1. Question Details LarTrig10 1.3.00

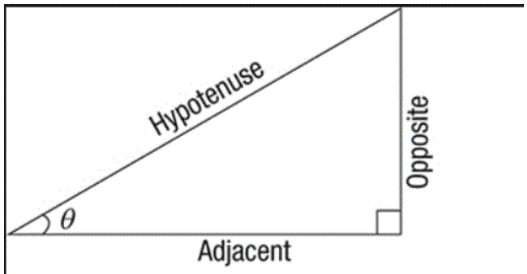
Match each trigonometric function with its right triangle definition.

(a) sine

(b) cosine

(c) tangent (d) cosecant (e) secant (f) cotangent

SOHCAHTOA



$$\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}} \qquad \csc\theta = \frac{\text{hypotenuse}}{\text{opposite}}$$

$$\cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}} \qquad \sec\theta = \frac{\text{hypotenuse}}{\text{adjacent}}$$

$$\tan\theta = \frac{\text{opposite}}{\text{adjacent}} \qquad \cot\theta = \frac{\text{adjacent}}{\text{opposite}}$$

2. Question Details

Fill in the blanks.

Relative to the acute angle θ, the three sides of a right triangle are the ---Select--- side, the ---Select--- side, and the ---Select---.

3. Question Details

Fill in the blank.

Cofunctions of ---Select--- angles are equal.

complementary angles

$a+b=90^\circ$ Complement

$a+b=180^\circ$ Supplement

$a>0, b>0$

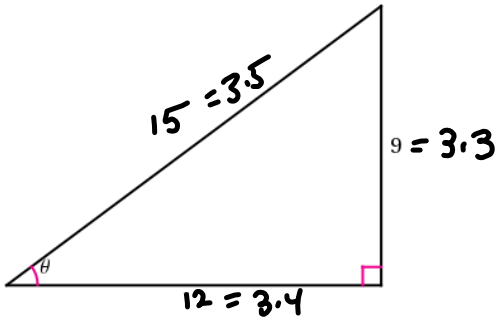
4. Question Details

Fill in the blanks.

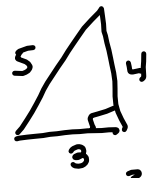
An angle of ---Select--- represents the angle from the horizontal upward to an object, whereas an angle of ---Select--- represents the angle from the horizontal downward to an object.

5. Question Details

Find the exact values of the six trigonometric functions of the angle θ shown in the figure.



$3^2+4^2=25=5^2$



$\sin\theta = \frac{3}{5}$ $\quad \csc\theta = \frac{5}{3}$

$\cos\theta = \frac{4}{5}$ $\quad \sec\theta = \frac{5}{4}$

$\tan\theta = \frac{3}{4}$ $\quad \cot\theta = \frac{4}{3}$

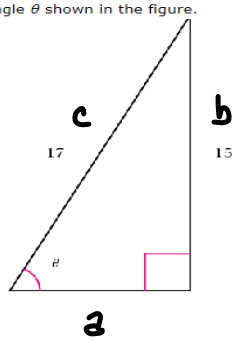
6. Question Details

Find the exact values of the six trigonometric functions of the angle θ shown in the figure.

Same game

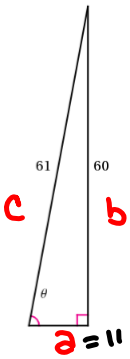
$17^2 - 15^2 = a^2$

$c^2 - b^2 = a^2$



7. Question Details

Find the exact values of the six trigonometric functions of the angle θ shown in the figure. (Use the Pythagorean Theorem to find the third side of the triangle.)



c b a = 11

$a^2+b^2=c^2 \rightarrow a^2=c^2-b^2$

$a^2+60^2=61^2$

$a^2=61^2-60^2=121=a^2$

Trick: $(61-60)(61+60) = 1\cdot 121 = 121!$

$c^2-d^2=(c-d)(c+d)!$

$a=\pm\sqrt{121}=\pm 11.$

All positive, so $a=11$

SOHCAHTOA

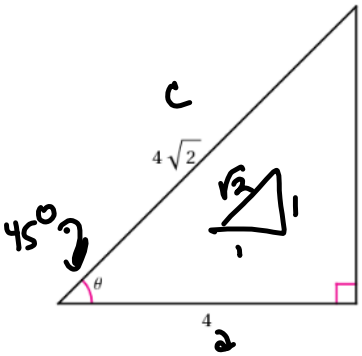
$\sin\theta=\frac{b}{c}=\frac{60}{61}$ $\quad \csc\theta=\frac{61}{60}$

$\cos\theta=\frac{a}{c}=\frac{11}{61}$ $\quad \sec\theta=\frac{61}{11}$

$\tan\theta=\frac{60}{11}$ $\quad \cot\theta=\frac{11}{60}$

Question Details

Find the exact values of the six trigonometric functions of the angle θ shown in the figure.



$(hk)^n=h^n k^n$

$a^2+b^2=c^2$

$b^2=c^2-a^2=(4\sqrt{2})^2-4^2$

$=4^2\sqrt{2}^2-16=16\cdot 2-16$

$=16=b^2$

$b=\pm\sqrt{16}=\pm 4 \rightarrow +4$

b = 4

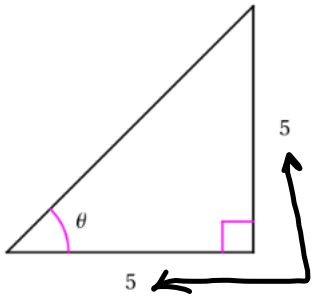
$\sin\theta=\frac{4}{4\sqrt{2}}=\frac{1}{\sqrt{2}}$ $\quad \csc\theta=\sqrt{2}$

$\cos\theta=\frac{4}{4\sqrt{2}}=\frac{1}{\sqrt{2}}$ $\quad \sec\theta=\sqrt{2}$

$\tan\theta=\frac{4}{4}=1$ $\quad \cot\theta=1$

9. Question Details

Find the exact values of the six trigonometric functions of the angle θ shown in the figure.



same!

Must be 45^0 !

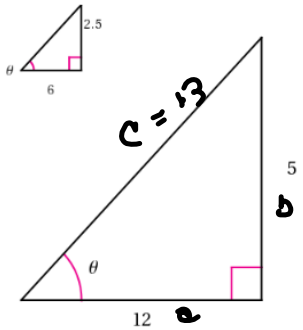
So $\sin\theta = \frac{1}{\sqrt{2}}$ $\quad \csc\theta = \sqrt{2}$

$\cos\theta = \frac{1}{\sqrt{2}}$ $\quad \sec\theta = \sqrt{2}$

$\tan\theta = 1$ $\quad \cot\theta = 1$

10. Question Details

Find the exact values of the six trigonometric functions of the angle θ for each of the two triangles.



Same θ for both!

They're similar triangles

$\frac{5}{2.5} = 2 = \frac{12}{6}$: The ratios of the sides to one another are identical. Similar.

$\sin\theta = \frac{5}{13}$ $\quad \csc\theta = \frac{13}{5}$

$\cos\theta = \frac{12}{13}$ $\quad \sec\theta = \frac{13}{12}$

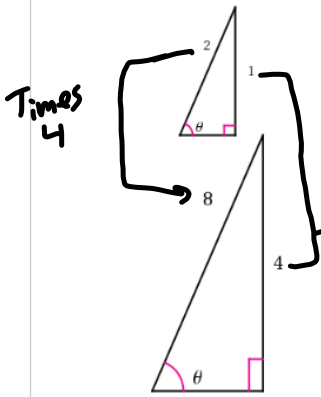
$\tan\theta = \frac{5}{12}$ $\quad \cot\theta = \frac{12}{5}$

$12^2 + 5^2 = 144 + 25 = 169 = 13^2$

$a^2 + b^2 = c^2$

11. Question Details

Find the exact values of the six trigonometric functions of the angle θ for each of the two triangles.



Times 4

Again, Similar Triangles.
Trigs are the same for both.
So do one & get the other one, free!

→ Times 4.

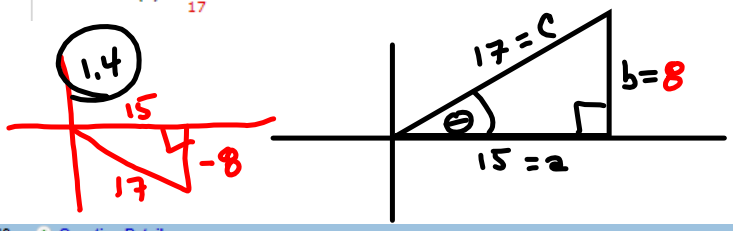
Explain why the function values are the same.

- The triangles are congruent, and the trigonometric function values must be the same.
- The triangles are similar, and corresponding sides are proportional.

12. Question Details

Sketch a right triangle corresponding to the trigonometric function of the acute angle θ. Then find the exact values of the other five trigonometric functions of θ.

$\cos(\theta) = \frac{15}{17}$

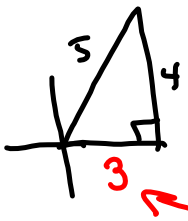


$b^2 = c^2 - a^2$
$= 17^2 - 15^2 = 289 - 225$
$= 64 \Rightarrow$
$b = \pm\sqrt{64} \rightarrow b = 8$

13. Question Details

Sketch a right triangle corresponding to the trigonometric function of the acute angle θ. Then find the exact values of the other five trigonometric functions of θ.

$\sin(\theta) = \frac{4}{5}$

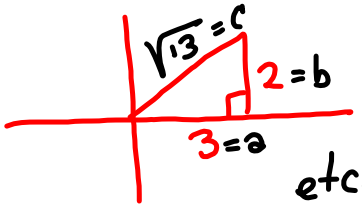


3-4-5! by inspection

14. Question Details

Sketch a right triangle corresponding to the trigonometric function of the acute angle θ. Then find the exact values of the other five trigonometric functions of θ.

$\tan(\theta) = \frac{2}{3}$



etc.

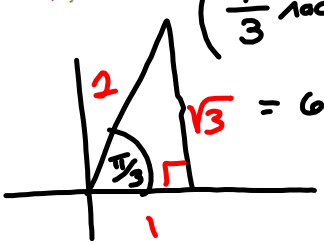
$a^2 + b^2 = 3^2 + 2^2 = 9 + 4 = 13 = c^2$
$\Rightarrow c = \pm\sqrt{13} \rightarrow c = \sqrt{13}$
Hangin' positive.

15. Question Details

Construct an appropriate triangle to complete the table. ($0° \le \theta \le 90°$, $0 \le \theta \le \pi/2$)

Function	θ (deg)	θ (rad)	Function Value
$\sin\theta$	60°	$\frac{\pi}{3}$	$\frac{\sqrt{3}}{2}$

$\left(\frac{\pi}{3}\text{ rad}\right)\left(\frac{180^\circ}{\pi\text{ rad}}\right) = 60^\circ$



16. Question Details

Construct an appropriate triangle to find the missing values. ($0° \le \theta \le 90°$, $0 \le \theta \le \pi/2$)

Function	θ (deg)	θ (rad)	Function Value
$\tan\theta$	60°	$\frac{\pi}{3}$	$\sqrt{3}$

17. Question Details

Use a calculator to evaluate each function. Round your answers to four decimal places. (Be sure the calculator is in the correct angle mode.)

(a) sin 20°
.3420

(b) cos 70°
.9397

My software is stuck in radians mode.

$(20^\circ)\left(\frac{\pi\text{ rad}}{180^\circ}\right) = \frac{\pi}{9}$ rad.

.3420201433
.9396926210

18. Question Details

Use a calculator to evaluate each function. Round your answers to four decimal places. (Be sure the calculator is in the correct mode.)

(a) tan 15.5°

(b) cot 74.5°
.2773

Calculator may not have COT key, so do TAN & then 1/x. OR

DO 1/TAN(74.5°)

.2773245438

19. Question Details

Use a calculator to evaluate each function. Round your answers to four decimal places. (Be sure the calculator is in the correct angle mode.)

(a) cos(5° 54' 29") 1.0053

(b) sec(5° 54' 29") 1.0053

DMS - Degrees, minutes, seconds to decimal.

$= \sec\left(5 + \frac{54}{60} + \frac{29}{3600}\left(\frac{\pi}{180}\right)\right) \approx$

FOR MY SOFTWARE

1.005340009

.9946883551

20. Question Details

Use a calculator to evaluate each function. Round your answers to four decimal places. (Be sure the calculator is in the correct mode.)

(a) sec 22° 24'

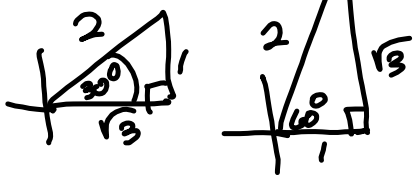
(b) csc 55° 5'

21. Question Details

Use the given function values and the trigonometric identities to find the exact value of each indicated trigonometric function.

$\sin(60°) = \frac{\sqrt{3}}{2}$, $\cos(60°) = \frac{1}{2}$

CO - CO



(a) sin(30°)

(b) cos(30°)

(c) tan(60°)

(d) cot(60°)

22. Question Details

Use the given function value and the trigonometric identities to find the exact value of each indicated trigonometric function.

$\sin(30°) = \frac{1}{2}$ $\tan(30°) = \frac{\sqrt{3}}{3} = \frac{1}{\sqrt{3}}$

(a) csc(30°)

2

(b) cot(60°)

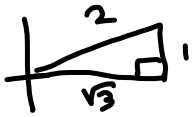
$= \frac{\sqrt{3}}{3}$

(c) cos(30°)

$\frac{\sqrt{3}}{2}$

(d) cot(30°)

$\sqrt{3}$



Reciprocal identities

$\csc\theta = \frac{1}{\sin\theta}$

$\sec\theta = \frac{1}{\cos\theta}$

$\cot\theta = \frac{1}{\tan\theta}$

$3 = \sqrt{3}\sqrt{3}$

$\frac{3}{\sqrt{3}} = \frac{\sqrt{3}\sqrt{3}}{\sqrt{3}}$

Part (c), (d) $\cot\theta = \ldots$

$\tan\theta = \frac{\sin\theta}{\cos\theta}$

So $\frac{1}{\sqrt{3}} = \frac{\frac{1}{2}}{\cos\theta}$

$\cos\theta = \frac{1}{2} \cdot \sqrt{3} = \frac{\sqrt{3}}{2}$

23. Question Details

Use trigonometric identities to transform the left side of the equation into the right side $(0 < \theta < \pi/2)$.

$\tan\theta \cot\theta = 1$

$\tan\theta \cot\theta = \frac{\sin\theta}{\cos\theta} \cdot \frac{\square}{\sin\theta}$

$= 1$

24. tion Details

rigonometric identities to transform the left side of the equation into the right side $(0 < \alpha < \pi/2)$.

$\tan\alpha \cos\alpha = \sin\alpha$

$\tan\alpha \cos\alpha = \frac{\sin\alpha}{\square} \cdot \cos\alpha$

$= \sin\alpha$

25. Question Details

Use trigonometric identities to transform the left side of the equation into the right side $(0 < \theta < \pi/2)$.

$(1 + \sin\theta)(1 - \sin\theta) = \cos^2\theta$

$(1 + \sin\theta)(1 - \sin\theta) = 1 - (\quad)$

$= \cos^2\theta$

26. Question Details

Use trigonometric identities to transform the left side of the equation into the right side $(0 < \theta < \pi/2)$.

$(\sec\theta + \tan\theta)(\sec\theta - \tan\theta) = 1$

$(\sec\theta + \tan\theta)(\sec\theta - \tan\theta) = \sec^2\theta - (\quad)$

$= \dfrac{1 - (\quad)}{\cos^2\theta}$

$= \dfrac{\quad}{\cos^2\theta}$

$= 1$

27. Question Details

Use trigonometric identities to transform the left side of the equation into the right side $(0 < \theta < \pi/2)$.

$\sin^2\theta - \cos^2\theta = \sin^2\theta - (1 - (\quad))$

$= 2\sin^2\theta - 1$

28. Question Details

Use trigonometric identities to transform the left side of the equation into the right side $(0 < \theta < \pi/2)$.

$\dfrac{\tan\beta + \cot\beta}{\tan\beta} = \dfrac{\tan\beta}{\tan\beta} + \dfrac{\cot\beta}{\tan\beta}$

$= 1 + \quad$

$= \csc^2\beta$

29. Question Details

Find the values of θ in degrees $(0° < \theta < 90°)$ and radians $(0 < \theta < \pi/2)$ without the aid of a calculator.

(a) $\cos\theta = \dfrac{\sqrt{2}}{2}$

$\theta =$ degrees

$\theta =$ radians

(b) $\tan\theta = 1$

$\theta =$ degrees

$\theta =$ radians

30. Question Details

Find each value of θ in degrees $(0° < \theta < 90°)$ and radians $(0 < \theta < \pi/2)$ without using a calculator.

(a) $\sec\theta = \dfrac{2\sqrt{3}}{3}$

$\theta =$ degrees

$\theta =$ radians

(b) $\cot\theta = 1$

$\theta =$ degrees

$\theta =$ radians

31. Question Details

Find each value of θ in degrees ($0° < \theta < 90°$) and radians ($0 < \theta < \pi/2$) without using a calculator.

(a) $\csc(\theta) = \frac{2\sqrt{3}}{3}$

$\theta =$ [ ] degrees

$\theta =$ [ ] radians

(b) $\sin(\theta) = \frac{\sqrt{2}}{2}$

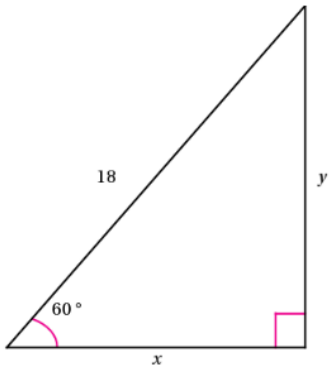
$\theta =$ [ ] degrees

$\theta =$ [ ] radians

32. Question Details

Find the exact values of x and y.

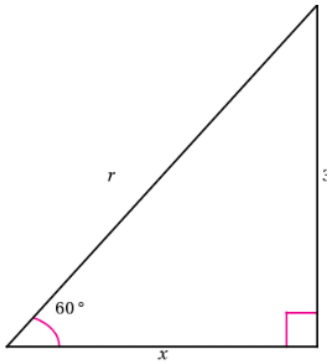
$(x, y) =$ ([ ])



33. Question Details

Find the exact values of x and r.

$(x, r) =$ ([ ])



34. Question Details

You are standing 48 meters from the base of a building. You estimate that the angle of elevation to the top of the 86th floor (the observatory) is 82°.

If the total height of the building is another 126 meters above the 86th floor, what is the approximate height of the building? (Round your answers to one decimal place.)

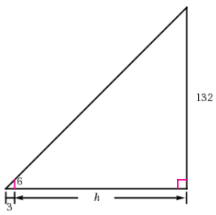
One of your friends is on the 86th floor. What is the distance between you and your friend?

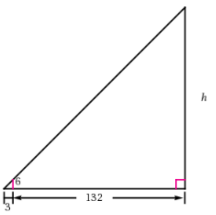
[ ] meters

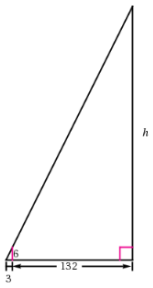
35. Question Details

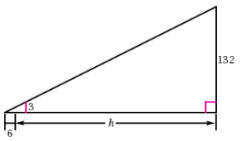
A six-foot person walks from the base of a broadcasting tower directly toward the tip of the shadow cast by the tower. When the person is 132 feet from the tower and 3 feet from the tip of the shadow, the person's shadow starts to appear beyond the tower's shadow.

(a) Draw a right triangle that gives a visual representation of the problem. Label the known quantities of the triangle and use a variable to represent the height of the tower.









(b) Use a trigonometric function to write an equation involving the unknown quantity h.

$\tan(\theta) = \frac{6}{3} =$ [ ]

(c) What is the height of the tower?

[ ] .