

Lesson 11-6: Angles of Elevation and Depression

Part 1: Solving Problems Using Trigonometric Ratios

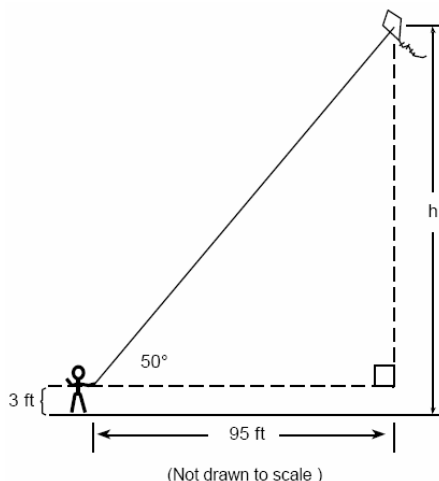
1. 060419a, P.I. A.A.44

The angle of elevation from a point 25 feet from the base of a tree on level ground to the top of the tree is 30° . Which equation can be used to find the height of the tree?

[A] $\cos 30^\circ = \frac{x}{25}$ [B] $\sin 30^\circ = \frac{x}{25}$
[C] $30^2 + 25^2 = x^2$ [D] $\tan 30^\circ = \frac{x}{25}$

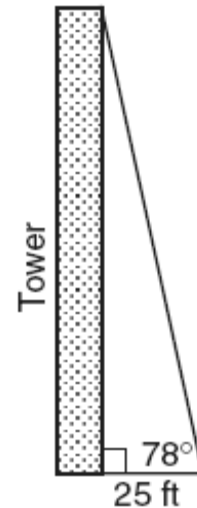
2. 069934a, P.I. A.A.44

Joe is holding his kite string 3 feet above the ground, as shown in the accompanying diagram. The distance between his hand and a point directly under the kite is 95 feet. If the angle of elevation to the kite is 50° , find the height, h , of his kite, to the nearest foot.



3. 010735a, P.I. A.A.44

From a point on level ground 25 feet from the base of a tower, the angle of elevation to the top of the tower is 78° , as shown in the accompanying diagram. Find the height of the tower, to the nearest tenth of a foot.



4. 080536a, P.I. A.A.44

A tree casts a shadow that is 20 feet long. The angle of elevation from the end of the shadow to the top of the tree is 66° . Determine the height of the tree, to the nearest foot.

5. 080133a, P.I. A.A.44

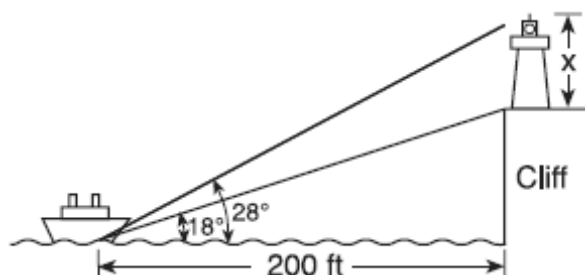
A ship on the ocean surface detects a sunken ship on the ocean floor at an angle of depression of 50° . The distance between the ship on the surface and the sunken ship on the ocean floor is 200 meters. If the ocean floor is level in this area, how far above the ocean floor, to the *nearest meter*, is the ship on the surface?

6. 060639a, P.I. A.A.44

A person measures the angle of depression from the top of a wall to a point on the ground. The point is located on level ground 62 feet from the base of the wall and the angle of depression is 52° . How high is the wall, to the *nearest tenth of a foot*?

7. 010838a, P.I. A.A.44

A lighthouse is built on the edge of a cliff near the ocean, as shown in the accompanying diagram. From a boat located 200 feet from the base of the cliff, the angle of elevation to the top of the cliff is 18° and the angle of elevation to the top of the lighthouse is 28° . What is the height of the lighthouse, x , to the *nearest tenth of a foot*?



[1] D

[4] 116 and an appropriate method is shown.

[3] An appropriate method is shown, but the answer is left in an inappropriate form, such as 116.2.

or [3] An appropriate method is shown, but 3 feet is not added, and the answer is left 113.

or [3] Tangent function is used, but computational mistakes are made, but 3 feet is added to the incorrect value and the answer is found correctly.

[2] An incorrect trigonometric function is used, 3 feet is added, and the answer is rounded correctly.

or [2] Tangent function is used, but computational mistakes are made, and 3 feet is not added to an incorrect answer.

[1] 116 and no work is shown.

or [1] An incorrect trigonometric function is used, and 3 feet is added to the incorrect answer, but the answer is rounded incorrectly.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[2] incorrect procedure.

[2] 117.6, and appropriate work is shown,

such as $\tan 78^\circ = \frac{x}{25}$.

[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, but an appropriate solution is found.

or [1] A correct trigonometric equation is written, but no further correct work is shown.

or [1] 117.6, 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

[3] incorrect procedure.

[3] 45, and appropriate work is shown, such

as $\tan 66^\circ = \frac{x}{20}$.

[2] A correct trigonometric ratio is used, and values are substituted correctly, but one computational or rounding error is made, or the calculator is left in radian mode.

[1] Appropriate work is shown, but two or more computational or rounding errors are made.

or [1] Appropriate work is shown, but one conceptual error is made, such as using an incorrect trigonometric ratio.

or [1] An incorrect diagram is drawn, but an appropriate solution is found.

or [1] A correctly labeled diagram is drawn, but no further correct work is shown.

or [1] A correct trigonometric ratio is written, but no further correct work is shown.

or [1] 45, 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

[4] incorrect procedure.

[4] 153, and appropriate work is shown, such

as $\sin 50^\circ = \frac{x}{200}$.

[3] An appropriate analysis is shown, but one computational or rounding error is made.

[2] An incorrect trigonometric function is

used, such as $\cos 50^\circ = \frac{x}{200}$, but it is carried

to an appropriate final answer and is rounded correctly.

[1] An incorrect trigonometric function is used and solved appropriately, but it is rounded incorrectly.

or [1] Only an appropriate diagram is shown.

or [1] 153, but no work is shown.

[0] Use of the Pythagorean theorem, such as $200^2 = 50^2 + x^2$, is shown.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[5] obviously incorrect procedure.

[4] 79.4, and appropriate work is shown, such as $\tan 52 = \frac{x}{62}$.

[3] Appropriate work is shown, but one computational or rounding error is made.
or [3] An incorrectly labeled diagram is drawn, but the appropriate trigonometric function is used, and an appropriate answer is found.

[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 an incorrect trigonometric function or ratio.

[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.

or [1] A correctly labeled diagram is drawn, but no further correct work is shown.

or [1] A correct equation is written, but no further correct work is shown.

or [1] An incorrectly labeled diagram is drawn, but an appropriate equation is written, but no further correct work is shown.

or [1] 79.4, 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

[6] incorrect procedure.

[4] 41.4, and appropriate work is shown, such as $200 \tan 28^\circ - 200 \tan 18^\circ$.

[3] Appropriate work is shown, but one computational or rounding error is made.
or [3] Appropriate work is shown to find the correct height of the cliff and the correct combined height of the lighthouse and the cliff, but they are not subtracted.

[2] Appropriate work is shown, but two or more computational or rounding errors are made.

[2] Appropriate work is shown, but one conceptual error is made, such as using an incorrect trigonometric function.

or [2] Appropriate work is shown to find the correct height of the cliff or the correct combined height of the lighthouse and the cliff, 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] A correct equation is written to find the height of the lighthouse, but no further correct work is shown.

or [1] 41.4, but no work is shown.

[0] The correct height of the cliff or the correct combined height of the lighthouse and cliff is found, but no work is shown.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[7] obviously incorrect procedure.