

## 6.11 Solving Right Triangles Using Trigonometric Relationships

### A Practice Understanding Task



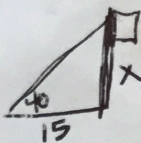
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- I. For each problem:
- make a drawing
  - write an equation
  - solve (do not forget to include units of measure)



1. Carrie places a 10 foot ladder against a wall. If the ladder makes an angle of  $65^\circ$  with the level ground, how far up the wall is the top of the ladder?

$$\sin(65) = \frac{x}{10} \quad x = 9.06$$



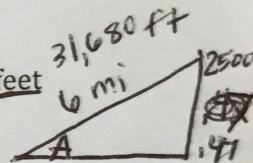
2. A flagpole casts a shadow that is 15 feet long. The angle of elevation at this time is  $40^\circ$ . How tall is the flagpole?

$$\tan(40) = \frac{x}{15} \quad x = 12.59$$

3. In southern California, there is a six mile section of Interstate 5 that increases 2,500 feet in elevation. What is the angle of elevation?

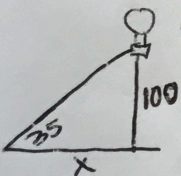
$$\sin(A) = \frac{47}{6} \quad A = 4.49$$

4.53



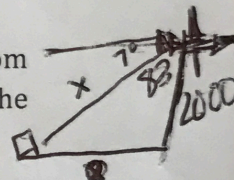
4. A hot air balloon is 100 feet straight above where it is planning to land. Sarah is driving to meet the balloon when it lands. If the angle of elevation to the balloon is  $35^\circ$ , how far away is Sarah from where the balloon will land?

$$\tan(35) = \frac{100}{x} \quad x = 142.81$$



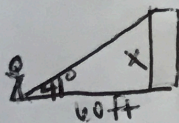
5. An airplane is descending as it approaches the airport. If the angle of depression from the plane to the ground is  $7^\circ$ , and the plane is 2,000 feet above the ground, what is the distance from the plane to the airport?

$$\cos(83) = \frac{2000}{x} \quad x = 16,411.02$$



6. Michelle is 60 feet away from a building. The angle of elevation to the top of the building is  $41^\circ$ . How tall is the building?

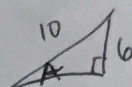
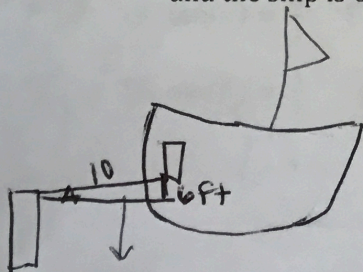
$$\tan(41) = \frac{x}{60} \quad x = 52.16$$



7. A ramp is used for loading equipment from a dock to a ship. The ramp is 10 feet long and the ship is 6 feet higher than the dock. What is the angle of elevation of the ramp?

$$\sin^{-1}\left(\frac{6}{10}\right) = A$$

$$A = 36.87$$



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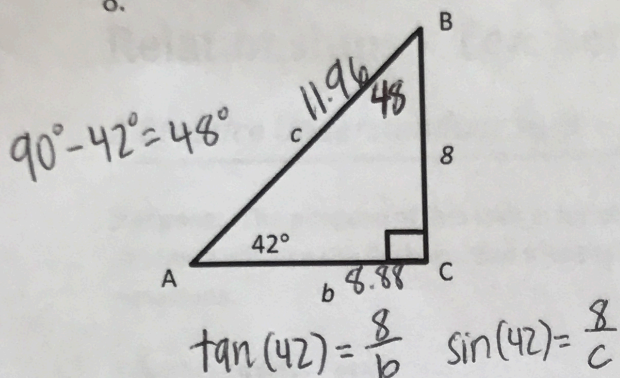
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$$3x = 15$$

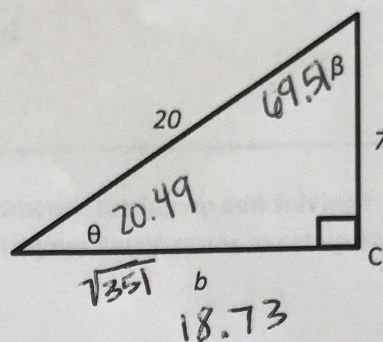
$$x + 7 = 14$$

II. For each right triangle below, find all unknown side lengths and angle measures:

8.



9.



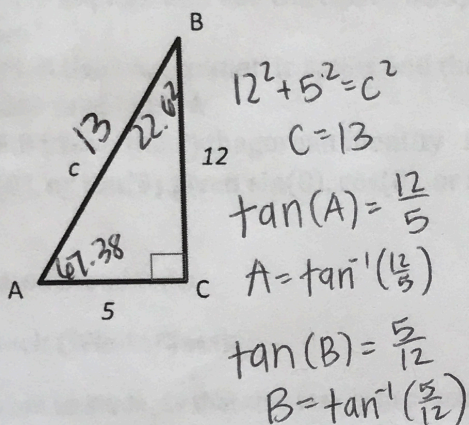
$$20^2 - 7^2 = b^2$$

$$b = 18.73$$

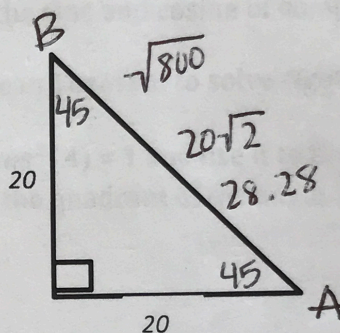
$$\sin(\theta) = \frac{7}{20} \rightarrow \theta = \sin^{-1}\left(\frac{7}{20}\right)$$

$$\cos(\beta) = \frac{7}{20} \rightarrow \beta = \cos^{-1}\left(\frac{7}{20}\right)$$

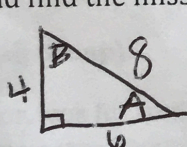
10.



11.



12. Draw and find the missing angle measures of the right triangle whose sides measure 4, 6, and 8.



$$A = \tan^{-1}\left(\frac{4}{6}\right) = 33.69$$

$$B = \tan^{-1}\left(\frac{6}{4}\right) = 56.31$$

III. Determine the values of the two remaining trigonometric ratios when given one of the trigonometric ratios.

$$5^2 - 3^2 = a^2 \quad 13. \cos(\alpha) = \frac{3}{5} \quad \sin(\alpha) = \frac{4}{5} \quad \tan(\alpha) = \frac{4}{3}$$

$$8^2 + 3^2 = c^2 \quad 14. \tan(\theta) = \frac{8}{3} \quad \sqrt{73} \quad \sin(\theta) = \frac{8}{\sqrt{73}} \quad \cos(\theta) = \frac{3}{\sqrt{73}}$$

$$7^2 - 4^2 = b^2 \quad 15. \sin(\beta) = \frac{4}{7} \quad \sqrt{33} \quad \cos(\beta) = \frac{\sqrt{33}}{7} \quad \tan(\beta) = \frac{4}{\sqrt{33}}$$