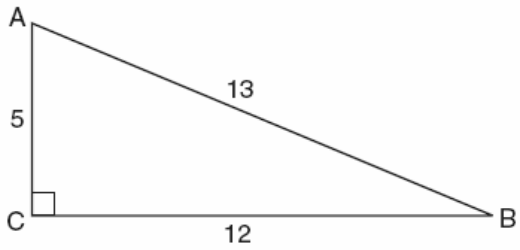
Lesson 11-5: Trigonometric Ratios

Part 1: Finding Trigonometric Ratios

1. 080414a, P.I. A.A.42
Which ratio represents $\cos A$ in the accompanying diagram of ΔABC?

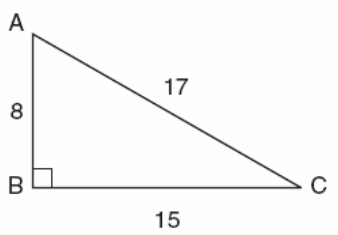


[A] $\frac{13}{5}$ [B] $\frac{12}{5}$ [C] $\frac{12}{13}$ [D] $\frac{5}{13}$

2. fall0721ia, P.I. A.A.42
In triangle MCT, the measure of $\angle T = 90°$, $MC = 85$ cm, $CT = 84$ cm, and $TM = 13$ cm. Which ratio represents the sine of $\angle C$?

[A] $\frac{13}{84}$ [B] $\frac{84}{85}$ [C] $\frac{84}{13}$ [D] $\frac{13}{85}$

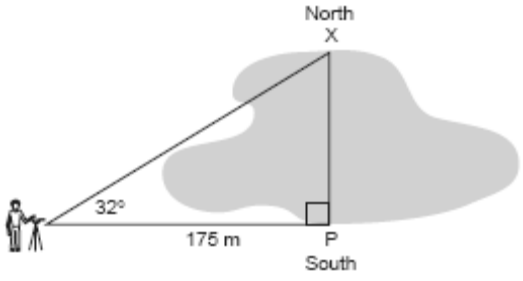
3. 010316a, P.I. A.A.42
In the accompanying diagram of right triangle ABC, $AB = 8$, $BC = 15$, $AC = 17$, and $m\angle ABC = 90$.



What is $\tan \angle C$?

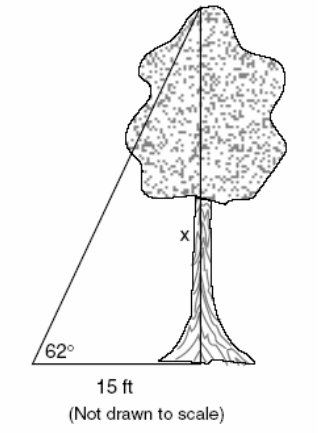
[A] $\frac{8}{15}$ [B] $\frac{15}{17}$ [C] $\frac{17}{15}$ [D] $\frac{8}{17}$

4. 060030a, P.I. A.A.44
A surveyor needs to determine the distance across the pond shown in the accompanying diagram. She determines that the distance from her position to point P on the south shore of the pond is 175 meters and the angle from her position to point X on the north shore is 32°. Determine the distance, PX, across the pond, rounded to the *nearest meter*.



5. 080033a, P.I. A.A.44
A 10-foot ladder is to be placed against the side of a building. The base of the ladder must be placed at an angle of 72° with the level ground for a secure footing. Find, to the *nearest inch*, how far the base of the ladder should be from the side of the building and how far up the side of the building the ladder will reach.

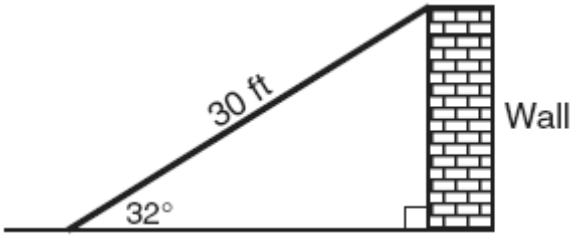
6. 010135a, P.I. A.A.44
Find, to the *nearest tenth of a foot*, the height of the tree represented in the accompanying diagram.



7. 010531a, P.I. A.A.44
In the accompanying diagram, a ladder leaning against a building makes an angle of 58° with level ground. If the distance from the foot of the ladder to the building is 6 feet, find, to the *nearest foot*, how far up the building the ladder will reach.

8. 010235a, P.I. A.A.44
Draw and label a diagram of the path of an airplane climbing at an angle of 11° with the ground. Find, to the *nearest foot*, the ground distance the airplane has traveled when it has attained an altitude of 400 feet.

9. 080724a, P.I. A.A.44
The accompanying diagram shows a ramp 30 feet long leaning against a wall at a construction site.

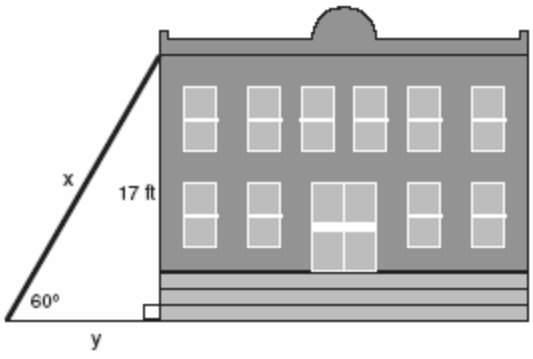


If the ramp forms an angle of 32° with the ground, how high above the ground, to the *nearest tenth*, is the top of the ramp?

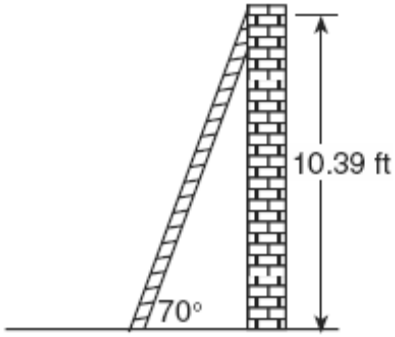
[A] 15.9 ft [B] 56.6 ft

[C] 18.7 ft [D] 25.4 ft

10. 080231a, P.I. A.A.44
In the accompanying diagram, *x* represents the length of a ladder that is leaning against a wall of a building, and *y* represents the distance from the foot of the ladder to the base of the wall. The ladder makes a 60° angle with the ground and reaches a point on the wall 17 feet above the ground. Find the number of feet in *x* and *y*.



11. 010638a, P.I. A.A.44
As shown in the accompanying diagram, a ladder is leaning against a vertical wall, making an angle of 70° with the ground and reaching a height of 10.39 feet on the wall. Find, to the *nearest foot*, the length of the ladder. Find, to the *nearest foot*, the distance from the base of the ladder to the wall.



12. 080108b, P.I. A.A.44
At Mogul's Ski Resort, the beginner's slope is inclined at an angle of 12.3°, while the advanced slope is inclined at an angle of 26.4°. If Rudy skis 1,000 meters down the advanced slope while Valerie skis the same distance on the beginner's slope, how much longer was the horizontal distance that Valerie covered?

[A] 231.6 m [B] 895.7 m

[C] 977.0 m [D] 81.3 m

[1] D

[2] D

[3] A

[3] 109 meters and appropriate work is shown by using an appropriate trigonometric ratio, such as $\tan 32° = \frac{y}{175}$.
[2] 109 meters but one rounding error is made.
or [2] The student uses an appropriate trigonometric function with an inverted ratio, such as $\tan 32° = \frac{175}{y}$, but completes the calculation appropriately, such as showing 280 meters.
[1] The student uses an incorrect trigonometric ratio but completes the calculation appropriately.
or [1] The student uses an inverted tangent ratio and makes one computational or rounding error.
or [1] The student uses the correct trigonometric ratio but solves it incorrectly or does not solve it at all.
or [1] 109 meters but no work or explanation is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[4]

[4] 114" (9 feet 6 inches) and 37" (3 feet 1 inch) and appropriate work is shown, such as $\sin 72° = \frac{x}{10}$ *and* $\cos 72° = \frac{y}{10}$ or use of the Pythagorean theorem.
[3] An incorrect diagram is drawn, but appropriate work and an appropriate solution for that diagram are shown.
or [3] Appropriate work is shown, but the answers are rounded to the nearest foot and then converted to inches, arriving at 120" and 36".
or [3] The setup is correct, but the answers are not converted to the nearest inch.
[2] One correct dimension is shown, such as 114" (9 feet 6 inches) or 37" (3 feet 1 inch).
or [2] Only one error involving interchanging sine and cosine is made.
or [2] An incorrect diagram is drawn, and the solution is appropriate for the diagram but is not rounded to the nearest inch.
[1] The student switches sine and cosine and does not round to the nearest inch.
or [1] The student uses the correct trigonometric function to compute one side correctly but does not convert it to the nearest inch.
or [1] 114" (9 feet 6 inches) and 37" (3 feet 1 inch) but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[5]

[4] 28.2, and an appropriate equation is shown, such as $\tan 62 = \frac{x}{15}$.
[3] Appropriate work is shown, but the answer is rounded incorrectly.
or [3] The student uses the correct tangent function and rounds the answer, but makes one computational error.
[2] The student uses the correct tangent function, but makes several errors.
or [2] An incorrect trigonometric function is used, but appropriate work is shown.
[1] The tangent function is indicated, but the ratio is set up incorrectly.
or [1] 28.2, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[6]

[2] 10, and appropriate work is shown.
[1] Appropriate work is shown, but one computational or rounding error is made.
or [1] Appropriate work is shown, but one conceptual error is made, such as using an incorrect trigonometric function.
or [1] Appropriate work is shown, but the length of the ladder is found.
or [1] 10, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[7]

[4] 2,058, and appropriate work is shown, such as the accompanying diagram and equation.

[3] Appropriate work is shown, including a correct diagram and the use of the tangent function, but one computational error is made.
or [3] Appropriate work is shown, including a correct diagram and the use of the tangent function, but the answer is not rounded or is rounded incorrectly.
[2] A correct diagram is drawn, but an incorrect trigonometric function is selected, but it is solved and rounded appropriately.
or [2] A correct diagram is drawn and the tangent function is selected, but no further work is shown.
or [2] An incorrect diagram is drawn, but the appropriate trigonometric function, based on the drawing, is selected, solved, and rounded appropriately.
[1] An incorrect diagram is drawn and an incorrect trigonometric function is selected, but it is solved and rounded appropriately.
or [1] Only a correct diagram is drawn.
or [1] 2,058, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[8]

[9] A

[4] $x = 19.62990915$ and $y = 9.814954576$ or equivalent answers, and appropriate work is shown, such as $\sin 60° = \frac{17}{x}$ and $\tan 60° = \frac{17}{y}$ or the Pythagorean theorem.
[3] Appropriate work is shown, but one computational or rounding error is made.
or [3] Appropriate work is shown, and the correct answers are found, but not identified.
[2] Appropriate work is shown, but one conceptual error is made, such as $\sin 60° = \frac{x}{17}$.
or [2] Appropriate work is shown, but more than one computational or rounding error is made.
[1] Appropriate work is shown, but two conceptual errors are made, such as $\sin 60° = \frac{x}{17}$ and $\tan 60° = \frac{y}{17}$.
or [1] $x = 19.62990915$ and $y = 9.814954576$ or equivalent answers, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[10]

[4] Length of ladder =11 and distance from the base of the ladder to the wall = 4, and appropriate work is shown, such as using sine and then tangent or the Pythagorean theorem.
[3] Appropriate work is shown, but one computational or rounding error is made.
or [3] Appropriate work is shown, but the correct answers are not labeled or are labeled incorrectly.
[2] Appropriate work is shown, but two or more computational or rounding errors are made.
or [2] Appropriate work is shown, but one conceptual error is made, such as using one incorrect trigonometric ratio.
or [2] Appropriate work is shown, but only the length of the ladder or the distance from the base of the ladder to the wall is found.
or [2] Two correct trigonometric equations are written, but no further correct work is shown.
[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
or [1] Only one correct trigonometric equation is written, and no further correct work is shown.
or [1] Length of ladder = 11 and distance from the base of the ladder to the wall = 4, but no work is shown.
[0] Length of ladder = 11 or distance from the base of the ladder to the wall = 4, but no work is shown.
or [0] 11 and 4, but no work is shown, and the solutions are not labeled.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[11]

[12] D