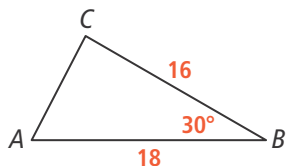




UNDERSTAND

10. **Construct Arguments** How is the area of a triangle determined if the lengths of two sides and the measure of the included angle are given?

11. **Error Analysis** Leah is asked to find AC . What is her error?



$$AC^2 = AB^2 + BC^2 - 2(AB)(BC) \sin A$$

$$AC^2 = 18^2 + 16^2 - 2(18)(16) \sin 30^\circ$$

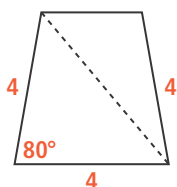
$$AC^2 = 292$$

$$AC \approx 17.1$$

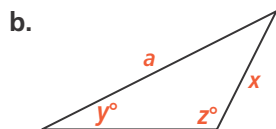
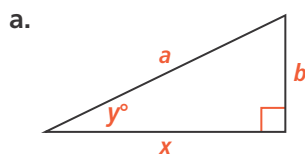


12. **Mathematical Connections**

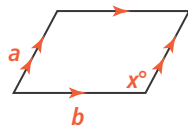
Find the length of the diagonal of the isosceles trapezoid. Then find the length of the fourth side.



13. **Use Appropriate Tools** For each triangle, write an equation for x using a trigonometric function.

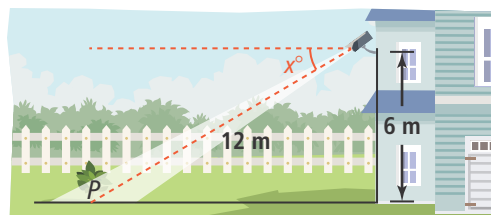


14. **Higher Order Thinking** What is a formula for the area of the parallelogram in the figure? Explain.

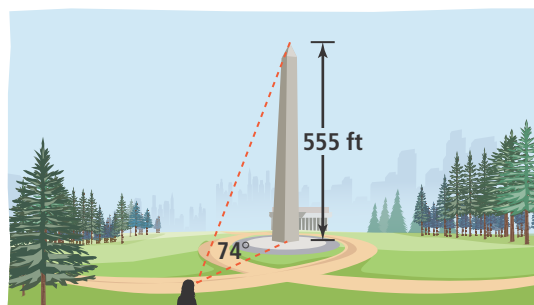


PRACTICE

15. What is the angle of elevation to a building 1,000 m away that is 300 m high? **SEE EXAMPLE 1**
16. To what angle of depression should the security camera be adjusted in order to have the lens aimed at point P on the ground? **SEE EXAMPLE 2**

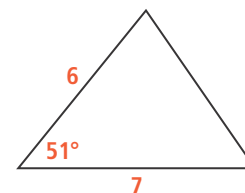


17. The angle of elevation to the sun is 21.5° . What is the length of the shadow cast by a person 5 ft 6 in. tall? **SEE EXAMPLE 2**
18. Libby's eyes are 5 ft above the ground, and the angle of elevation of her line of sight to the top of the monument is 74° . How far is she from the monument? **SEE EXAMPLE 3**



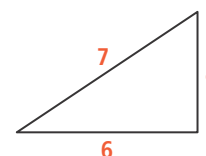
19. Triangle GHI has $GH = 13$, $GI = 15$, and $m\angle G = 74$. What is the area of the triangle? **SEE EXAMPLE 4**

20. What is the area of the triangle? **SEE EXAMPLE 4**



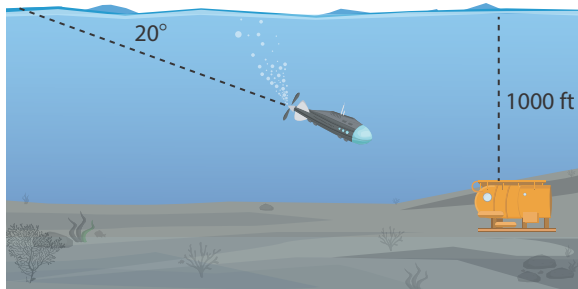
21. Triangle KLM has $KL = 22$, $KM = 27$, and $LM = 29$. What is the area of the triangle? **SEE EXAMPLE 4**

22. What is the area of the triangle? **SEE EXAMPLE 4**



APPLY

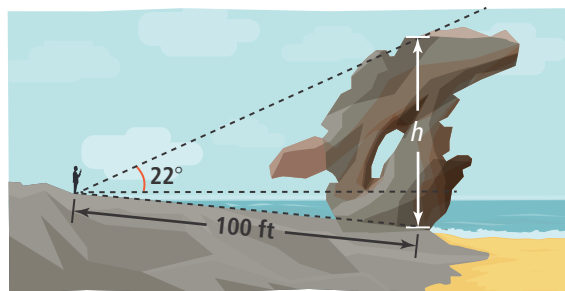
23. **Model With Mathematics** A research submarine dives at a speed of 100 ft/min directly toward the research lab. How long will it take the submarine to reach the lab from the surface of the ocean to the nearest tenth of a minute?



24. **Make Sense and Persevere** Benito aims for the center of the target from a distance of 70 meters. If Benito shoots an arrow at a 0.055° angle of depression below the center, will he hit the yellow circle? Explain.

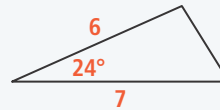


25. **Reason** Ramona is climbing a hill with a 10° incline and wants to know the height of the rock formation. She walks 100 ft up the hill and uses a clinometer to measure the angle of elevation to the top of the formation. She then walks another 229.4 ft to the top of the hill. What is the height h of the rock formation?

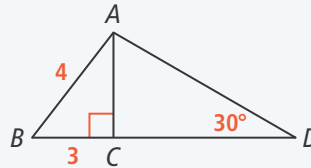


ASSESSMENT PRACTICE

26. What is the area of the triangle? Round to the nearest one hundredth of a square unit.

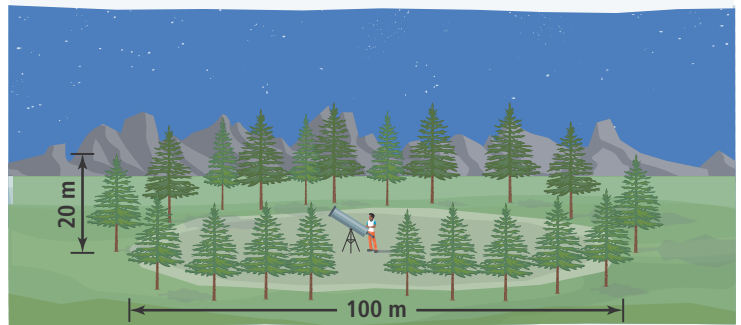


27. **SAT/ACT** Which of the following equations is true?



- I. $\tan B = \frac{4}{3}$
 - II. $AD = 2\sqrt{7}$
 - III. $AB^2 = BD^2 + AD^2 - 2 \cdot (BD) \cdot (AD)\cos 30^\circ$
- Ⓐ I only Ⓒ III only
Ⓑ II only Ⓓ II and III only

28. **Performance Task** An amateur astronomer sets up his telescope in the center of a circular field. The field is surrounded by trees 20 m tall. The tripod holding the telescope pivots 1 m above the ground.



Part A What is the lowest angle of elevation at which the astronomer can observe a star?

Part B If the astronomer wants to observe a star 15° above the horizon to the east, how far west must the astronomer move the telescope to see the star?

Part C If the astronomer sets up the telescope in the center of the field on the bed of a truck 1.5 meters above the ground, what is the lowest angle at which he can observe?