LESSON 2

Reciprocal Trigonometric Functions.

The reciprocal functions are cosecant (csc), secant (sec), and cotangent (cot).

Cosecant is the reciprocal of sine. Its abbreviation is csc. To determine csc, just flip sin over.

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

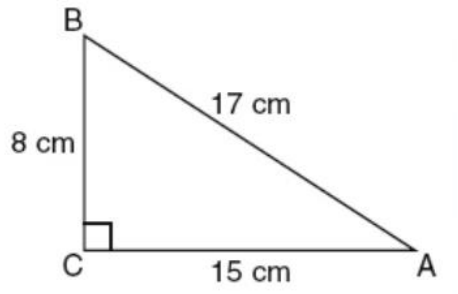
Secant is the reciprocal of cosine. Its abbreviation is sec. To determine sec, just flip cos over.

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

Cotangent is the reciprocal of tangent. Its abbreviation is cot. To determine cot, just flip tan over.

$$\textbf{cot A} = \frac{1}{\tan A}$$

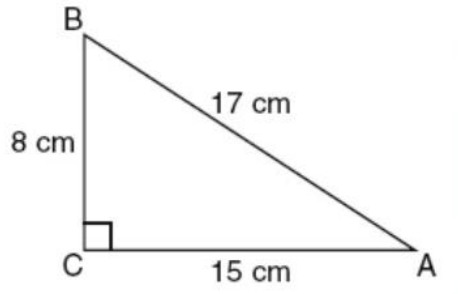
Example 3. Find the cosecant, secant, and cotangent ratios of angle A.



Solution.

1. $\csc A = \frac{1}{\sin A} = \frac{17}{8}$
2. $\sec A = \frac{1}{cosA} = \frac{17}{15}$
3. $\cot A = \frac{1}{\tan A} = \frac{15}{8}$

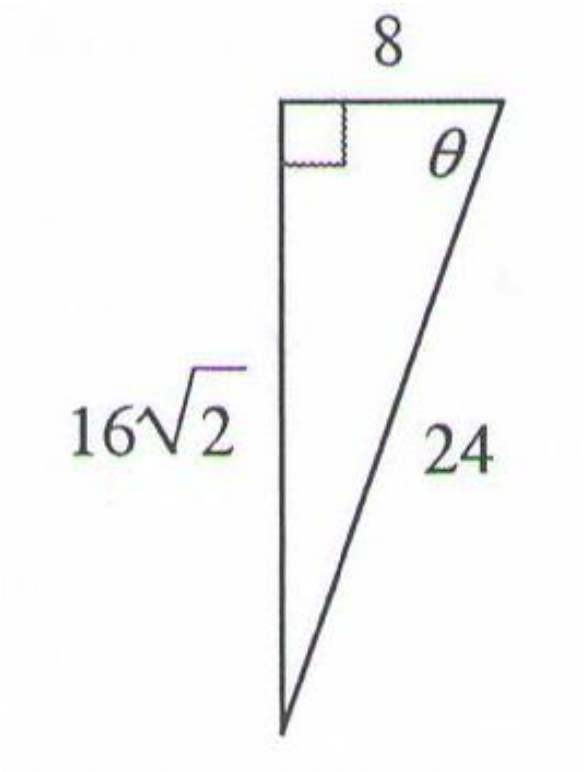
Example 4. Find the cosecant, secant, and cotangent ratios of angle B.



Solution.

1. $\csc B = \dfrac{1}{\sin B} = \dfrac{17}{15}$
2. $\sec B = \dfrac{1}{\cos B} = \dfrac{17}{8}$
3. $\cot B = \dfrac{1}{\tan B} = \dfrac{8}{15}$

Example 5. Find the cosecant, secant, and cotangent ratios of angle θ.



Solution.

1. $\csc\theta = \dfrac{24}{16\sqrt{2}} = \dfrac{3}{2\sqrt{2}} \times \dfrac{2\sqrt{2}}{2\sqrt{2}} \Rightarrow \dfrac{6\sqrt{2}}{8} = \dfrac{3\sqrt{2}}{4}$

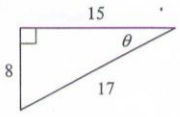
2. $\sec\theta = \dfrac{24}{8} = 3$

3. $\cot\theta = \dfrac{8}{16\sqrt{2}} = \dfrac{1}{2\sqrt{2}} \Rightarrow \dfrac{1}{2\sqrt{2}} \times \dfrac{2\sqrt{2}}{2\sqrt{2}} = \dfrac{2\sqrt{2}}{8} = \dfrac{\sqrt{2}}{4}$

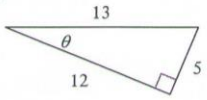
Lesson 2 Exercise

Find the value of the trig function indicated.

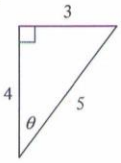
1) sec θ



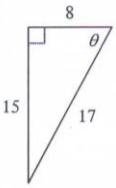
2) sec θ



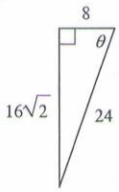
3) cot θ



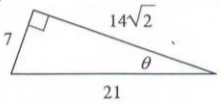
4) csc θ



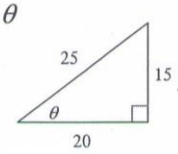
5) csc θ



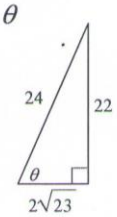
6) cos θ



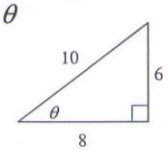
7) cot θ



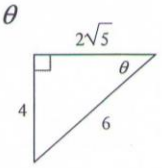
8) tan θ



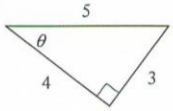
9) tan θ



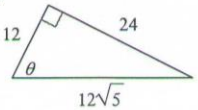
10) cot θ



11) tan θ



12) cot θ



SOLUTIONS.

Lesson 1 Exercise

1. **tan Z =** $\frac{21}{28}=\frac{3}{4}$
2. **cos C =** $\frac{16}{34}=\frac{8}{17}$
3. **sin C =** $\frac{28}{35}=\frac{4}{5}$
4. **tan X =** $\frac{32}{24}=\frac{4}{3}$
5. **cos A =** $\frac{30}{34}=\frac{15}{17}$
6. **sin A =** $\frac{32}{40}=\frac{4}{5}$
7. **sin Z =** $\frac{24}{40}=\frac{3}{5}$
8. **sin C =** $\frac{14}{50}=\frac{7}{25}$
9. **cos Z =** $\frac{24}{30}=\frac{4}{5}$
10. **tan C =** $\frac{27}{36}=\frac{3}{4}$

Lesson 2 Exercise

1. **sec θ =** $\frac{17}{15}$
2. **sec θ =** $\frac{13}{12}$
3. **cot θ =** $\frac{4}{3}$
4. **csc θ =** $\frac{17}{15}$
5. **csc θ =** $\frac{24}{16\sqrt{2}}=\frac{3}{2\sqrt{2}}\times\frac{2\sqrt{2}}{2\sqrt{2}}\Rightarrow\frac{6\sqrt{2}}{8}=\frac{3\sqrt{2}}{4}$
6. **cos θ =** $\frac{14\sqrt{2}}{21}=\frac{2\sqrt{2}}{3}$
7. **cot θ =** $\frac{20}{15}=\frac{4}{3}$
8. **tan θ =** $\frac{22}{2\sqrt{23}}=\frac{11}{\sqrt{23}}\Rightarrow\frac{11}{\sqrt{23}}\times\frac{\sqrt{23}}{\sqrt{23}}=\frac{11\sqrt{23}}{23}$
9. **tan θ =** $\frac{6}{8}=\frac{3}{4}$
10. **cot θ =** $\frac{2\sqrt{5}}{4}=\frac{\sqrt{5}}{2}$
11. **tan θ =** $\frac{3}{4}$
12. **cot θ =** $\frac{12}{24}=\frac{1}{2}$