$ cm

$= 60$ m

$24 \div \frac{4}{1000}$

$= \frac{\cancel{24}^{6}}{1} \times \frac{1000}{\cancel{4}_{1}}$

$= 6000$ cm

$= 60$ m

c) $7.6 \div 0.004$

$= 1900$ cm

$= 19$ m

$\frac{7.6}{1} \div \frac{4}{1000}$

$= \frac{\cancel{7.6}^{1.9}}{1} \times \frac{1000}{\cancel{4}_{1}}$

$= 1900$ cm

$= 19$ m

Another option for b & c:

b) $\frac{1}{250} = \frac{24}{x}$

$x = 6000$ cm

$x = 60$ m

c) $\frac{1}{250} = \frac{7.6}{y}$

$y = 1900$ cm

$y = 19$ m

PLEASE TURN TO
PAGE 316 IN *MMS9*.

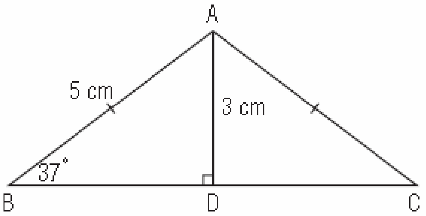
This is a review of several properties you should already know about triangles.

Start Where You Are

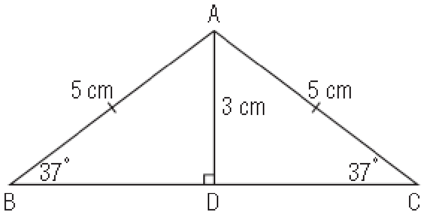
What Should I Recall?

Suppose I have to solve this problem:
Determine the unknown measures of the angles and sides in ΔABC.
The given measures are rounded to the nearest whole number.

I think of what I already know about triangles.
I see that AB and AC have the same hatch marks; this means the sides are equal.
$AC = AB$
So, $AC = 5$ cm

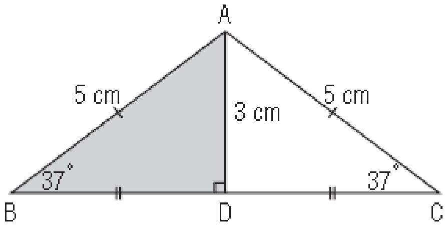


I know that a triangle with 2 equal sides is an isosceles triangle.
So, ΔABC is isosceles.
An isosceles triangle has 2 equal angles that are formed where the equal sides intersect the third side.
I use 3 letters to describe an angle.

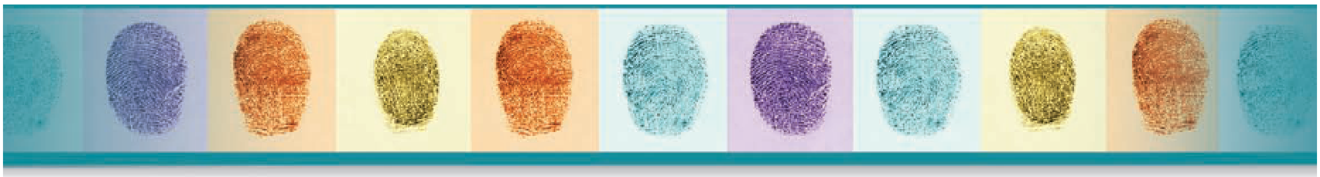


$$\begin{aligned} \text{So, } \angle ACD &= \angle ABD \\ &= 37^\circ \end{aligned}$$

Since ΔABC is isosceles, the height AD is the perpendicular bisector of the base BC.
So, $BD = DC$ and $\angle ADB = 90^\circ$
I can use the Pythagorean Theorem in ΔABD to calculate the length of BD.



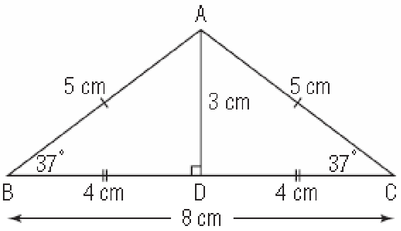
$$\begin{aligned} AD^2 + BD^2 &= AB^2 \\ 3^2 + BD^2 &= 5^2 \\ 9 + BD^2 &= 25 \\ 9 - 9 + BD^2 &= 25 - 9 \\ BD^2 &= 16 \\ BD &= \sqrt{16} \\ BD &= 4 \end{aligned}$$



BD = 4 cm
So, BC = 2 × 4 cm
= 8 cm

I know that the sum of the angles in a triangle is 180°.
So, I can calculate the measure of $\angle BAC$.

$$\angle BAC + \angle ACD + \angle ABD = 180^\circ$$
$$\angle BAC + 37^\circ + 37^\circ = 180^\circ$$
$$\angle BAC + 74^\circ = 180^\circ$$
$$\angle BAC + 74^\circ - 74^\circ = 180^\circ - 74^\circ$$
$$\angle BAC = 106^\circ$$

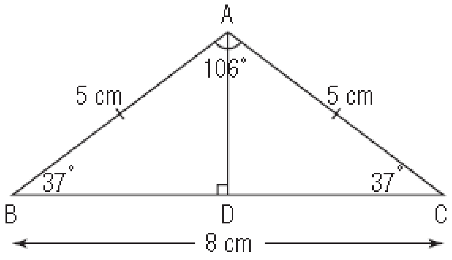


My friend Janelle showed me a different way to calculate.
She recalled that the line AD is a line of symmetry for an isosceles triangle.
So, ΔABD is congruent to ΔACD.

This means that $\angle BAD = \angle CAD$
Janelle calculated the measure of $\angle BAD$ in ΔABD.

$$\angle BAD + 37^\circ + 90^\circ = 180^\circ$$
$$\angle BAD + 127^\circ = 180^\circ$$
$$\angle BAD + 127^\circ - 127^\circ = 180^\circ - 127^\circ$$
$$\angle BAD = 53^\circ$$

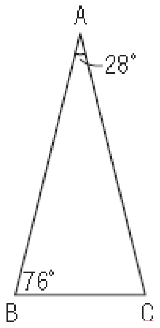
Then, $\angle BAC = 2 \times 53^\circ$
$= 106^\circ$



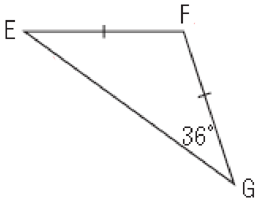
Check

1. Calculate the measure of each angle.

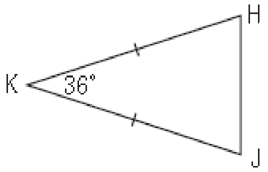
a) $\angle ACB$

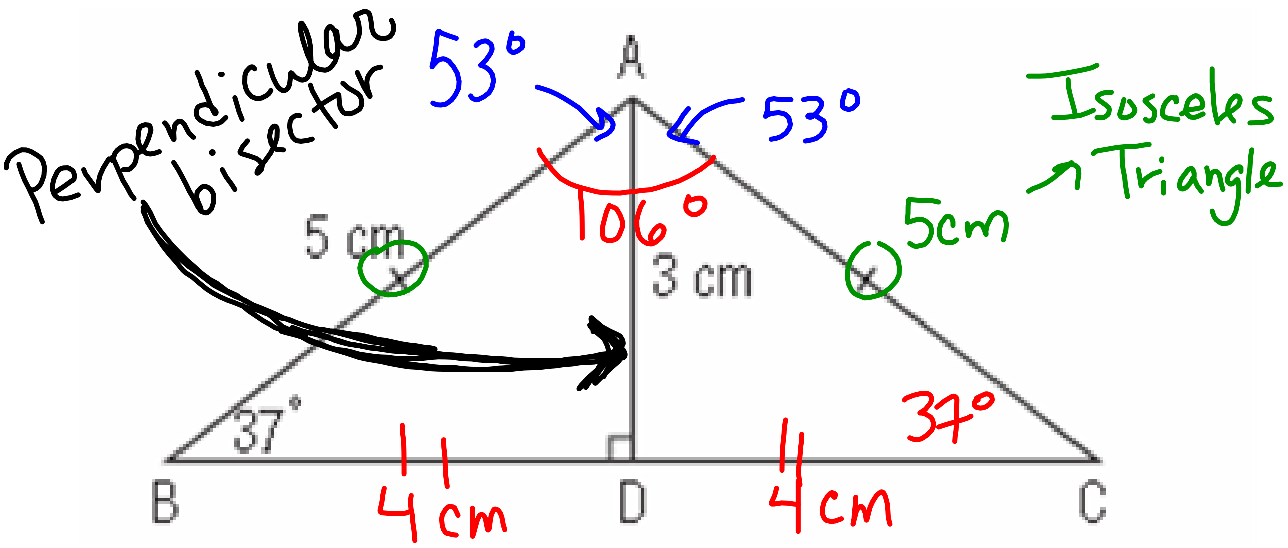


b) $\angle GEF$ and $\angle GFE$



c) $\angle HJK$ and $\angle KHJ$





$\angle A = 180 - 2(37)$
$= 180 - 74$
$= 106^\circ$

$\overline{BC} = 8$cm

SIMILAR TRIANGLES

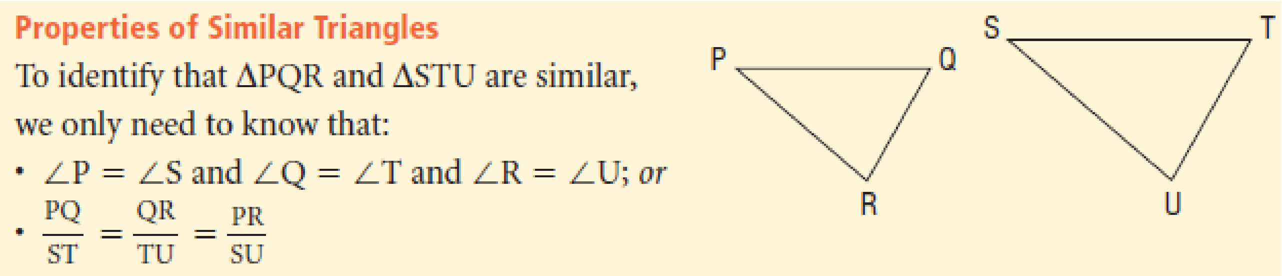
TO IDENTIFY SIMILAR TRIANGLES:

* **the measures of the 3 pairs of corresponding angles must be EQUAL**

OR

* **the ratios of the lengths of the 3 pairs of corresponding sides must be EQUAL; in other words, corresponding sides are proportional**

***MMS9*, Page 344:**

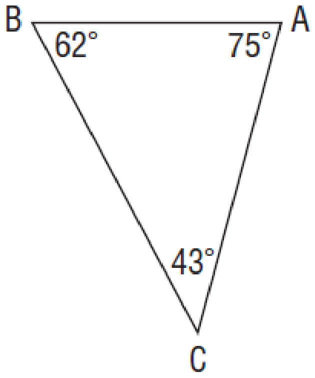


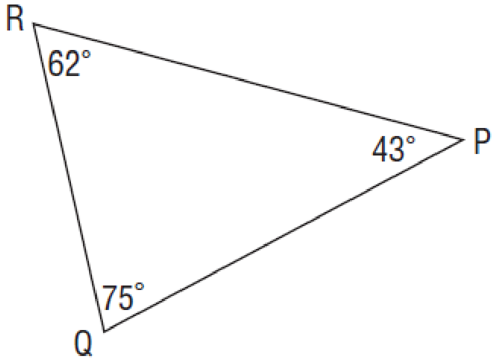
Properties of Similar Triangles

To identify that ΔPQR and ΔSTU are similar, we only need to know that:

- $\angle P = \angle S$ and $\angle Q = \angle T$ and $\angle R = \angle U$; *or*
- $\frac{PQ}{ST} = \frac{QR}{TU} = \frac{PR}{SU}$

ARE THESE TWO TRIANGLES SIMILAR?





EXAMPLE - How you show PROOF OF SIMILARITY (AAA
in your work:

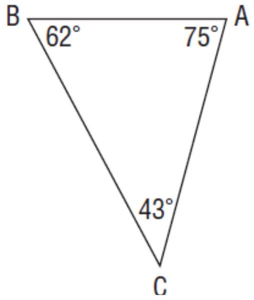
(NOTE: "AAA" = angle; angle; angle)

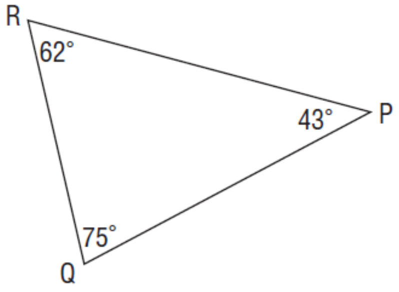
$\angle A = \angle Q$ **(GIVEN)**

$\angle B = \angle R$ **(GIVEN)**

$\angle C = \angle P$ **(GIVEN)**

∴ $\triangle ABC \sim \triangle QRP$ (AAA)





$$\Delta ABC \sim \Delta QRP$$

SYMBOL FOR "SIMILAR TO"

THIS IS CALLED A
"SIMILARITY STATEMENT".