

Geometry · Right Triangle Trigonometry · Worksheet Answer Key

Common Core G-SRT.C.6, G-SRT.C.7, G-SRT.C.8 · mathovore.fr

This answer key gives a full worked solution for every problem on the right triangle trigonometry worksheet. Compare each setup, not just the final number, and check the rounding rules. Calculators must be in degree mode.

Geometry Common Core: G-SRT.C.6 · G-SRT.C.7 · G-SRT.C.8

Problem 1: Name the sides

The side across from $\angle A$ is $\overline{BC}$. The leg that touches $\angle A$ (other than the hypotenuse) is $\overline{AB}$. The side across from the right angle is $\overline{AC}$.

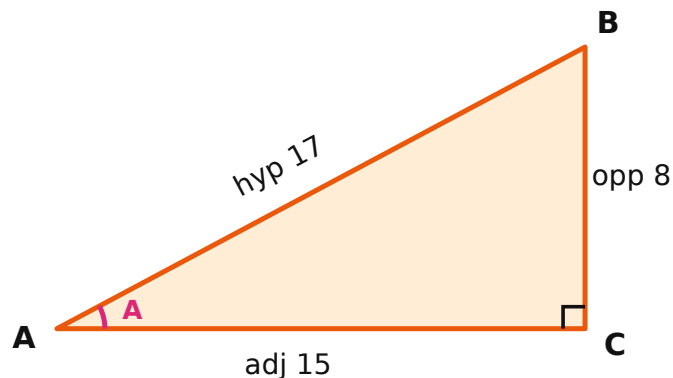
Opposite: $\overline{BC}$; adjacent: $\overline{AB}$; hypotenuse: $\overline{AC}$.

Problem 2: Ratios from side lengths

Relative to A , the opposite side is 8, the adjacent side is 15 and the hypotenuse is 17.

$$\sin A = \frac{8}{17}, \cos A = \frac{15}{17}, \tan A = \frac{8}{15}.$$

$$\sin A = \frac{8}{17}, \cos A = \frac{15}{17}, \tan A = \frac{8}{15}$$



Opposite 8, adjacent 15, hypotenuse 17.

Problem 3: Ratios for the other angle

The side opposite D is $EF = 21$. The side opposite E is $DF = 20$.

$$\sin D = \frac{21}{29}, \cos E = \frac{21}{29}, \tan E = \frac{20}{21}.$$

$\sin D = \cos E = \frac{21}{29}$. They are equal because D and E are complementary.

Problem 4: Ratios in a 7-24-25 triangle

The side opposite P is $QR = 7$ and the side adjacent to P is $PQ = 24$.

$\tan P = \frac{7}{24}$, $\cos P = \frac{24}{25}$. The side opposite R is $PQ = 24$, so $\sin R = \frac{24}{25}$.

$\tan P = \frac{7}{24}$, $\cos P = \frac{24}{25}$, $\sin R = \frac{24}{25}$

Problem 5: Using a calculator

Enter each angle with the calculator in degree mode.

$\sin 28^\circ \approx 0.4695$, $\cos 63^\circ \approx 0.4540$, $\tan 51^\circ \approx 1.2349$.

0.4695, 0.4540, 1.2349

Problem 6: Finding an angle from a ratio

Use the inverse function for each ratio.

$x = \sin^{-1}(0.6) \approx 36.9^\circ$; $x = \cos^{-1}(0.25) \approx 75.5^\circ$; $x = \tan^{-1}(2.4) \approx 67.4^\circ$.

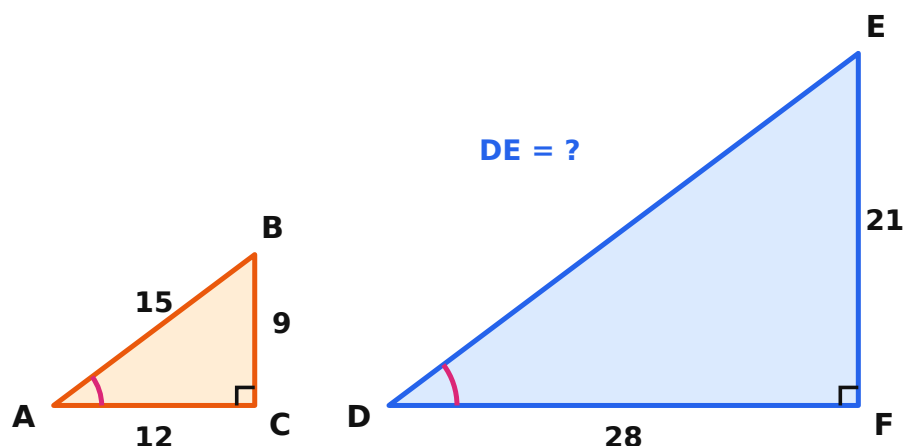
36.9° , 75.5° , 67.4°

Problem 7: Similar right triangles

In triangle ABC, $\sin A = \frac{9}{15} = \frac{3}{5}$. Since $\angle D \cong \angle A$, $\sin D = \sin A = \frac{3}{5}$. In triangle DEF, $\sin D = \frac{EF}{DE} = \frac{21}{DE}$. Set the ratios equal: $\frac{21}{DE} = \frac{3}{5}$, so $3 \cdot DE = 105$ and $DE = 35$.

Check: $\frac{21}{35} = \frac{3}{5}$.

$DE = 35$



Both triangles give sine of the marked angle equal to $\frac{3}{5}$; DE is 35.

Problem 8: Complementary angle identities

Subtract each angle from 90° and switch between sine and cosine.

$$\sin 20^\circ = \cos 70^\circ, \cos 75^\circ = \sin 15^\circ, \sin 38^\circ = \cos 52^\circ.$$

$$\cos 70^\circ, \sin 15^\circ, \cos 52^\circ$$

Problem 9: Solving with complementary angles

Sine and cosine are equal only for complementary angles, so the angles add to 90° .

$$(3x+5) + (2x+10) = 90, \text{ so } 5x+15 = 90, 5x = 75 \text{ and } x = 15.$$

$$\text{Check: } \sin 50^\circ = \cos 40^\circ.$$

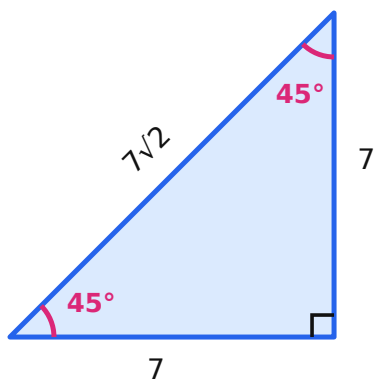
$$x = 15$$

Problem 10: 45-45-90 triangle, find the hypotenuse

In a 45-45-90 triangle the hypotenuse is the leg times $\sqrt{2}$.

$$x = 7\sqrt{2} \approx 9.9.$$

$$x = 7\sqrt{2} \approx 9.9$$



Hypotenuse 7 times the square root of 2.

Problem 11: 45-45-90 triangle, find the legs

The legs equal the hypotenuse divided by $\sqrt{2}$.

$$\text{leg} = \frac{12 \cdot \sqrt{2}}{\sqrt{2} \cdot \sqrt{2}} = \frac{12\sqrt{2}}{2} = 6\sqrt{2} \approx 8.5.$$

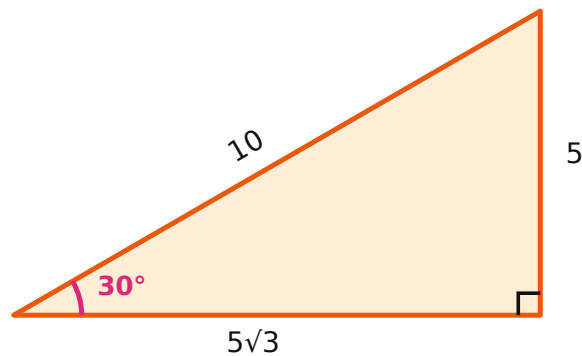
$$6\sqrt{2} \approx 8.5 \text{ in}$$

Problem 12: 30-60-90 triangle, short leg given

The side opposite 30° is the short leg, 5. The hypotenuse is twice the short leg, and the long leg is the short leg times $\sqrt{3}$.

$$x = 2(5) = 10 \text{ and } y = 5\sqrt{3} \approx 8.7.$$

$$x = 10, y = 5\sqrt{3} \approx 8.7$$



Short leg 5, long leg 5 times the square root of 3, hypotenuse 10.

Problem 13: 30-60-90 triangle, hypotenuse given

The short leg is half the hypotenuse, and the long leg is the short leg times $\sqrt{3}$.

$$\text{short leg} = \frac{18}{2} = 9 \text{ and long leg} = 9\sqrt{3} \approx 15.6.$$

$$9 \text{ cm}, 9\sqrt{3} \text{ cm}$$

Problem 14: 30-60-90 triangle, long leg given

The long leg equals the short leg times $\sqrt{3}$, so the short leg is $\frac{6\sqrt{3}}{\sqrt{3}} = 6$. The hypotenuse is twice the short leg: $2(6) = 12$.

$$\text{short leg } 6 \text{ ft, hypotenuse } 12 \text{ ft}$$

Problem 15: Angle from two sides

The known sides are opposite and adjacent, so use tangent: $\tan A = \frac{7}{11}$.

$$A = \tan^{-1}\left(\frac{7}{11}\right) \approx 32.5^\circ.$$

$$m\angle A \approx 32.5^\circ$$

Problem 16: Solve a right triangle

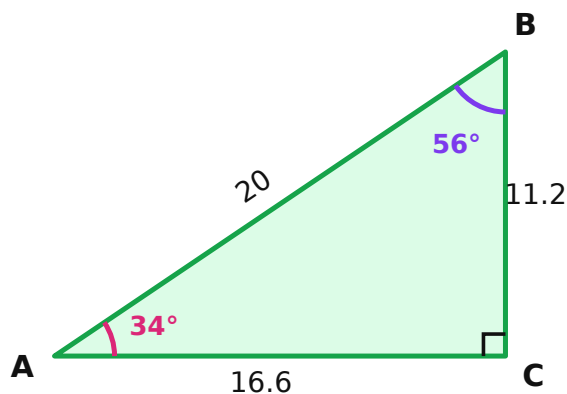
The acute angles are complementary: $\angle B = 90^\circ - 34^\circ = 56^\circ$.

Side a is opposite A : $\sin 34^\circ = \frac{a}{20}$, so $a = 20 \sin 34^\circ \approx 11.2$.

Side b is adjacent: $\cos 34^\circ = \frac{b}{20}$, so $b = 20 \cos 34^\circ \approx 16.6$.

Check: $11.2^2 + 16.6^2 \approx 401.0 \approx 20^2$.

$\angle B = 56^\circ$, $a \approx 11.2$, $b \approx 16.6$



All six parts of the solved triangle.

Problem 17: Ladder against a wall

The height is opposite the 70° angle and the ladder is the hypotenuse, so use sine.

$\sin 70^\circ = \frac{h}{15}$, so $h = 15 \sin 70^\circ \approx 14.1$.

$h \approx 14.1$ ft

Problem 18: Height of a flagpole

The distance is adjacent to the angle and the part of the pole above her eyes is opposite, so use tangent.

$\tan 32^\circ = \frac{h}{85}$, so $h = 85 \tan 32^\circ \approx 53.1$ ft above eye level.

Add her eye height: $53.1 + 5.5 = 58.6$.

≈ 58.6 ft

Problem 19: Lighthouse and boat

The angle of depression equals the angle of elevation from the boat, so the angle at the boat

is 25° . The 120 ft height is opposite and the distance d is adjacent.

$$\tan 25^\circ = \frac{120}{d}, \text{ so } d = \frac{120}{\tan 25^\circ} \approx 257.3.$$

$$d \approx 257.3 \text{ ft}$$

Problem 20: Wheelchair ramp

The rise is opposite the angle. The ramp surface is the hypotenuse and the horizontal distance is adjacent.

$$\text{Length: } \sin 4.8^\circ = \frac{2.5}{L}, \text{ so } L = \frac{2.5}{\sin 4.8^\circ} \approx 29.9.$$

$$\text{Horizontal distance: } \tan 4.8^\circ = \frac{2.5}{x}, \text{ so } x = \frac{2.5}{\tan 4.8^\circ} \approx 29.8.$$

$$\text{ramp} \approx 29.9 \text{ ft, horizontal} \approx 29.8 \text{ ft}$$

Problem 21: Kite height

The string is the hypotenuse and the height above his hand is opposite the angle, so use sine.

$$100 \sin 48^\circ \approx 74.3 \text{ ft above his hand. Add 4 ft: } 74.3 + 4 = 78.3.$$

$$\approx 78.3 \text{ ft}$$

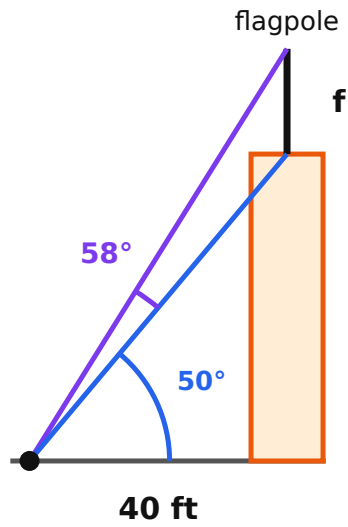
Problem 22: Flagpole on a building

Find each height with tangent, then subtract.

$$\text{To the roof: } 40 \tan 50^\circ \approx 47.7. \text{ To the top of the pole: } 40 \tan 58^\circ \approx 64.0.$$

$$\text{Flagpole: } 64.0 - 47.7 \approx 16.3, \text{ which agrees with } 40(\tan 58^\circ - \tan 50^\circ) \approx 16.3.$$

$$\approx 16.3 \text{ ft}$$



The flagpole is the difference of the two heights.