Starter

Get out your "Quadrilaterals Review" from last class, make sure it's ready to turn in, we'll turn it in just after the bell rings. If you have questions, make sure you ask, we'll go over questions after attendance is taken.

*Grab a book from the front and tear out chapter 8, pg. 565-648

12 $n \cdot 160 = \frac{180(n-2)}{\cancel{n}} \cdot \cancel{n}$

$160n = 180(n-2)$

$160n = 180n - 360$

$-160n \quad -160n$

$0 = 20n - 36\cancel{0}$

$+360 \quad +\cancel{3}60$

$\frac{360}{20} = \frac{20n}{20}$

$\boxed{18 = n}$ sides

Feb 27-8:47 AM

8.1 Three Angle Measure
Introduction to Trigonometry

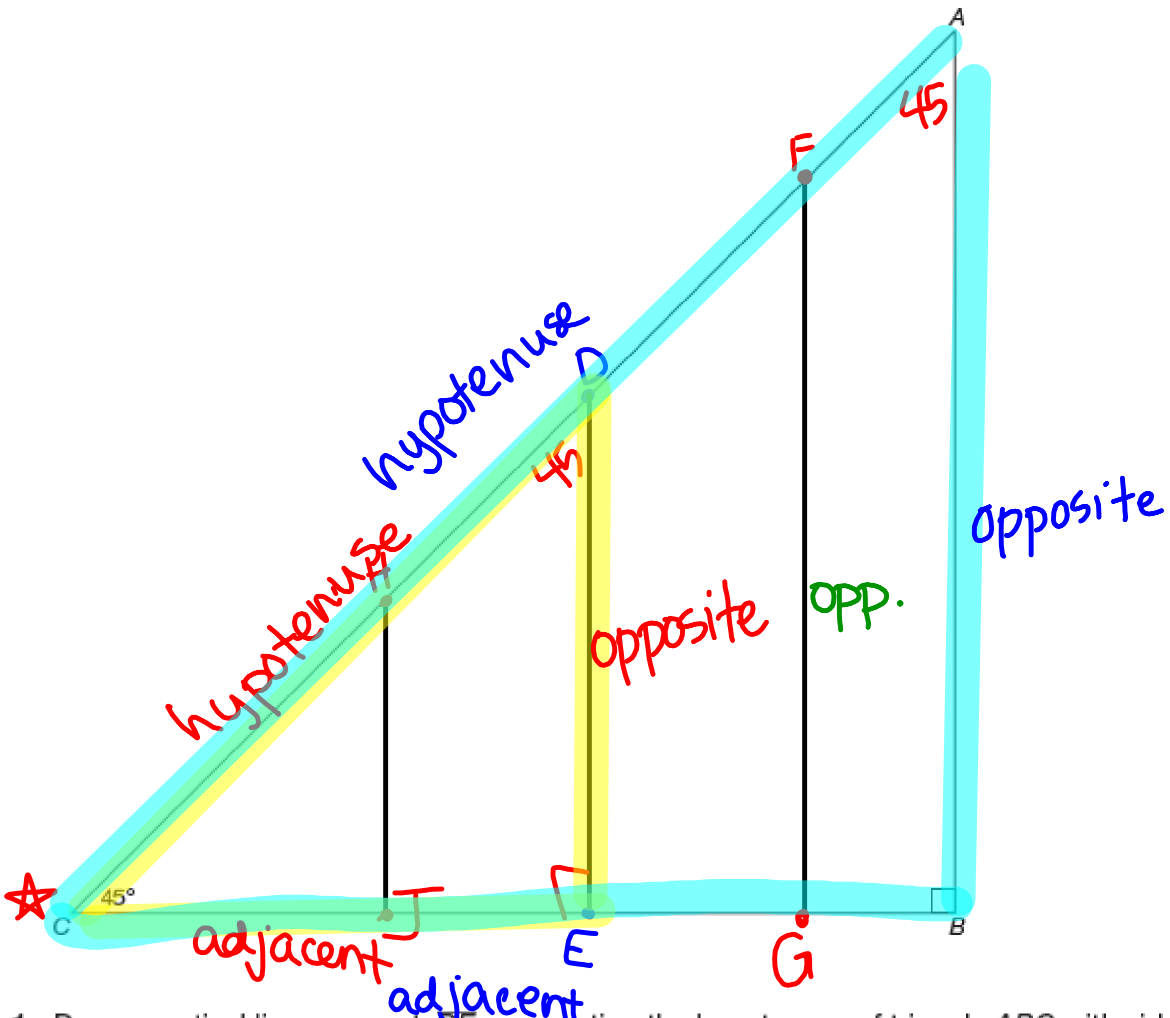
PG.567-568 IN YOUR BOOK

You know that to convert between measurements you can multiply by a conversion ratio. For example, to determine the number of centimeters that is equivalent to 30 millimeters, you can multiply by $\frac{1 \text{ cm}}{10 \text{ mm}}$ because there are 10 millimeters in each centimeter:

$$30 \cancel{\text{mm}} \times \frac{1 \text{ cm}}{10 \cancel{\text{mm}}} = \frac{30 \text{ cm}}{10}$$
$$= 3 \text{ cm}$$

In trigonometry, you use conversion ratios too. These ratios apply to right triangles.

Triangle *ABC* shown is a 45°-45°-90° triangle.



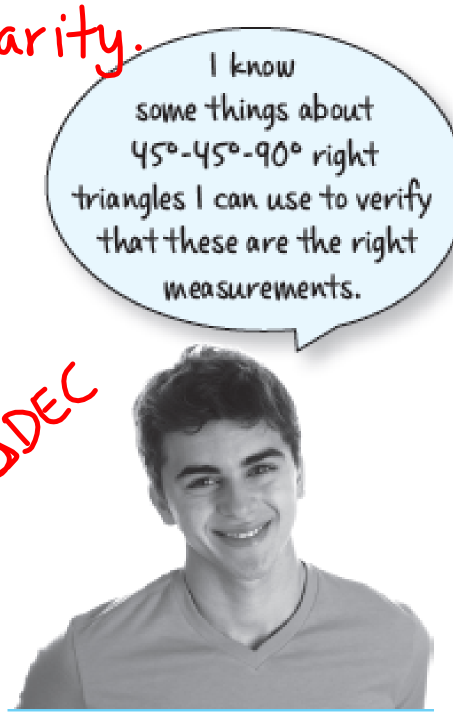
1. Draw a vertical line segment, $\overline{DE}$, connecting the hypotenuse of triangle *ABC* with side $\overline{BC}$. Label the endpoint of the vertical line segment along the hypotenuse as point *D*. Label the other endpoint as point *E*.

Sep 14-9:16 AM

PG.569 IN YOUR BOOK

2. Explain how you know that triangle *ABC* is similar to triangle *DEC*.

$\triangle ABC \sim \triangle DEC$ by AA similarity.



3. Measure each of the sides of triangles *ABC* and *DEC* in millimeters. Record the approximate measurements.

$\triangle ABC$

AC = 148.5mm

AB = 105mm

CB = 105mm

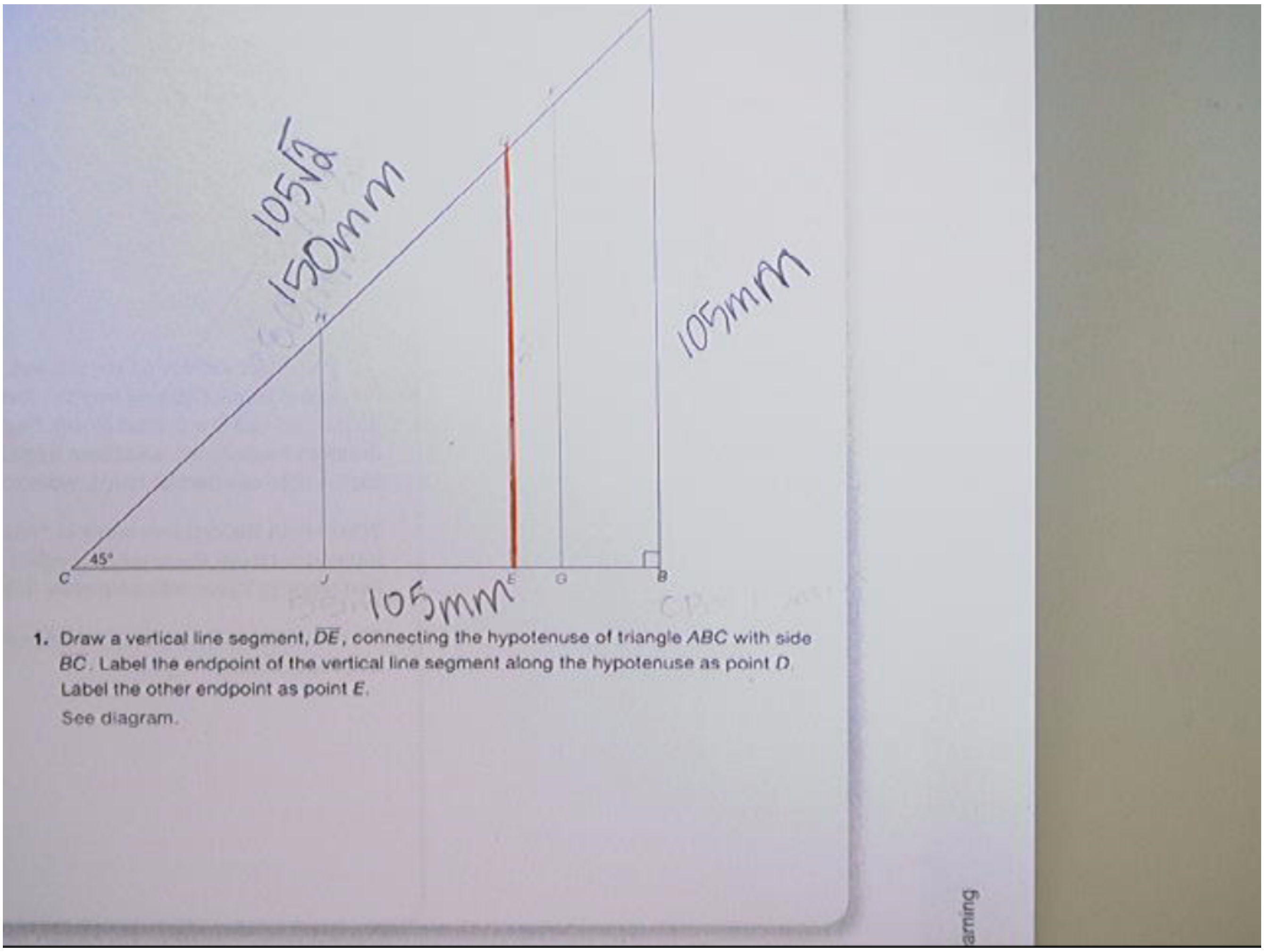
$\triangle DEC$

CD =

DE =

CE =

*measure your $\triangle DEC$



1. Draw a vertical line segment, $\overline{DE}$, connecting the hypotenuse of triangle ABC with side BC. Label the endpoint of the vertical line segment along the hypotenuse as point D. Label the other endpoint as point E.
   See diagram.

Dec 1-11:43 AM

PG.569 IN YOUR BOOK

You know that the hypotenuse of a right triangle is the side that is opposite the right angle. In trigonometry, the legs of a right triangle are often referred to as the *opposite side* and the *adjacent side*. These references are based on the angle of the triangle that you are looking at, which is called the **reference angle.** The **opposite side** is the side opposite the reference angle. The **adjacent side** is the side adjacent to the reference angle that is *not* the hypotenuse.

4. For triangles *ABC* and *DEC*, identify the opposite side, adjacent side, and hypotenuse, using angle *C* as the reference angle.

ΔDEC

DE is opposite $\angle C$

EC is adjacent to $\angle C$

CD is the hypotenuse

ΔABC

opposite: AB

adjacent: BC

hypotenuse: CA

PG.570 IN YOUR BOOK

5. Determine each side length ratio for triangles *ABC* and *DEC*, using angle *C* as the reference angle. Write your answers as decimals rounded to the nearest thousandth.

ΔABC | ΔDEC

a. $\dfrac{\text{side opposite } \angle C}{\text{hypotenuse}}$ $\quad \dfrac{AB}{CA} = \dfrac{105}{148.5} = 0.707$ $\quad \dfrac{DE}{CD} = \_\_\_\_ =$

b. $\dfrac{\text{side adjacent to } \angle C}{\text{hypotenuse}}$ $\quad \dfrac{CB}{CA} = \dfrac{105}{148.5} = 0.707$ $\quad \dfrac{CE}{CD} = \_\_\_\_ =$

c. $\dfrac{\text{side opposite } \angle C}{\text{side adjacent to } \angle C}$ $\quad \dfrac{AB}{CB} = \dfrac{105}{105} = 1.000$ $\quad \dfrac{DE}{CE} = \_\_\_\_ = 1.000$

Nov 18-8:54 AM

PG.571 IN YOUR BOOK

6. Draw two more vertical line segments, $\overline{FG}$ and $\overline{HJ}$, connecting the hypotenuse of triangle *ABC* with side $\overline{BC}$. Label the endpoints of the vertical line segments along the hypotenuse as points *F* and *H*. Label the other endpoints as points *G* and *J*.

a. Explain how you know that triangles *ABC*, *DEC*, *FGC*, and *HJC* are all similar.

b. Measure each of the sides of the two new triangles you created. Record the side length measurements for all four triangles in the table.

Triangle Name	Length of Side Opposite Angle *C*	Length of Side Adjacent to Angle *C*	Length of Hypotenuse
Triangle *ABC*	105mm	105mm	148.5mm
Triangle *DEC*			
Triangle *FGC*			
Triangle *HJC*			

c. Determine each side length ratio for all four triangles using angle *C* as the reference angle.

Triangle Name	$\frac{\text{side opposite } \angle C}{\text{hypotenuse}}$	$\frac{\text{side adjacent to } \angle C}{\text{hypotenuse}}$	$\frac{\text{side opposite } \angle C}{\text{side adjacent to } \angle C}$
Triangle *ABC*	$\frac{105}{148.5} = 0.707$	$\frac{105}{148.5} = 0.707$	$\frac{105}{105} = 1$
Triangle *DEC*			
Triangle *FGC*			
Triangle *HJC*			

PG.572 IN YOUR BOOK

7. Compare the side length ratios of all four triangles in the table. What do you notice?

1 and 0.707

8. Compare your measurements and ratios with those of your classmates. What do you notice?

9. Calculate the slope of the hypotenuse in each of the four triangles. Explain how you determined your answers.

always 1

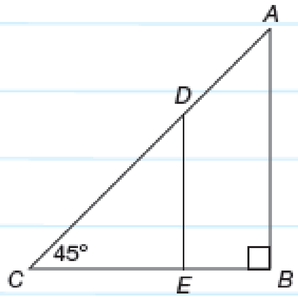
$\frac{opp}{adj}$

Dec 1-8:48 AM

PG.573-574 IN YOUR BOOK

Given the same reference angle measure, are each of the ratios you studied constant in similar right triangles? You can investigate this question by analyzing similar right triangles without side measurements.

Consider triangles *ABC* and *DEC* shown. They are both 45°-45°-90° triangles.



Triangle *ABC* is similar to triangle *DEC* by the AA Similarity Theorem. This means that the ratios of the corresponding sides of the two triangles are equal.

$$\frac{CE}{CB} = \frac{CD}{CA}$$

Rewrite the proportion.

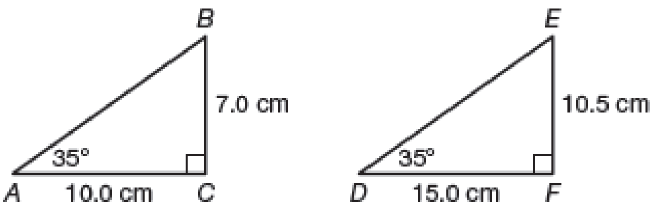
$$\begin{array}{rcl} \text{side adjacent to } \angle C \rightarrow & CE \quad CB & \leftarrow \text{side adjacent to } \angle C \\ & \overline{CD} = \overline{CA} & \\ \text{hypotenuse} \rightarrow & & \leftarrow \text{hypotenuse} \end{array}$$

So, the ratio $\dfrac{\text{side adjacent to reference angle}}{\text{hypotenuse}}$ is constant in similar right triangles given the same reference angle measure.

10. Use triangle *ABC* in the worked example with reference angle *C* to verify that the ratios $\dfrac{\text{side opposite reference angle}}{\text{hypotenuse}}$ and $\dfrac{\text{side opposite reference angle}}{\text{side adjacent to reference angle}}$ are constant in similar right triangles. Show your work.

Finish pg.574-577 for homework!
What is below is not in your book

1. Analyze triangle *ABC* and triangle *DEF*. Use $\angle A$ and $\angle D$ as the reference angles.



a. Identify the leg opposite $\angle A$, the leg adjacent to $\angle A$, and the hypotenuse in $\triangle ABC$.

b. Calculate the length of the hypotenuse of triangle *ABC*. Round your answer to the nearest tenth.

c. Calculate the ratios $\frac{\text{opposite}}{\text{hypotenuse}}$, $\frac{\text{adjacent}}{\text{hypotenuse}}$, and $\frac{\text{opposite}}{\text{adjacent}}$ for the reference angle in triangle *ABC*. Round your answers to the nearest thousandth if necessary.

d. Describe the relationship between $\triangle ABC$ and $\triangle DEF$. Explain your reasoning.

e. Calculate the length of the hypotenuse in $\triangle DEF$ without using the Pythagorean Theorem. Explain your reasoning.

f. Calculate the ratios $\frac{\text{opposite}}{\text{hypotenuse}}$, $\frac{\text{adjacent}}{\text{hypotenuse}}$, and $\frac{\text{opposite}}{\text{adjacent}}$ for the reference angle in $\triangle DEF$. Round your answers to the nearest thousandth if necessary.

g. Compare the values of the three ratios for $\triangle ABC$ and $\triangle DEF$. What do you observe? Why do you think this is true?

Nov 19-2:51 PM

Homework

Finish Lesson 8.1 problem 2
pg 574-577

Aug 24-2:00 PM