

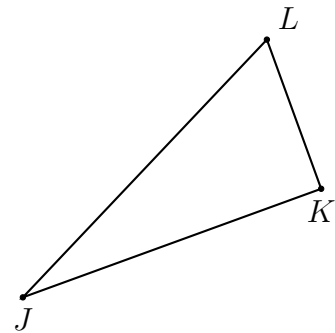
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10.6 Homework: Tangent applications

CCSS.HSG.SRT.C.8

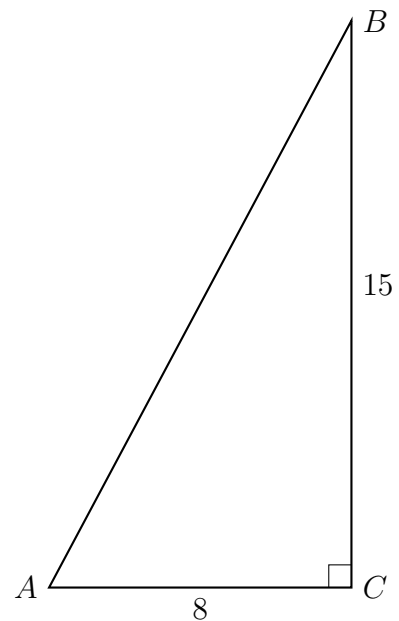
For a right triangle, $\tan \theta = \frac{\text{opposite}}{\text{adjacent}}$

1. Do Now: Given right $\triangle JKL$ with $\overline{JK} \perp \overline{KL}$, $JK = 10$, $m\angle J = 31^\circ$. Let x be the length of the side opposite $\angle J$, $x = KL$.
 - (a) Mark up the triangle.
 - (b) Find x .



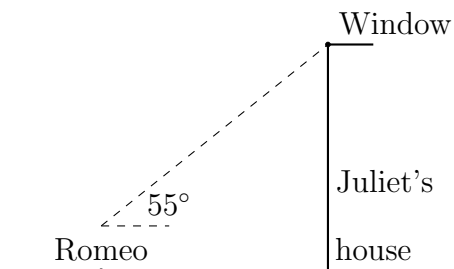
2. $\triangle ABC$ is shown with $m\angle C = 90^\circ$ and the lengths of the triangle's sides are $AC = 8$, $BC = 15$.
(not drawn to scale)

- (a) Write down the value of $\tan A$.
- (b) Find the measure of $\angle A$.
- (c) Write down the value of $\tan B$.
- (d) Find the measure of $\angle B$ two different ways.
- (e) Find AB .

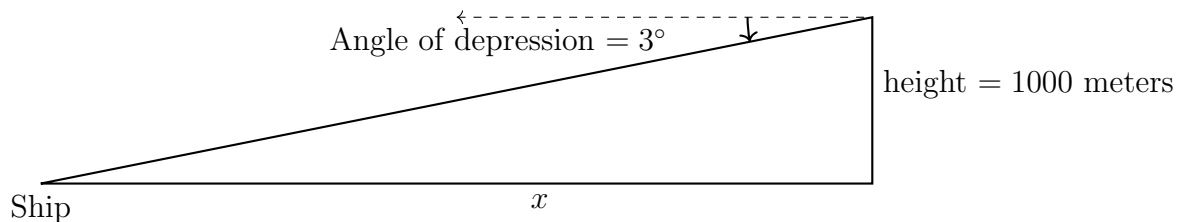


3. Romeo is standing 8 meters away from Juliet's house, looking up at Juliet's window. He is two meters tall and looks up at a 55° angle.

Find the height of Juliet's window ledge to the *nearest meter*. (not drawn to scale)

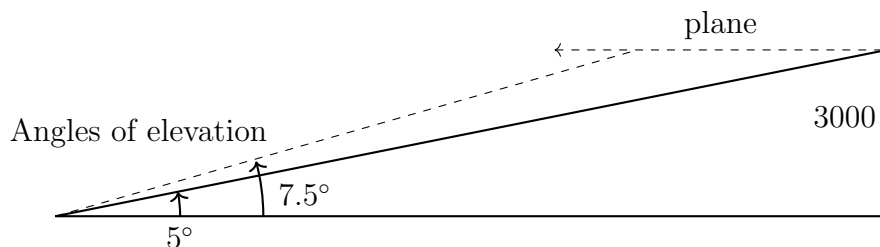


4. From the top of a lighthouse, a ship is visible at an angle of depression of 3° . If the lighthouse is 1000 meters tall, determine the distance of the ship from the lighthouse, x , to the *nearest kilometer*.



5. An airplane flying at an altitude of 3,000 meters is observed twice. The first time the angle of elevation is 5° and exactly one minute later the angle of elevation is 7.5° .

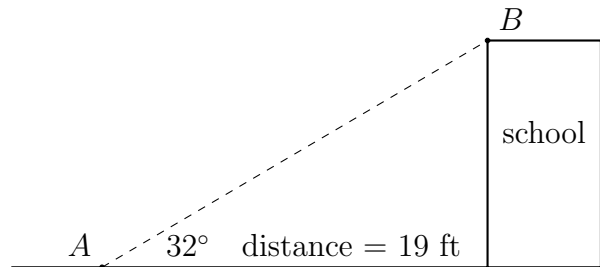
Find the distance the plane flies over the minute and its speed in kilometers per hour.



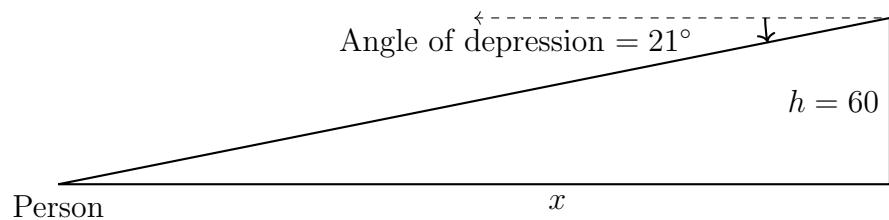
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6. Shown is a building with student A on the ground waving up to student B . Point A is 19 feet from the base of the building, and the angle of elevation from A to B is 32° .

Find how high up student B is from the ground to the *nearest foot*. (not to scale)

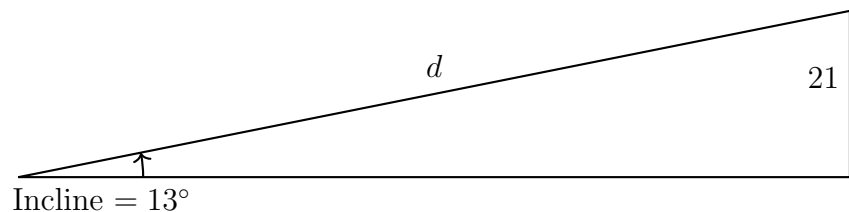


7. From the top of a subway station, a person is visible at an angle of depression of 21° . If the subway station is 60 feet tall, determine the distance from the person to the base of the subway station, x , to the *nearest foot*.



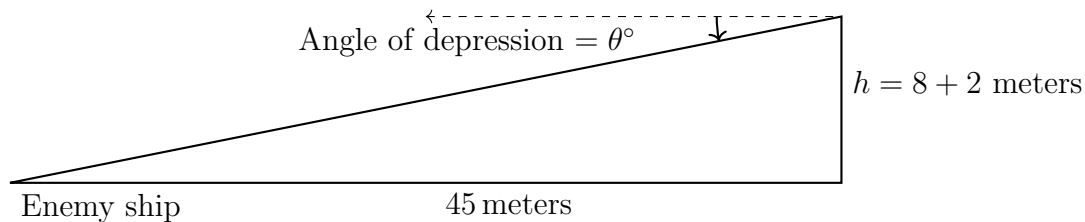
8. A child sleds from the top of a hill to a group of friends standing at the base of the hill. The hill is 21 feet tall, and the hill's incline is 13° . Find the distance, d , from the sledder to the group of friends to the *nearest foot*.

(hint: First find the horizontal distance, the base of the triangle. Then use the Pythagorean theorem to find the hypotenuse, d .)



9. A pirate, who is two meters tall, is standing on a mast 8 meters tall. Looking down, the pirate sees an enemy ship 45 meters away.

Find the angle of depression to the nearest degree.

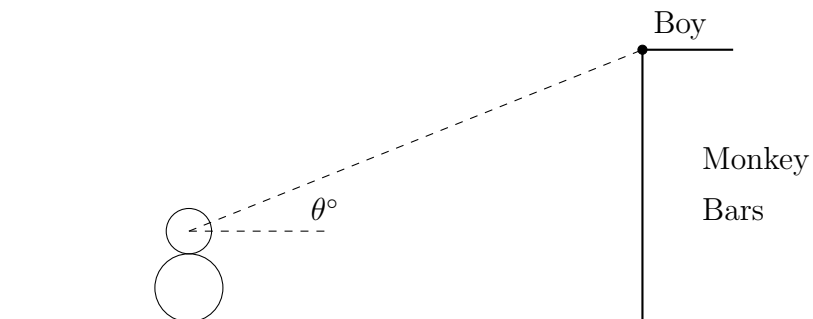


10. A snowman is standing 10 meters away from the base of a set of monkey bars, looking up at a boy 3 meters off the ground. The snowman is 1 meter tall.

(a) Mark the triangle.

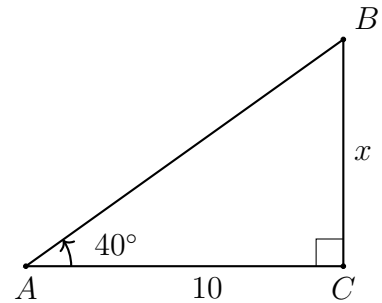
(b) Find the angle from the snowman's head to the boy, θ , to the nearest tenth degree.

(not drawn to scale)



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11. Given right $\triangle ABC$ with $AC = 10$, $m\angle A = 40^\circ$. Find the value of $BC = x$.



12. Graph and label $\triangle ABC$ with $A(0,0)$, $B(5,3)$, and $C(5,0)$. Calculate the length of each side of the triangle.

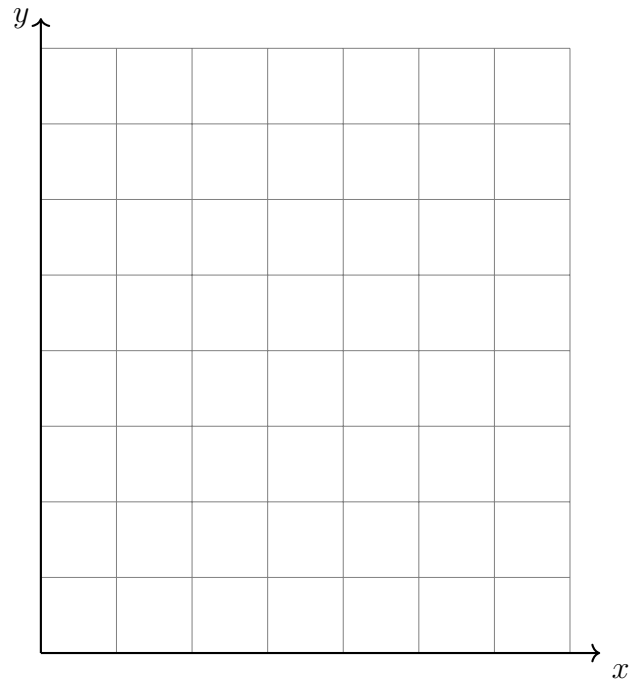
(a) $AC =$

(b) $BC =$

- (c) For the hypotenuse, express the length as a radical, then round to the nearest hundredth.

(hint: use the Pythagorean theorem $a^2 + b^2 = c^2$)

$AB =$



- (d) Find the slope of each line.

$m_{AB} =$

$m_{AC} =$

$m_{BC} =$

13. Calculate each value. Round to the nearest thousandth.

(a) $\tan 39^\circ$

(b) $\tan 11^\circ$

14. Find θ . Round to the nearest whole degree.

(a) $\theta = \tan^{-1}\left(\frac{3}{10}\right)$

(b) $\tan \theta = \frac{2.6}{4.9}$

15. Convert radians and degrees. (nearest whole degree, nearest hundredth radian).

(a) $85^\circ =$

(b) $1.15 \text{ radians} =$

16. Solve each equation for x , rounding to the nearest tenth.

(a) $\tan 33^\circ = \frac{x}{21}$

(b) $\tan 16^\circ = \frac{3.7}{x}$

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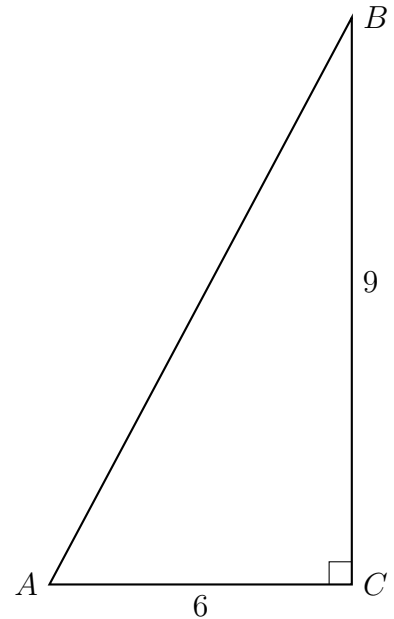
17. $\triangle ABC$ is shown with $m\angle C = 90^\circ$ and the lengths of the triangle's sides are $AC = 6$, $BC = 9$.
(not drawn to scale)

(a) Write down the value of $\tan A$.

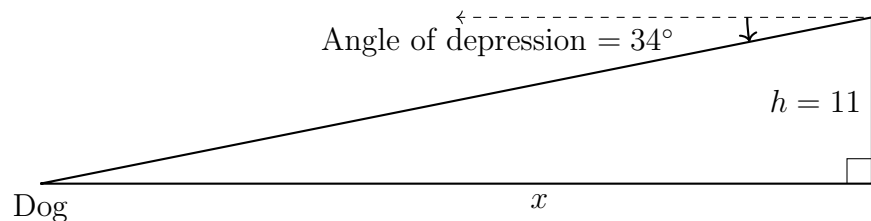
(b) Find the measure of $\angle A$.

(c) Write down the value of $\tan B$.

(d) Find the measure of $\angle B$.



18. From the top of a hill a dog is visible at an angle of depression of 34° . If the hill is 11 meters tall, determine the distance from the dog to the base of the hill, x , to the nearest meter.

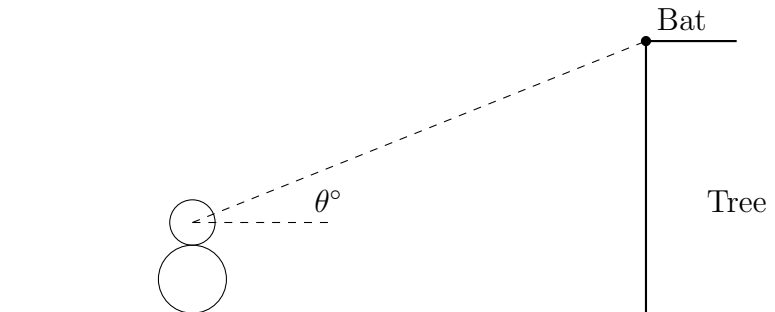


19. A bear is standing 22 feet away from the base of a tree, looking up at a bat 16 feet off the ground. The bear is 5 feet tall.

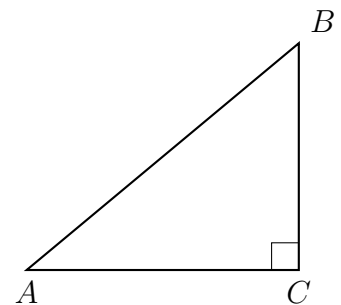
(a) Mark the scenario.

(b) Find the angle of elevation the bear views the bat, θ , to the nearest tenth degree.

(not drawn to scale)



20. The right $\triangle ABC$ has a base of $AC = 6$ units. The area of the triangle is 15 square units. Find the lengths of all three sides and measures of all angles of the triangle. (“solve the triangle”)



28 April 2023

21. A drone flying at an altitude of 1,800 meters is observed twice. The first time the angle of elevation is 7.2° and exactly one minute later the angle of elevation is 9.7° .

Find the distance the drone flies over the minute and its speed in kilometers per hour.

(not drawn to scale)

