Lesson 2.6.4: Applying Tangents

Targets:

1. I can use the value of the tangent ratio of the angle of elevation or depression to solve real-world problems.
2. I can explain why the slope of a line is the same as the tangent of its angle of depression or elevation.

Warm Up

a. Use a calculator to find the tangent of θ. Give your answer correct to four decimal places.

θ	0	10	20	30	40	50	60	70	80	90
$\sin\theta$	0	0.1736	0.3420	0.5	0.6428	0.7660	0.8660	0.9397	0.9848	1
$\cos\theta$	1	0.9848	0.9397	0.8660	0.7660	0.6428	0.5	0.3420	0.1736	0
$\frac{\sin\theta}{\cos\theta}$										
$\tan\theta$										

b. The table from Lesson 2.6.3 is provided here for you. In the row labeled $\frac{\sin\theta}{\cos\theta}$, divide the sine values by the cosine values. What do you notice?

Angle of Elevation vs. Angle of Depression

Watch the video and take notes here:

- What is an angle of elevation? Draw an example.

- What is an angle of depression? Draw an example.

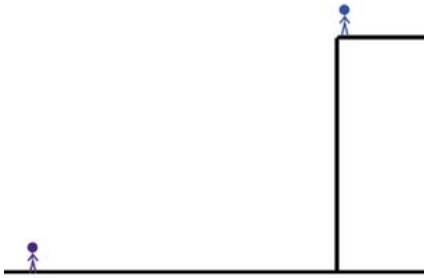
Practice 1

Scott, whose eye level is 1.5 m above the ground, stands 30 m from a tree. The angle of elevation of a bird at the top of the tree is 36°.

1. How far above ground is the bird?
2. How far away is Scott from the bird?

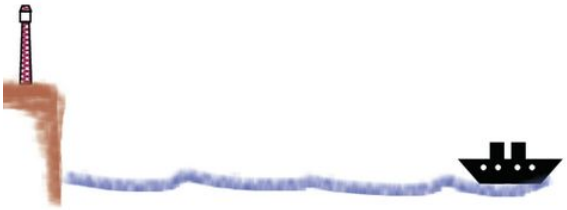
Practice 2

From an angle of depression of 40 degrees, John watches his friend approach his building while standing on the rooftop. The rooftop is 16 m from the ground, and John's eye level is about 1.8 m from the rooftop. What is the distance between John's friend and the building?



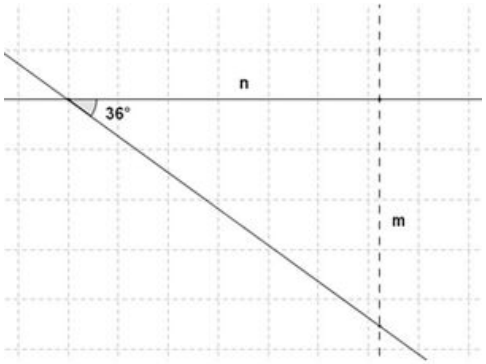
Practice 3

Standing on the gallery of a lighthouse (the deck at the top of a lighthouse), a person spots a ship at an angle of depression of 20 degrees. The lighthouse is 28 m tall and sits on a cliff 45 m tall as measured from sea level. What is the horizontal distance between the lighthouse and the ship? Sketch a diagram to support your answer.



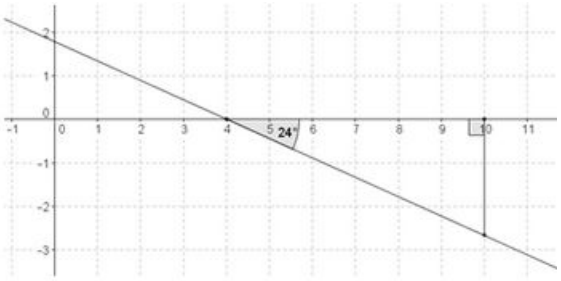
Practice 4

A line on the coordinate plane makes an angle of depression of 36 degrees. Find the slope of the line, correct to four decimal places.



Exit Ticket

1. The line on the coordinate plane makes an angle of depression of 24 degrees. Find the slope of the line, correct to four decimal places.



2. Samuel is at the top of a tower and will ride a trolley down a zip-line to a lower tower. The total vertical drop of the zip-line is 40 ft. The zip line's angle of elevation from the tower is 11.5 degrees. What is the horizontal distance between the towers?