St. Jean De Brebeuf Mathematics

CHAPTER 1.3

SIMILAR TRIANGLES

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KEY CONCEPTS

Two triangles are similar if corresponding angles are equal and the lengths of corresponding sides are **proportional**.

→two quantities are proportional if they have the same constant ratio

→the side lengths of two triangles are proportional if there is a single value which will multiply all of the side lengths of the first triangle to get the side lengths of the second triangle

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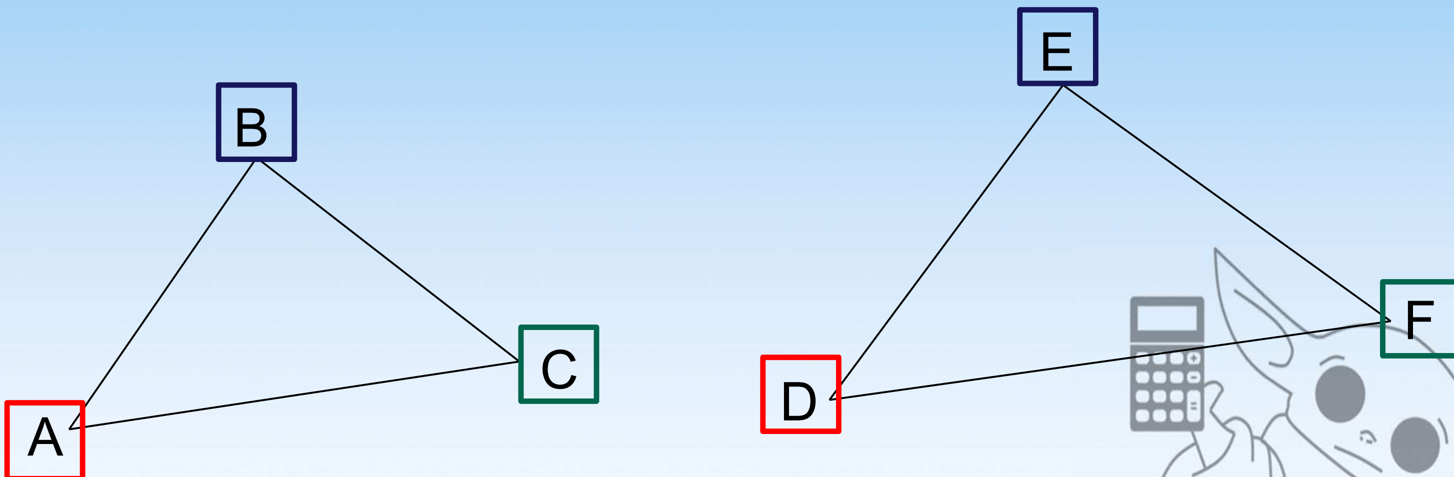
KEY CONCEPTS

When naming similar triangles (the symbol "~" indicates that the triangles are similar), the letters representing the equal angles are written in the same order. If $\Delta ABC \sim \Delta DEF$, then

$\angle A = \angle D$

$\angle B = \angle E$

$\angle C = \angle F$



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EXAMPLE 1

Finding the Length of Missing Sides and Angles

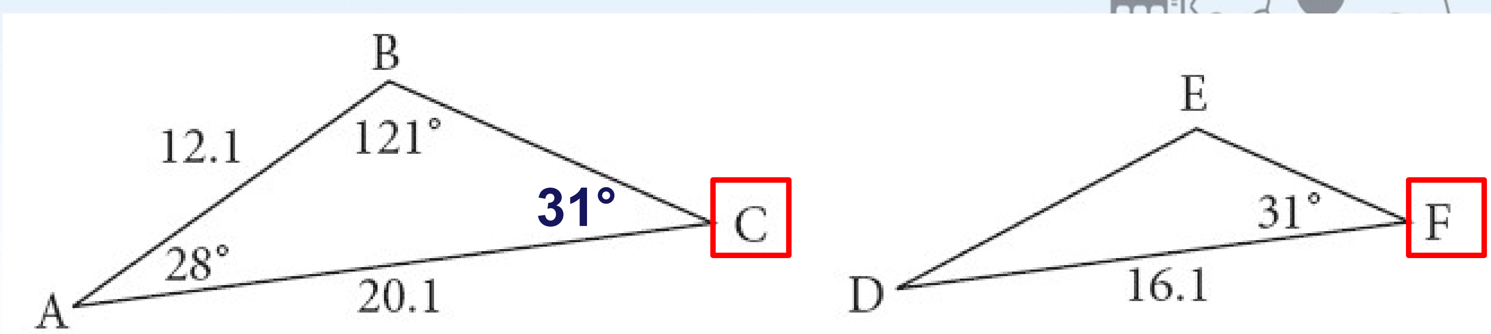
Given ΔABC ~ ΔDEF

(a) Find the measure of ∠**C**

Since ΔABC is *similar* to ΔDEF

∠C = ∠F (∠C is equal to ∠F)

Therefore ∠C = **31°**



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EXAMPLE 1

Finding the Length of Missing Sides and Angles

Given ΔABC ~ ΔDEF

(b) Find the length of **DE** to <u>one decimal place</u>.

Since ΔABC is *similar* to ΔDEF, we can set up a **proportion**!

→Enter the known values

→Solve for the unknown side length

$$\frac{AB}{DE} = \frac{BC}{EF} = \frac{CA}{FD}$$

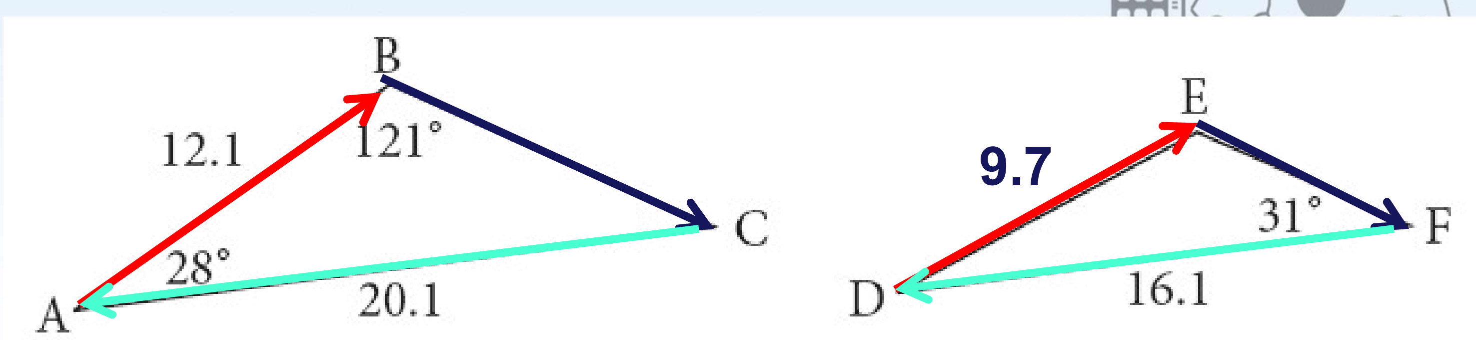
$$\frac{12.1}{DE} = \frac{BC}{EF} = \frac{20.1}{16.1}$$

*Cross multiply

$$\frac{12.1}{DE} = \frac{20.1}{16.1}$$

$$\frac{\cancel{20.1}DE}{\cancel{20.1}} = \frac{194.81}{20.1}$$

$$DE = 9.7$$



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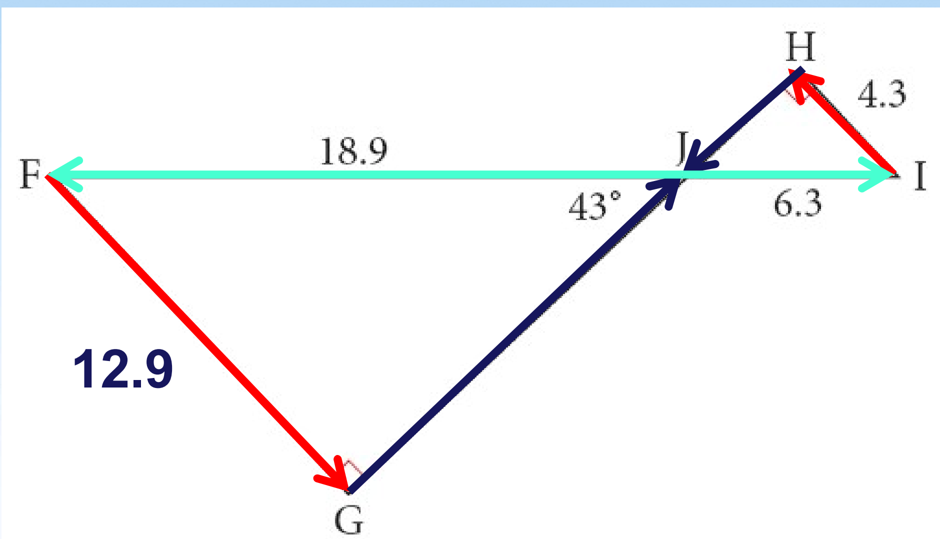
EXAMPLE 2

Using Opposite Angles and Similar Triangles to Find Missing Side Lengths

Given ΔFGJ ~ ΔIHJ, find the length of **FG**. Round your answer to <u>one</u> decimal place.



Since ΔFGJ is *similar* to ΔIHJ, we can set up a **proportion**!

→Enter the known values

→Solve for the unknown side length

$$\frac{FG}{IH} = \frac{GJ}{HJ} = \frac{JF}{JI}$$

$$\frac{FG}{4.3} = \frac{GJ}{HJ} = \frac{18.9}{6.3}$$

$$\frac{FG}{4.3} = \frac{18.9}{6.3}$$

*Cross multiply

$$\frac{6.3FG}{6.3} = \frac{81.27}{6.3}$$

$$FG = 12.9$$

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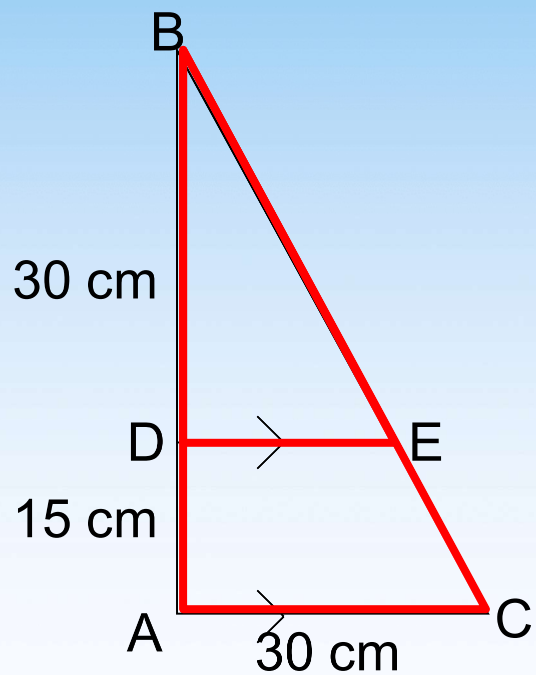
EXAMPLE 3
Using Parallel Lines and Similar Triangles to Find Missing Measures

In this diagram, DE is parallel to AC.
Find the length of **DE**.



Since ΔBDE is *similar* to ΔBAC
→We can set up a **proportion**!

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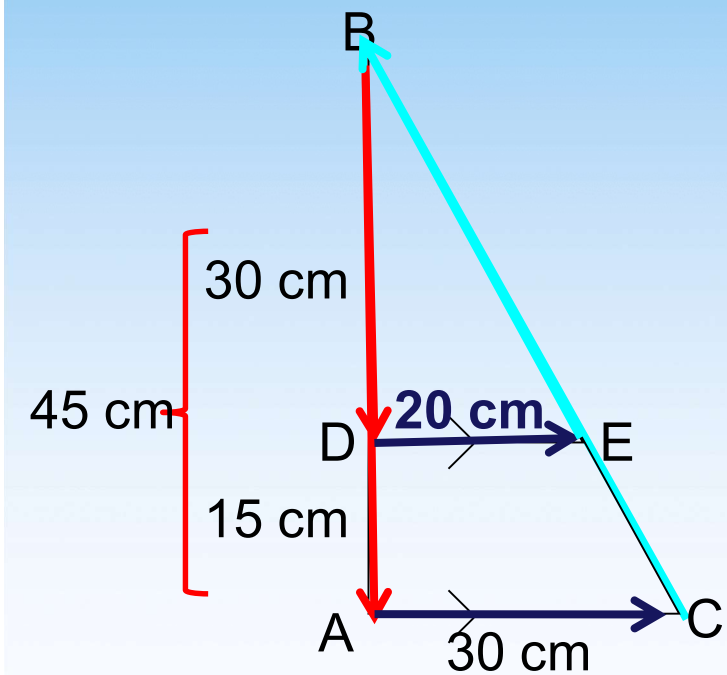
EXAMPLE 3

Using Parallel Lines and Similar Triangles to Find Missing Measures

In this diagram, DE is parallel to AC. Find the length of **DE**.



Since ΔBDE is *similar* to ΔBAC

→We can set up a **proportion**!

→Enter the known values

→Solve for the unknown side length

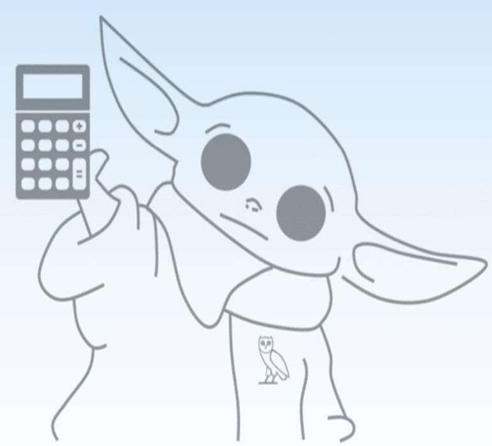
$$\frac{BD}{BA} = \frac{DE}{AC} = \frac{EB}{CB}$$

$$\frac{30}{45} = \frac{DE}{30} = \frac{EB}{CB}$$

$$\frac{30}{45} = \frac{DE}{30}$$

$$\frac{\cancel{45}DE}{\cancel{45}} = \frac{900}{45}$$

$$DE = 20\,cm$$



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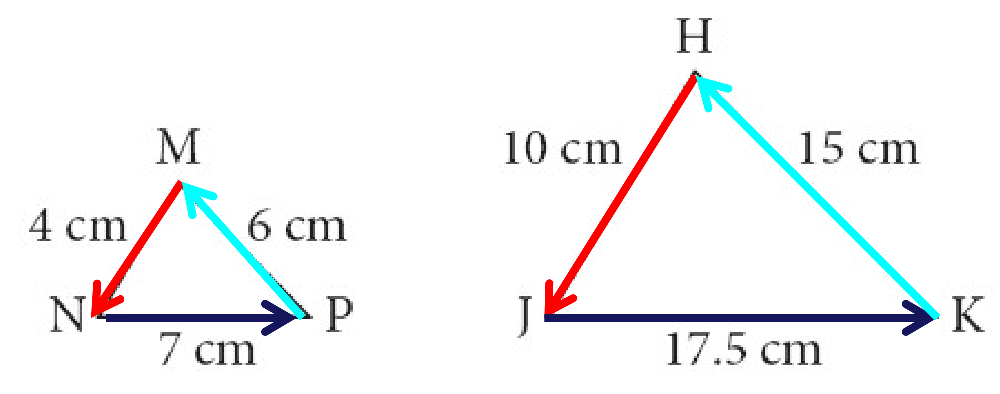
EXAMPLE 4 *Using Side Lengths to Determine if Triangles are Similar*

Show that ΔMNP ~ ΔHJK.



To show that the triangles are *similar*, we have to calculate the **ratios** of the corresponding sides

$$\frac{MN}{HJ} = \frac{4}{10} = 0.4$$

$$\frac{NP}{JK} = \frac{7}{17.5} = 0.4$$

$$\frac{PM}{KH} = \frac{6}{15} = 0.4$$

Since the ratios are all <u>the same</u>, ΔMNP is *similar* to ΔHJK

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Homework:

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#1a, 2ac, 3, 4, 8, 9