

Vertical Progression:

7th Grade	<p>7.RP.A Analyze proportional relationships and use them to solve real-world and mathematical problems.</p> <ul style="list-style-type: none"> ○ 7.RP.A.2 Recognize and represent proportional relationships between quantities. <p>7.G.A Draw, construct, and describe geometrical figures and describe the relationships between them.</p> <ul style="list-style-type: none"> ○ 7.G.A.1 Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.
8th Grade	<p>8.EE.B Understand the connections between proportional relationships, lines, and linear equations.</p> <ul style="list-style-type: none"> ○ 8.EE.B.6 Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b. <p>8.G.B Understand and apply the Pythagorean Theorem.</p> <ul style="list-style-type: none"> ○ 8.G.B.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.
Geometry	<p>ELG.MA.HS.G.7 Define trigonometric ratios and solve problems involving right triangles.</p> <ul style="list-style-type: none"> ○ G-SRT.6 Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles. ○ G-SRT.7 Explain and use the relationship between the sine and cosine of complementary angles. ○ G-SRT.8 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.*
Algebra 2	<p>ELG.MA.HS.F.9 Model periodic phenomena with trigonometric functions.</p> <ul style="list-style-type: none"> ○ F-TF.B.5 Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.* <p>ELG.MA.HS.F.10 Prove and apply trigonometric identities.</p> <ul style="list-style-type: none"> ○ F-TF.C.8 Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to find $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ and the quadrant of the angle.

Students will demonstrate command of the ELG by:

- Determining specific ratios for sine, cosine, and tangent for specified angles in right triangles if all sides are known or if only two sides are known.
- Explaining and using the relationship between the sine and cosine of complementary angles.
- Using trigonometric ratios and the Pythagorean Theorem to solve right triangles in mathematical and applied problems.

Vocabulary:

- | | | |
|-----------------------|---------------------|------------------------|
| • complementary angle | • right triangle | • tangent |
| • cosine | • similar triangles | • trigonometric ratios |
| • Pythagorean theorem | • sine | |

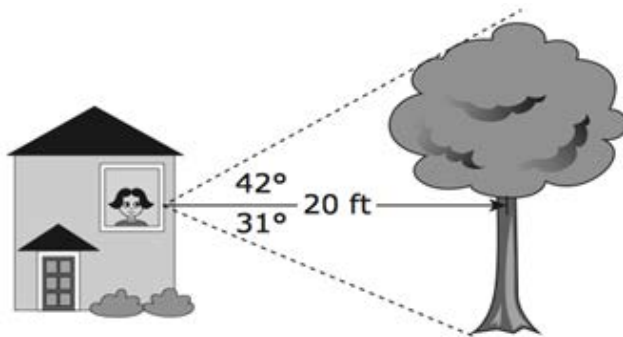
Sample Instructional/Assessment Tasks:

1) Standard(s): G-SRT.8

Source: PARCC Geometry PBA Practice Test

Item Prompt:

Mariela is standing in a building and looking out of a window at a tree. The tree is 20 feet away from Mariela. Mariela's line of sight to the top of the tree creates a 42° angle of elevation, and her line of sight to the base of the tree creates a 31° angle of depression.



What is the height, in feet, of the tree?

Solution:

30 to 30.03 feet

2) Standard(s): G-SRT.C.7

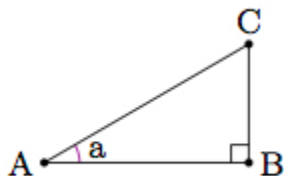
Source: <https://www.illustrativemathematics.org/content-standards/HSG/SRT/C/7/tasks/1443>

Item Prompt:

- Suppose $0^\circ < a < 90^\circ$ is the measure of an acute angle. Draw a picture and explain why $\sin a = \cos(90 - a)$
- Are there any angle measures $0^\circ < a < 90^\circ$ for which $\sin a = \cos a$? Explain.

Correct Answers:

a.



$$\sin 45^\circ = \cos 45^\circ = \frac{\sqrt{2}}{2}$$