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MATH
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Power Up: Math ACT Prep, Week 10

Right Triangle Trigonometry

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Essential Question

How can I increase my ACT score?

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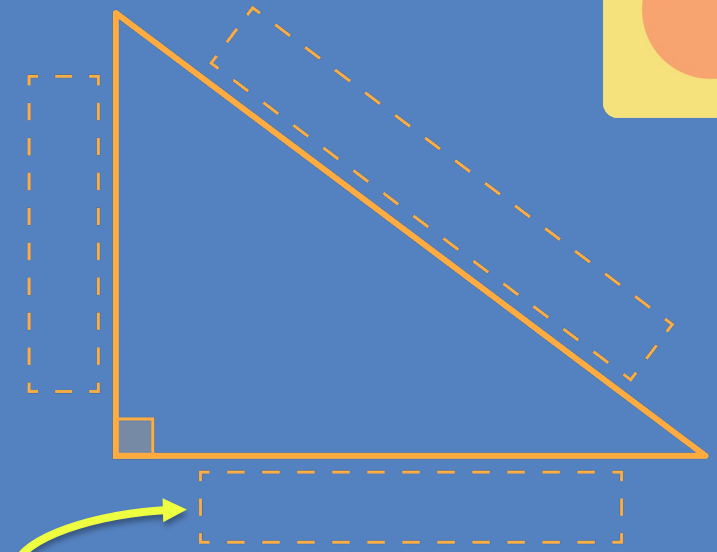
Learning Objectives

- 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.

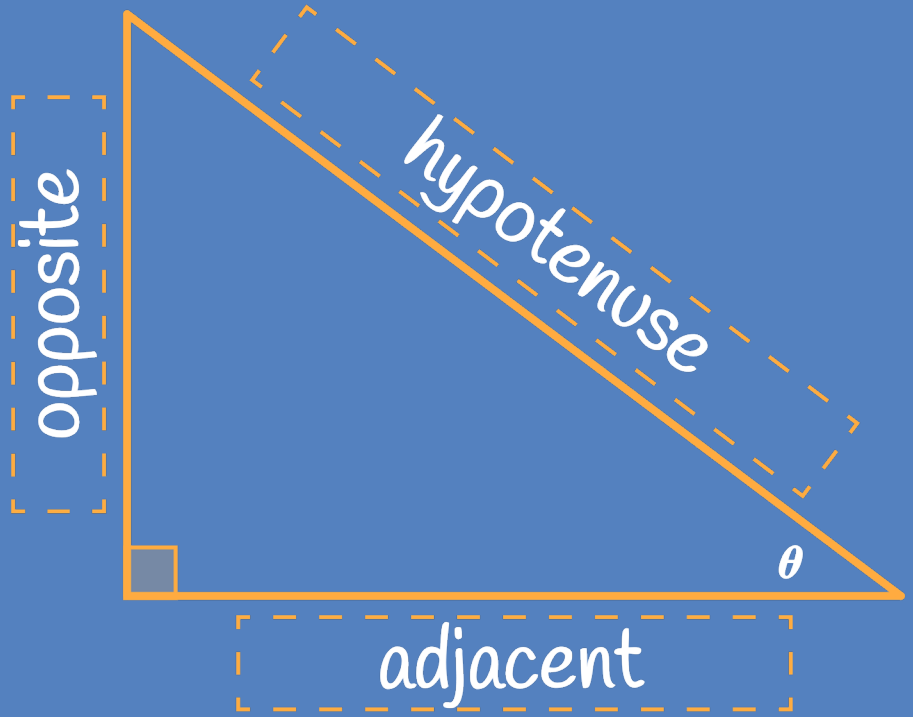
How I Know It

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.

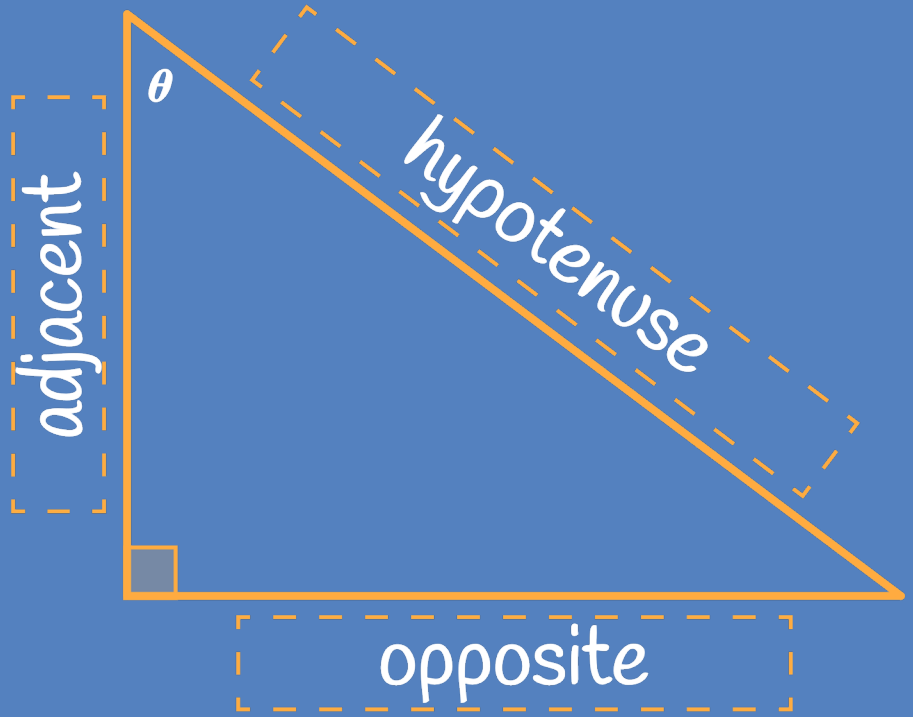


I knew that this was the ___ side because ___.

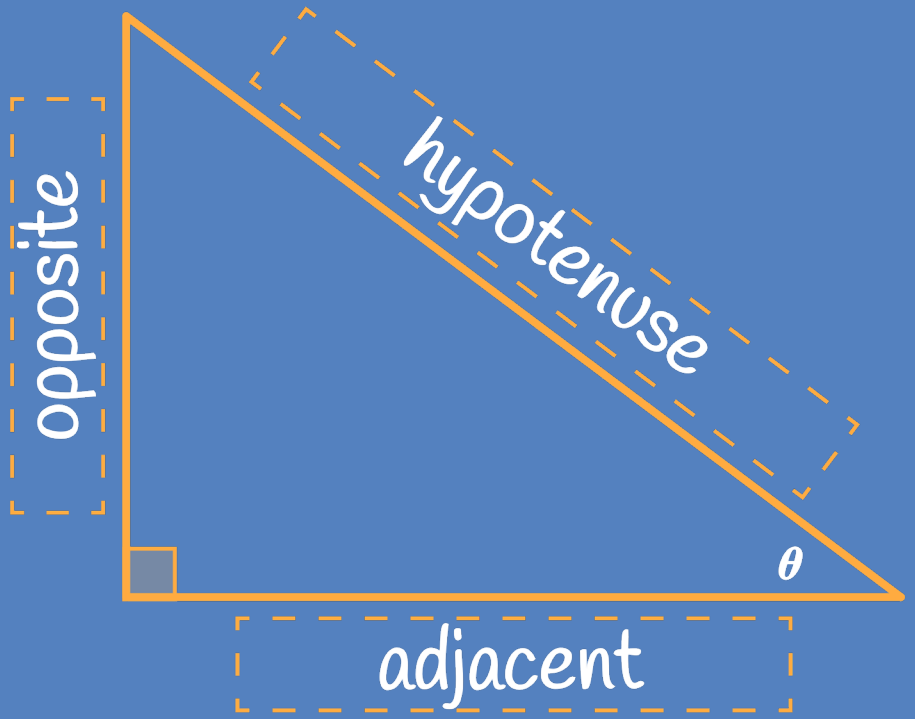
How I Know It: Triangle 1



How I Know It: Triangle 2

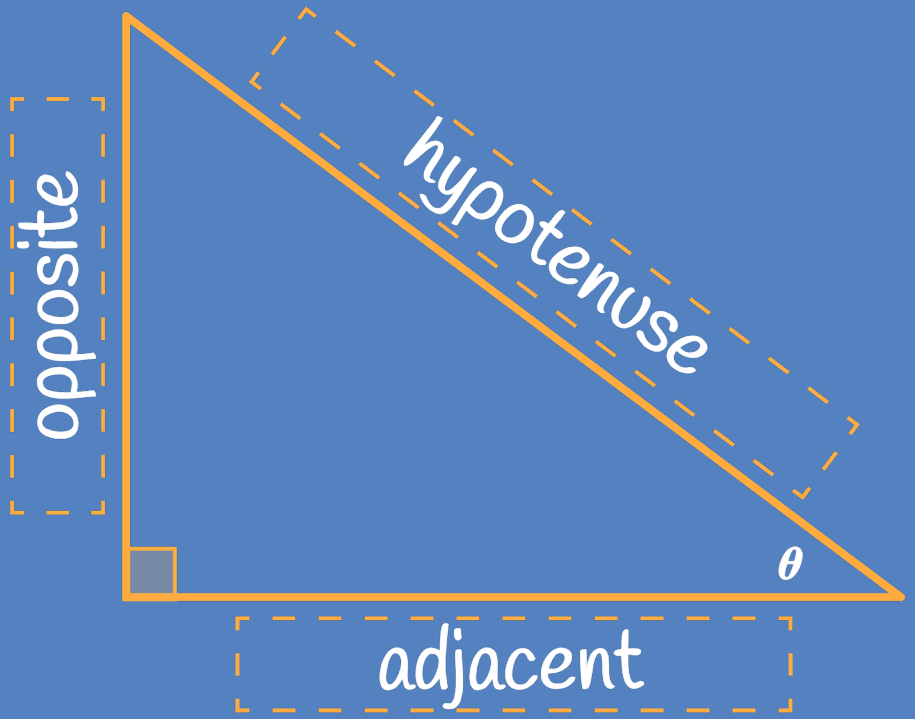


Guided Notes: Right Triangle Trigonometry



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

Guided Notes: Right Triangle Trigonometry



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

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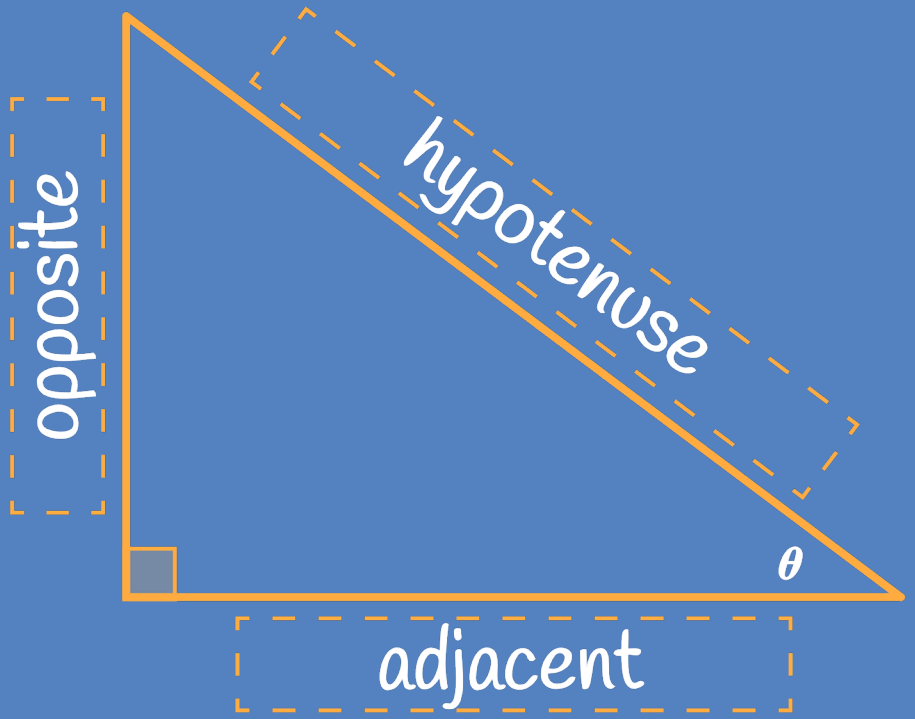
Guided Notes: Right Triangle Trigonometry



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

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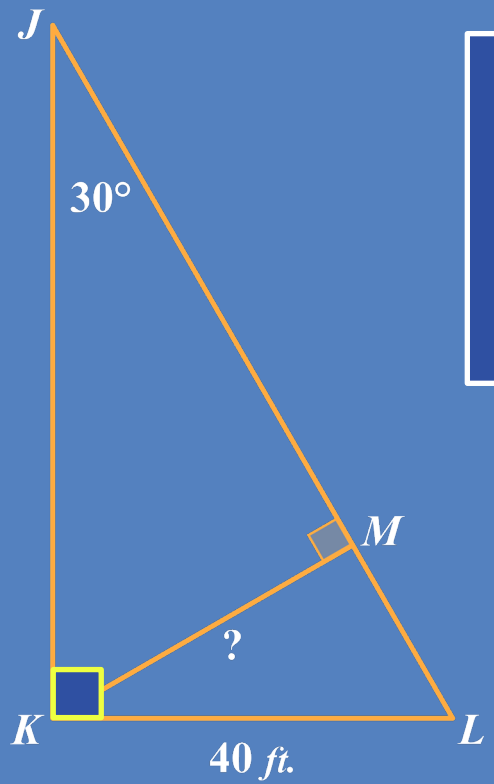
Guided Notes

- Let’s complete the Guided Notes together.

Find the Unknown Value (Question 2)



$m\angle JKM = 60°$.

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

$KM = ?$

$$\cos 30° = \frac{KM}{40}$$

$$KM = 40 \cdot \cos 30°$$

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

Exit Ticket

Leave your paper face down until the timer starts.

5-Minute Timer

Exit Ticket (Answers)

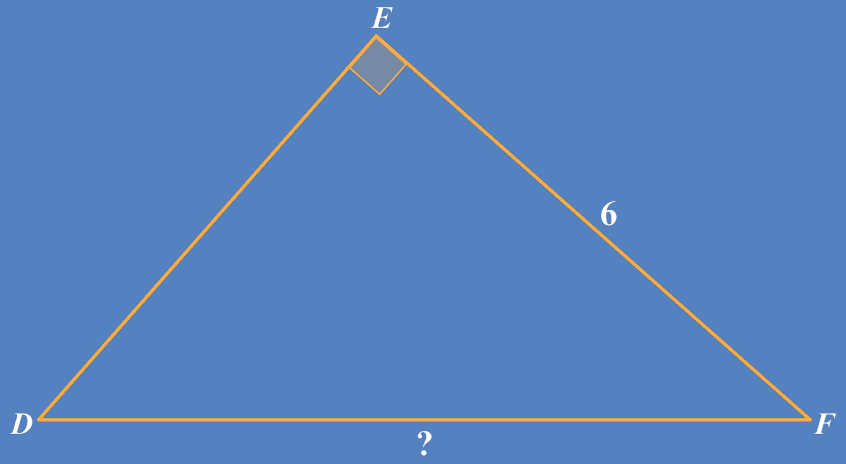
1) E
2) H
3) D
4) H
5) E

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 ΔDEF..., $\cos F = 3/4$ and EF is 6 cm. What is DF...?



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

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

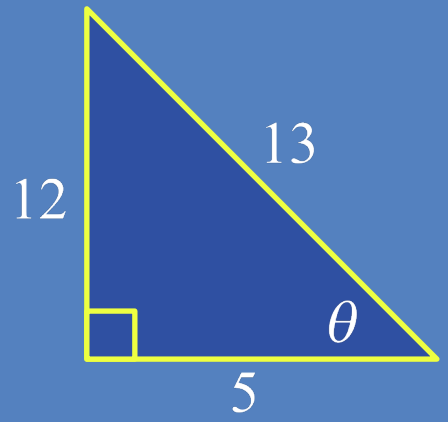
$$DF = 8$$

Exit Ticket (Solution 2)

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

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

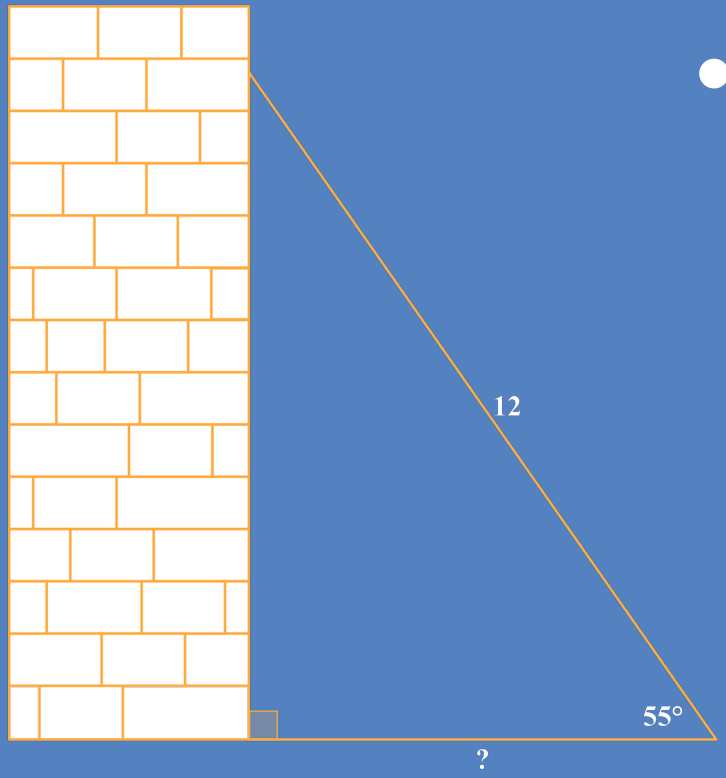
$$\tan\theta = \frac{12}{5}$$



$$\sin\theta = ?$$

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

Exit Ticket (Solution 3)



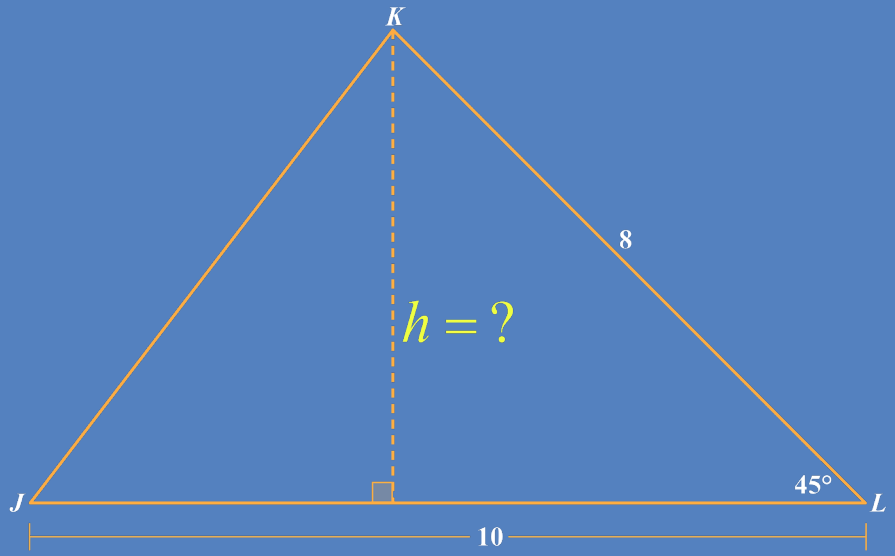
- …, a 12-foot ladder forms an angle of $55°$ with the level ground … The distance, in feet, between the bottom of the ladder and the building …?

$$\cos 55° = \frac{?}{12}$$

$$\Rightarrow \boxed{12 \cdot \cos 55°} = ?$$

Exit Ticket (Solution 4)

- …. What is the area, in square inches, of ΔJKL?



$$\sin 45° = \frac{h}{8}$$

$$h = 8 \cdot \sin 45°$$

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

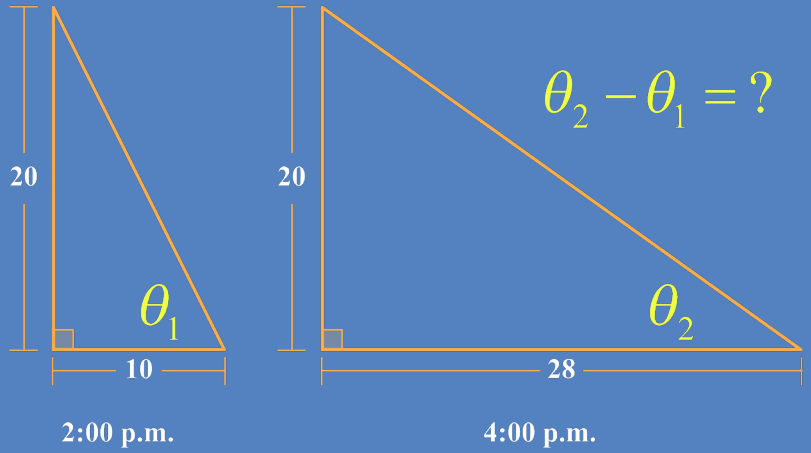
$$A = \frac{1}{2}(10)h = ?$$

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

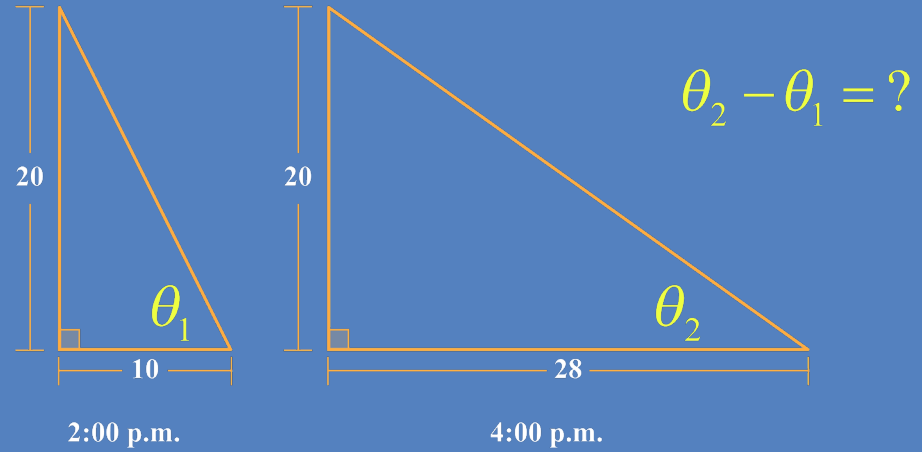
$$= \boxed{20\sqrt{2}}$$

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)



$$\theta_2 - \theta_1 = ?$$

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

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

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

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

$$\theta_2 - \theta_1 =$$

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

You Powered Up!

Achievement Unlocked:

Right Triangle Trigonometry

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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/....
- 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 3rd to take the ACT on June 8th.

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!

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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.