Integrated Math 2
Key Concept 7 REVIEW

Name: Inked Copy

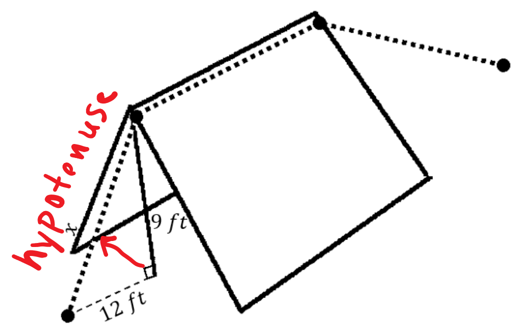
Period: ____________

Target 7A: Use the Pythagorean Theorem to find missing sides of right triangles in application problems.

$$a^2 + b^2 = c^2$$ ← hypotenuse

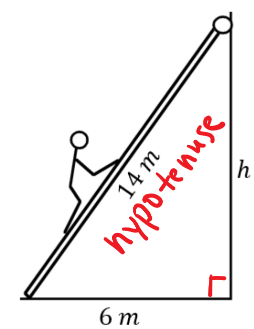
1. A tent is supported by a rope tied to a stake, as shown in the diagram. What is the length of the rope? (1 point)

$$9^2 + 12^2 = x^2$$
$$81 + 144 = x^2$$
$$\sqrt{225} = \sqrt{x^2}$$
$$\boxed{15 \text{ feet} = x}$$



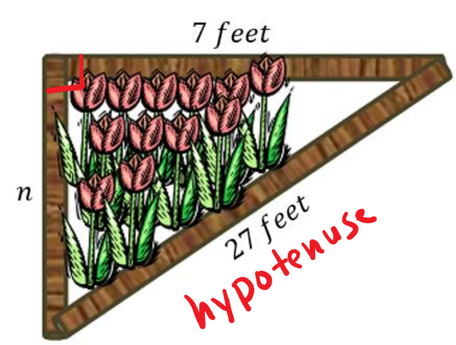
2. In the following picture, find the height that the ladder reaches. Round your answer to the nearest hundredth. (1 point)

$$6^2 + h^2 = 14^2$$
$$\cancel{36} + h^2 = 196$$
$$-\cancel{36} \qquad -36$$
$$\sqrt{h^2} = \sqrt{160}$$
$$\boxed{h = 12.65 \text{ m}}$$



3. Rhonda is planning a right triangular garden. She marked two sides that measure 27 feet and 7 feet. What is the length of side n? (1 point)

$$7^2 + n^2 = 27^2$$
$$\cancel{49} + n^2 = 729$$
$$-\cancel{49} \qquad -49$$
$$\sqrt{n^2} = \sqrt{680}$$
$$\boxed{n = 26.08 \text{ feet}}$$



4. In construction, floor space must be planned for staircases. If the vertical distance between the first and second floors is 375 cm, and a contractor is using the standard step pattern of 30 cm wide for 15 cm high: (3 points)

a) How many steps are needed to get from the first to the second floor?

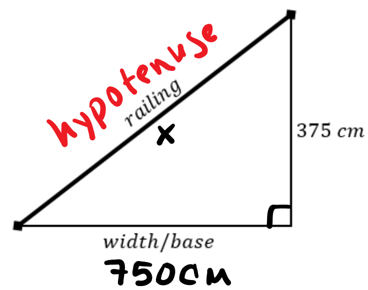
$$\frac{375\text{ cm (total)}}{15\text{ cm (step height)}} = \boxed{25\text{ steps}}$$

b) How much horizontal distance (i.e. width or base) will be needed for the staircase?

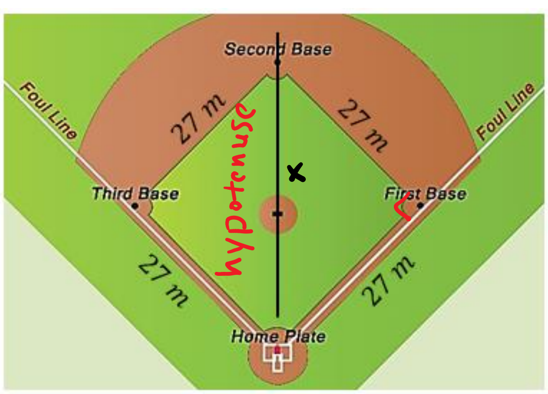
$$25\text{ steps} \cdot 30\text{ cm per step} = \boxed{750\text{ cm}}$$

c) What is the length of the railing (i.e. diagonal) that would be attached to these stairs?

$$375^2 + 750^2 = x^2$$
$$\sqrt{703{,}125} = \sqrt{x^2}$$
$$\boxed{838.53\text{ cm} = x}$$



5. A baseball "diamond" is actually a square with sides of 27 meters. If a runner tries to steal second base, how far must the catcher, at home plate, throw to get the runner "out"? Given this information, explain why runners more often try to steal second base rather than third. (3 points)



$$27^2 + 27^2 = x^2$$
$$\sqrt{1458} = \sqrt{x^2}$$
$$\boxed{38.18\text{ meters} = x}$$

Catcher to 2nd base: 38.18 m
Catcher to 3rd base: 27 m

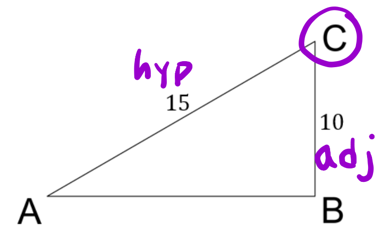
The catcher has a longer throw to 2nd base, so runners will more often steal 2nd base rather than 3rd base, which is closer to the catcher.

Target 7B: Define the trigonometric ratios for acute angles in a right triangle and calculate sine, cosine, and tangent ratios when given two side lengths.

$$sin = \frac{opposite}{hypotenuse} \qquad cos = \frac{adjacent}{hypotenuse} \qquad tan = \frac{opposite}{adjacent}$$

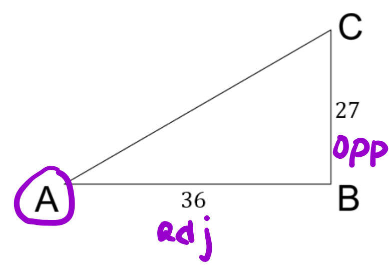
6. Identify the ratio of $cos\ C$. (1 point)

$$\cos C = \frac{adj}{hyp} = \frac{10}{15} \Rightarrow \boxed{\frac{2}{3}}$$



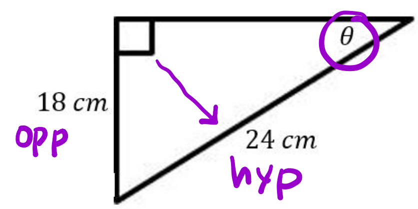
7. Identify the ratio of $tan\ A$. (1 point)

$$\tan A = \frac{opp}{adj} = \frac{27}{36} \Rightarrow \boxed{\frac{3}{4}}$$



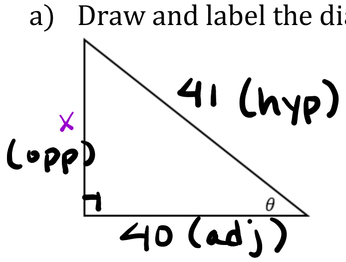
8. Identify the ratio of $sin\ \theta$. (1 point)

$$\sin \theta = \frac{opp}{hyp} = \frac{18}{24} \Rightarrow \boxed{\frac{3}{4}}$$



9. If $os\ \theta = \frac{40}{41}$, find $sin\ \theta$ by completing parts a), b) and c). (3 points)

a) Draw and label the diagram.



b) Find the missing side.

$$40^2 + x^2 = 41^2$$
$$\cancel{1600} + x^2 = 1681$$
$$\cancel{-1600} \qquad -1600$$
$$\sqrt{x^2} = \sqrt{81}$$
$$\Rightarrow \boxed{x = 9}$$

c) Identify the trigonometric ratio of $sin\ \theta$.

$$\sin\theta = \frac{opp}{hyp} = \boxed{\frac{9}{41}}$$

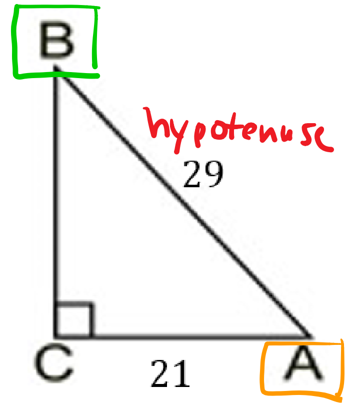
10. Given the right triangle, answer parts a), b), and c). (3 points):

a) Identify *sin B*. $= \frac{opp}{hyp} \Rightarrow \frac{21}{29}$

b) Identify *cos A*. $= \frac{adj}{hyp} \Rightarrow \frac{21}{29}$

c) Explain the relationship between the two trigonometric ratios and the acute angle measures.

B and A are complementary angles, therefore sin B = cos A. The ratios are the same.

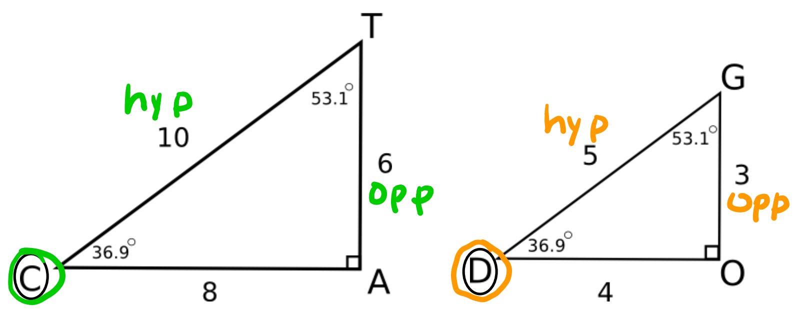


Target 7C: Use the characteristics of similar figures to justify the trigonometric ratios.

11. Prove that sin C and sin D are equal. (1 point) $\textit{sin} = \frac{\textit{opposite}}{\textit{hypotenuse}}$

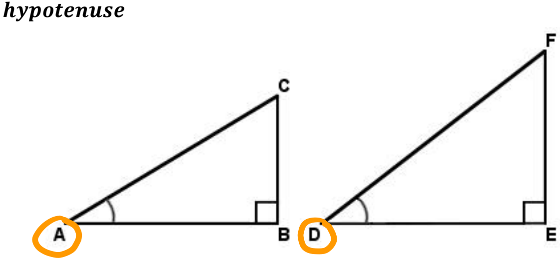
$\sin C = \frac{opp}{hyp} = \frac{6}{10} \Rightarrow \frac{3}{5}$

$\sin D = \frac{opp}{hyp} = \frac{3}{5}$



12. $\Delta ABC \sim \Delta DEF$. Given $\cos A = \frac{11}{61}$. What is $\cos D$? (1 point) $\textit{cos} = \frac{\textit{adjacent}}{\textit{hypotenuse}}$

$\cos D = \boxed{\frac{11}{61}}$

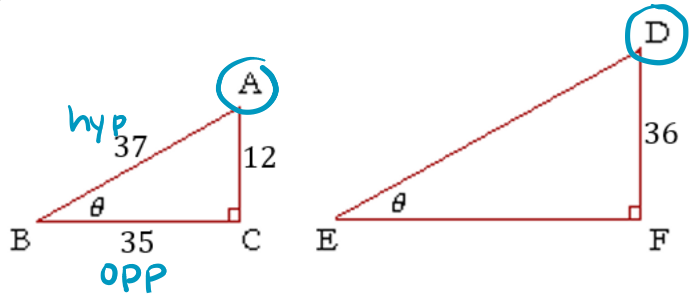


13. $\Delta ABC \sim \Delta DEF$. Identify sin D. (1 point) $\textit{sin} = \frac{\textit{opposite}}{\textit{hypotenuse}}$

* $\sin D = \sin A$

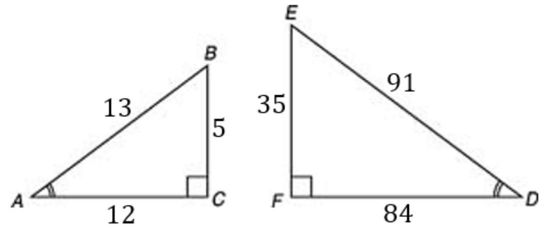
$\sin A = \frac{opp}{hyp} = \frac{35}{37}$

therefore, $\boxed{\sin D = \frac{35}{37}}$



14. Given the right triangle, answer parts a) and b). (3 points):

a) Find the sine ratios of the corresponding non-right angles for ΔABC and ΔDEF. Are they equivalent?



$\sin A = \frac{5}{13}$ $\sin D = \frac{35}{91} = \frac{5}{13}$

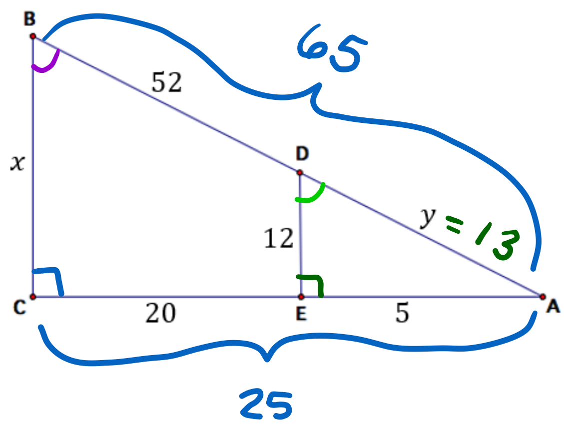
$\sin B = \frac{12}{13}$ $\sin E = \frac{84}{91} = \frac{12}{13}$

Yes, equivalent.

b) Explain how your result from #4 supports the triangles being similar.

If angles are $\cong$, then by AA~ the triangles are similar.

15. Given two similar right triangles, ΔACD and ΔABE, use the diagram to answer parts a), b), and c). (3 points)



a) Solve for y.

$5^2 + 12^2 = y^2$

$\sqrt{169} = \sqrt{y^2}$

$\boxed{13 = y}$

b) Solve for x.

$25^2 + x^2 = 65^2$

$625 + x^2 = 4225$

$-625 \quad -625$

$\sqrt{x^2} = \sqrt{3600} \longrightarrow \boxed{x = 60}$

c) Is the $\sin\angle ADE = \sin\angle ABC$? Show your work.

$\sin\angle ADE = \frac{opp}{hyp} = \boxed{\frac{5}{13}}$

$\sin\angle ABC = \frac{opp}{hyp} = \frac{25}{65} \Rightarrow \boxed{\frac{5}{13}}$

Yes. Both ratios are equal.