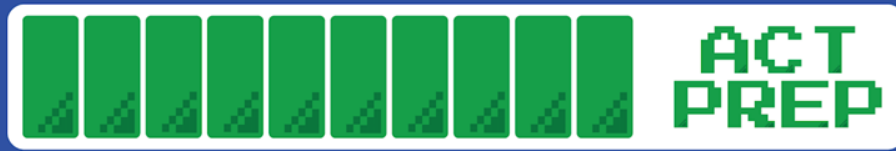


# Power Up: Math ACT Prep, Week 10

Right Triangle Trigonometry

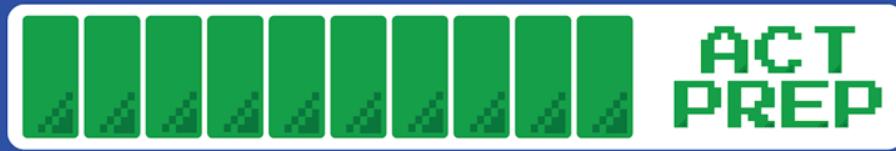


**K20**  
L•E•A•R•N



# Essential Question

How can I increase my ACT score?



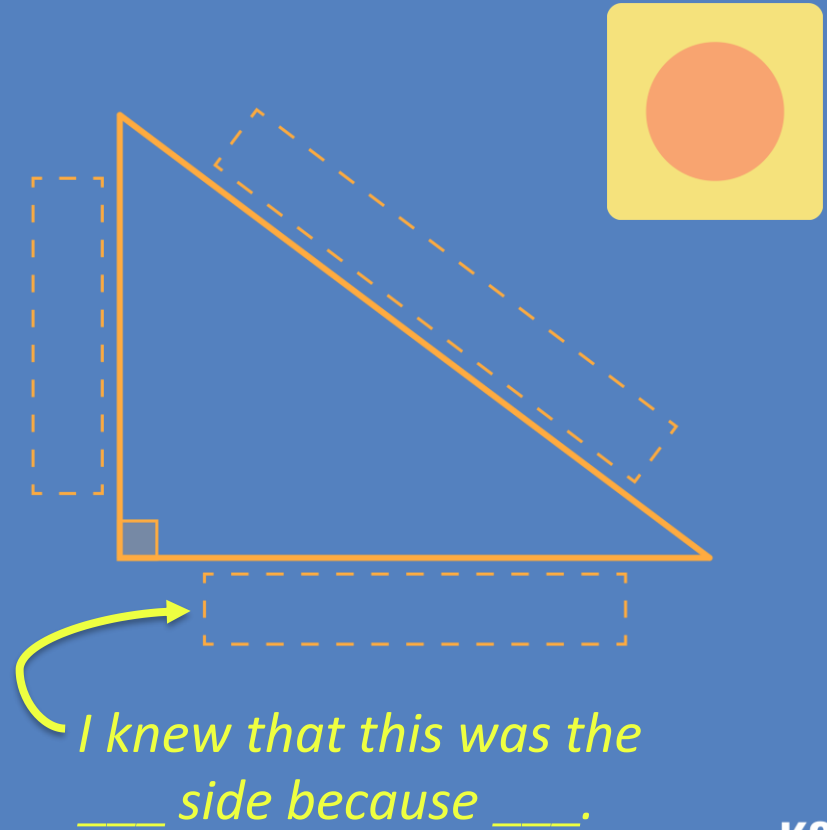
**K20**  
L•E•A•R•N

# Learning Objectives

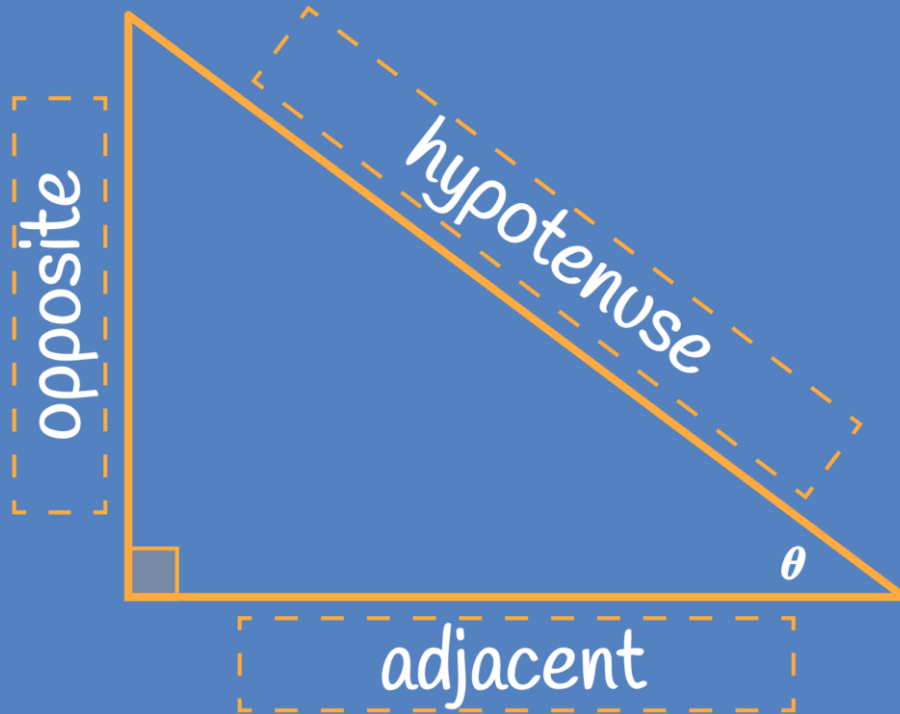
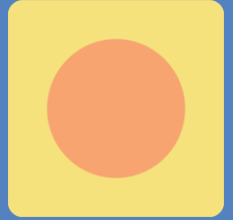
- Express the sine, cosine, and tangent of an angle in a right triangle as a ratio of given side lengths.
- Apply basic trigonometric ratios to solve right-triangle problems.

# How I Know It

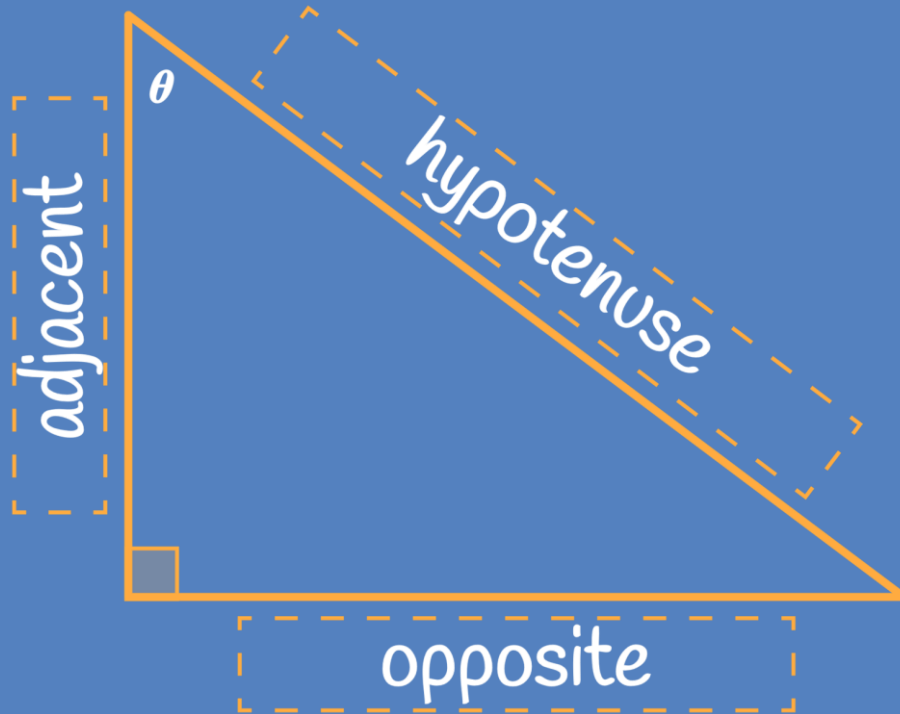
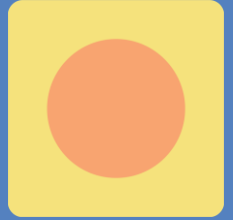
- 1) Label each side of each triangle using the words: *opposite*, *adjacent*, or *hypotenuse*.
- 2) Then write 1-2 sentences explaining how you knew which word to use.



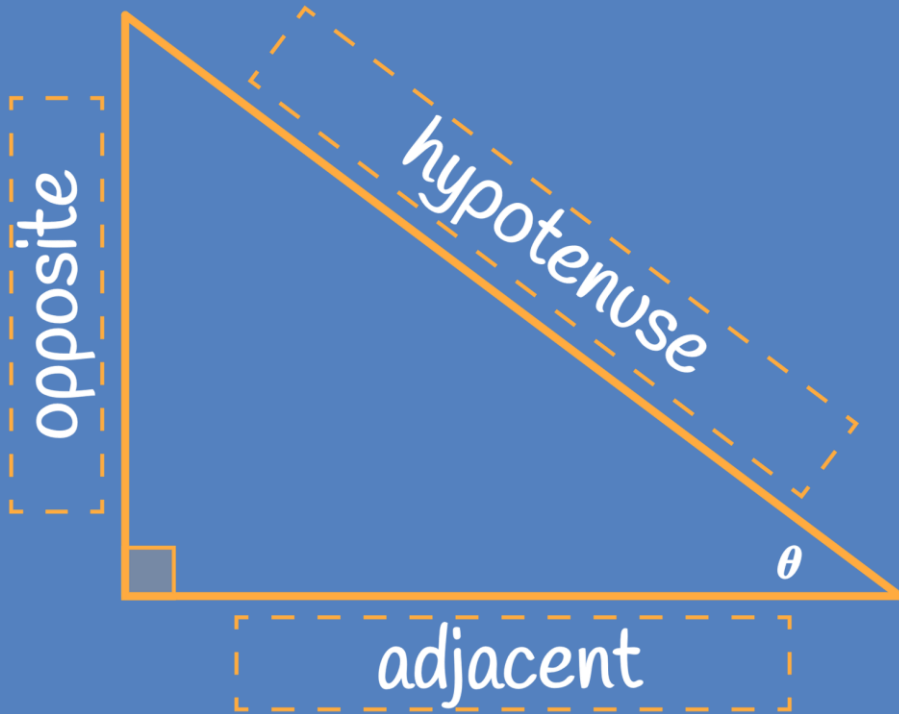
# How I Know It: Triangle 1



# How I Know It: Triangle 2



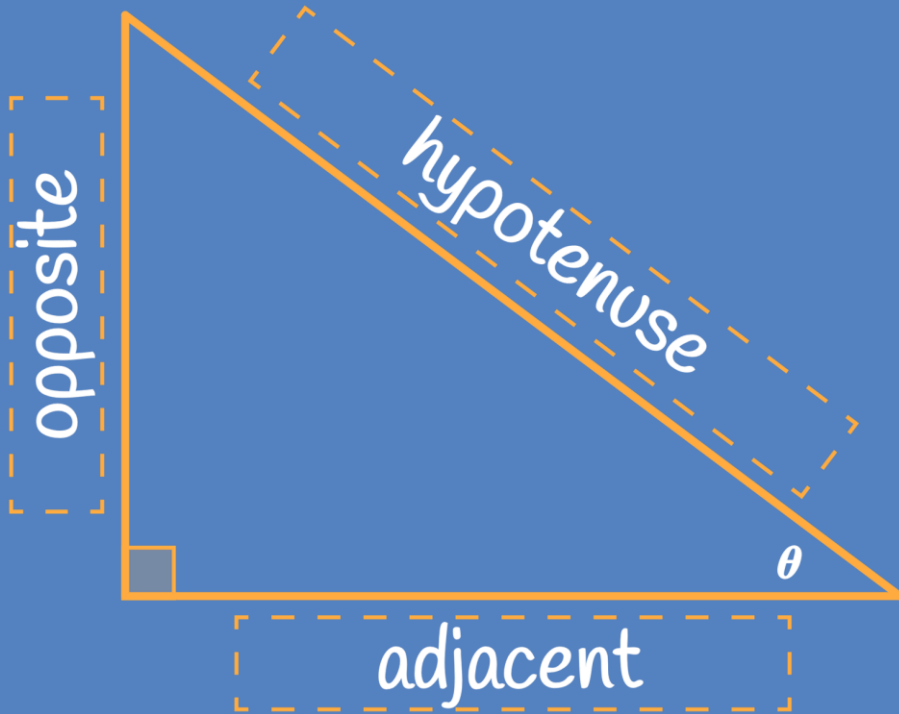
# Guided Notes: Right Triangle Trigonometry



- The **sine** of the angle is the ratio of the opposite side to the hypotenuse.
- $\sin \theta = \frac{\textit{opposite}}{\textit{hypotenuse}}$

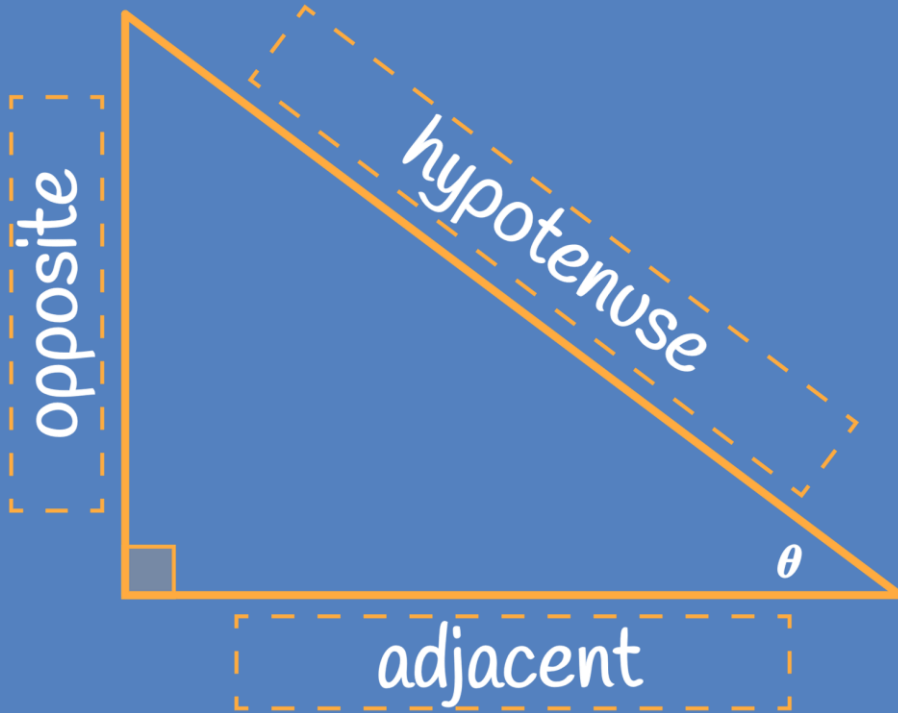


# Guided Notes: Right Triangle Trigonometry



- The **cosine** of the angle is the ratio of the adjacent side to the hypotenuse.
- $\cos \theta = \frac{\text{adjacent}}{\text{hypotenuse}}$

# Guided Notes: Right Triangle Trigonometry

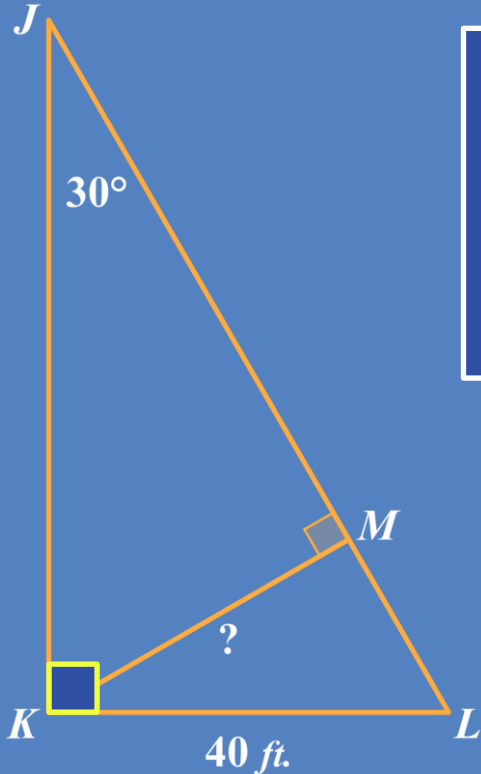


- The **tangent** of the angle is the ratio of the opposite side to the adjacent side.
- $\tan \theta = \frac{\textit{opposite}}{\textit{adjacent}}$

# Guided Notes

- Let's complete the Guided Notes together.

# Find the Unknown Value (Question 2)



$$m\angle JKM = 60^\circ.$$

Since  $m\angle JKL = 90^\circ$ ,  
 $m\angle MKL = 30^\circ$ .

$$KM = ?$$

$$\cos 30^\circ = \frac{KM}{40}$$

$$KM = 40 \cdot \cos 30^\circ$$

$$KM = 20\sqrt{3}$$

# Exit Ticket

Leave your paper face down until the timer starts.



5-Minute Timer

# Exit Ticket (Answers)

- 1) E
- 2) H
- 3) D
- 4) H
- 5) E

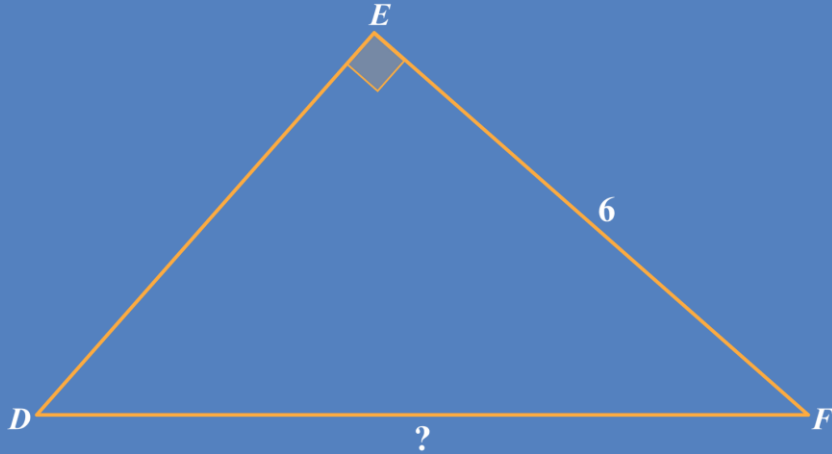
*How well did you do?*

Remember, it is 100% okay to not get 100% of the questions correct on the ACT.



# Exit Ticket (Solution 1)

- In  $\triangle DEF$ ...,  $\cos F = 3/4$  and  $EF$  is 6 cm. What is  $DF$ ...?



$$\cos F = \frac{3}{4} = \frac{6}{8}$$

$$\cos F = \frac{\text{adjacent}}{\text{hypotenuse}}$$

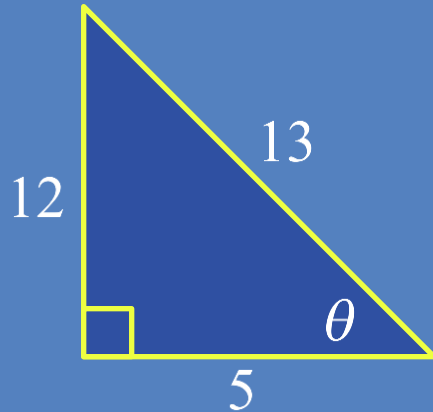
$$DF = 8$$

# Exit Ticket (Solution 2)

- For an angle with measure  $\theta$  in a right triangle,  $\cos\theta = 5/13$  and  $\tan\theta = 12/5$ . What is the value of  $\sin\theta$ ?

$$\cos\theta = \frac{5}{13}$$

$$\tan\theta = \frac{12}{5}$$

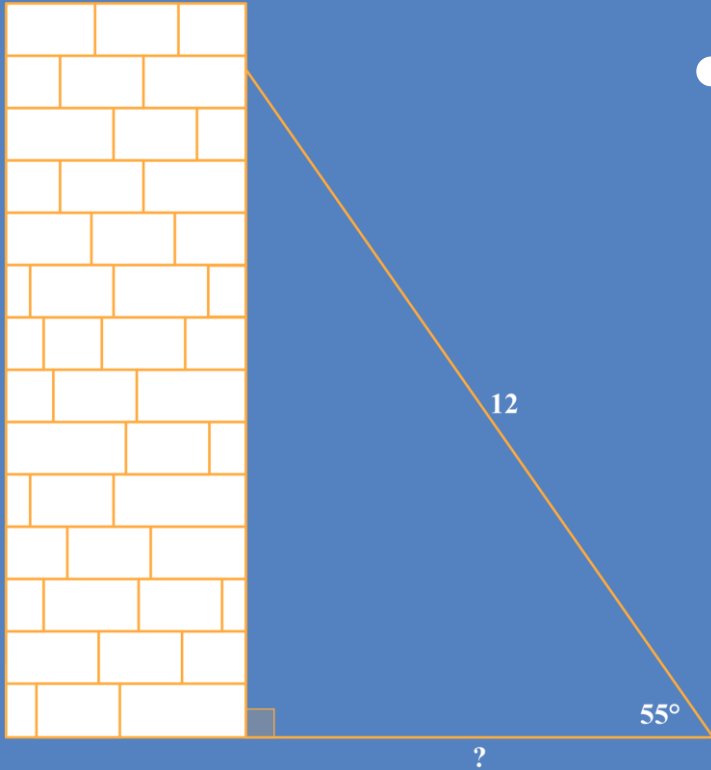


$$\sin\theta = ?$$

$$\sin\theta = \frac{12}{13}$$



# Exit Ticket (Solution 3)



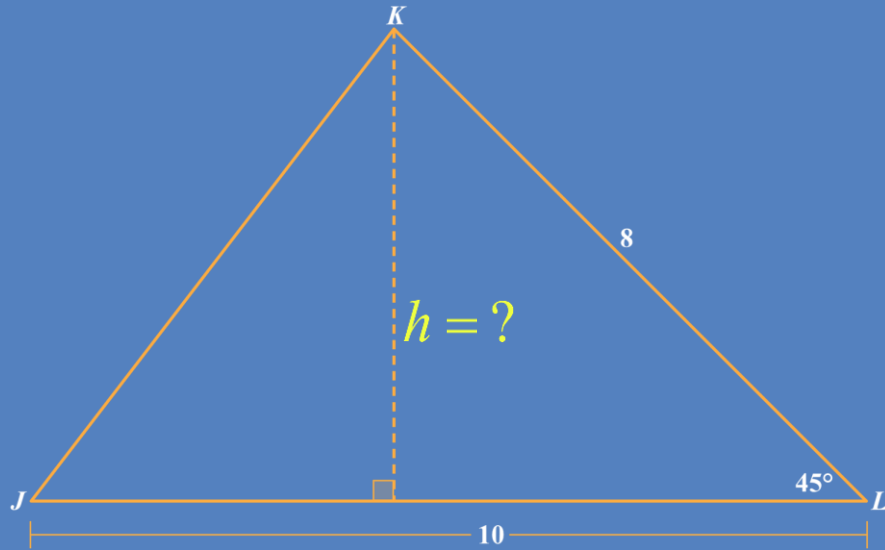
- ..., a 12-foot ladder forms an angle of  $55^\circ$  with the level ground ... The distance, in feet, between the bottom of the ladder and the building ...?

$$\cos 55^\circ = \frac{?}{12}$$

$$\Rightarrow 12 \cdot \cos 55^\circ = ?$$

# Exit Ticket (Solution 4)

- ... What is the area, in square inches, of  $\triangle JKL$ ?



$$\sin 45^\circ = \frac{h}{8}$$

$$h = 8 \cdot \sin 45^\circ$$

$$h = 4\sqrt{2}$$

$$A = \frac{1}{2}(10)h = ?$$

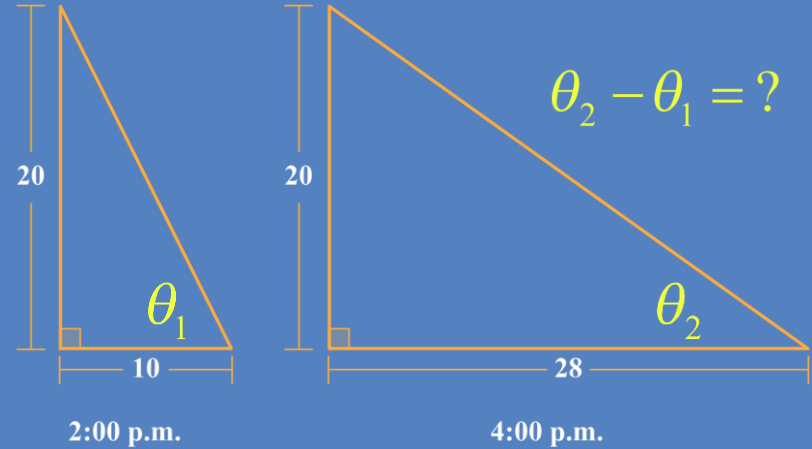
$$A = 5(4\sqrt{2})$$

$$= 20\sqrt{2}$$

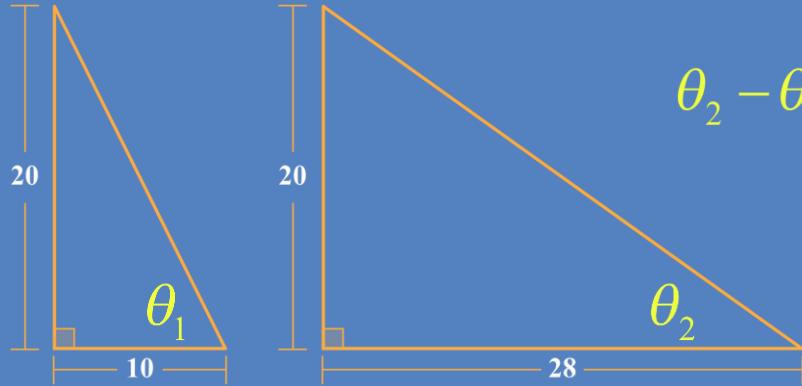
# Exit Ticket (Solution 5)

- A **20-foot-tall** flagpole casts a **shadow** at **2:00 p.m.** that extends **10 feet** horizontally ...

Then at **4:00 p.m.**, the shadow extends to **28 feet** horizontally ... Which of the following expressions equals the **positive difference** in the measures of the **angle of elevation from the end of the shadow to the top of the flagpole** at 2:00 p.m. and at 4:00 p.m.?



# Exit Ticket (Solution 5)



2:00 p.m.

4:00 p.m.

$$\tan \theta_1 = \frac{20}{10}$$

$$\theta_1 = \tan^{-1}\left(\frac{20}{10}\right)$$

$$\tan \theta_2 = \frac{20}{28}$$

$$\theta_2 = \tan^{-1}\left(\frac{20}{28}\right)$$

$$\theta_2 - \theta_1 =$$

$$\tan^{-1}\left(\frac{20}{10}\right) - \tan^{-1}\left(\frac{20}{28}\right)$$



# You Powered Up!

Achievement Unlocked:  
*Right Triangle Trigonometry*



# ACT: State Testing and National Testing



- **State Testing:** In states requiring high school students to take the ACT, the exam must be offered during the school day at the school.
- **National Testing:** These are exams offered on Saturdays and are given on the same date at several locations. Sign up early to get your preferred location.



# ACT: State Testing



- Be ready for state testing in **April!**
- Study, practice, and prepare between now and then.
- Your April score can be used towards college admissions and scholarship applications. **Do your best!**

# ACT: Superscoring



Why take the ACT more than once?

- You can average your best scores from each subject area to create a higher composite score: a **superscore!**
- Remember, you can unlock admission into colleges and universities and scholarships the higher you score.



# ACT: National Testing



- The ACT is offered multiple times a year at many different locations.
- Search for “ACT test dates” and select the link that will send you to the official ACT website: [www.act.org/...](http://www.act.org/...)
- Find the table of information about national test dates.

# ACT: National Testing

To take this test, register by this date.



Test Date	Regular Registration Deadline	Late Registration Deadline	Photo Upload and Standby Deadline
June 8, 2024	May 3	May 17	May 31
July 13, 2024	June 7	June 21	July 5
...	...	...	...

*Register by May 3<sup>rd</sup> to take the ACT on June 8<sup>th</sup>.*

# ACT: National Testing



Tests are usually offered each year during the following months:

- February
- April
- June
- July
- September
- October
- December

*Plan ahead and don't wait until the last minute to register. Avoid paying late registration fees!*

# ACT: National Testing



- Test Information Release (**TIR**): This is a copy of the multiple-choice ACT with your answers and a copy of the correct answers. It can also include the prompt and grading rubric for the writing portion with your scores.
- **If you qualify for a fee waiver, this is free.** Ask your school counselor to see if you are eligible.