

# CAT Section 2.1 Worksheet

Using triangle ABC with right angle at C, find each missing side length:

1.  $a=7, b=11$

$$7^2 + 11^2 = c^2$$

2.  $a=5, c=10$

$$5^2 + b^2 = 10^2$$

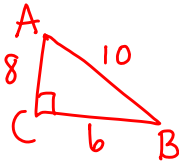
$$b = \sqrt{75} \text{ or } 5\sqrt{3}$$

3.  $b=8, c=12$

$$a^2 + 64 = 144$$

$$a = \sqrt{80} \text{ or } 4\sqrt{5}$$

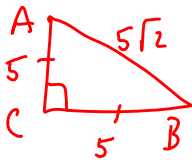
4. Given triangle ABC, with  $a=6, b=8$ , and  $c=10$ , find the  $\cos A$  and the  $\sin B$ .



$$\cos A = \frac{b}{10}$$

$$\sin B = \frac{8}{10} = \frac{4}{5}$$

5. In the 45-45-90 right triangle with  $a=5$ , list the missing side lengths, and then list the 6 trig ratios for angle A.



$$\sin A = \frac{5}{5\sqrt{2}} = \frac{\sqrt{2}}{2}$$

$$\csc A = \sqrt{2}$$

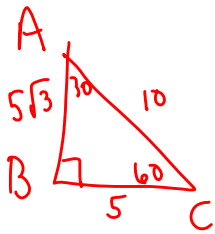
$$\cos A = \frac{5}{5\sqrt{2}} = \frac{\sqrt{2}}{2}$$

$$\sec A = \sqrt{2}$$

$$\tan A = 1$$

$$\cot A = 1$$

6. In the 30-60-90 right triangle with angle  $A = 30^\circ$  and  $a=5$ , list the missing side lengths, and then list the 6 trig ratios for angle A.



$$\sin A = \frac{5}{10} = \frac{1}{2}$$

$$\csc A = 2$$

$$\cos A = \frac{5\sqrt{3}}{10} = \frac{\sqrt{3}}{2}$$

$$\sec A = \frac{2}{\sqrt{3}}$$

$$\tan A = \frac{5\sqrt{3}}{5} = \sqrt{3}$$

$$\cot A = \frac{1}{\sqrt{3}}$$

Find one solution for each equation. Assume all angles involved are acute angles.

7.  $\cot(\theta - 8^\circ) = \tan(4\theta + 13^\circ)$

$$\theta - 8 + 4\theta + 13 = 90$$

$$5\theta + 5 = 90$$

$$5\theta = 85$$

$$\theta = 17^\circ$$

8.  $\sec(5\theta + 14^\circ) = \csc(2\theta - 8^\circ)$

$$5\theta + 14 + 2\theta - 8 = 90$$

$$7\theta + 6 = 90$$

$$7\theta = 84$$

$$\theta = 12^\circ$$

Simplify each.

9.  $\cos^2(30^\circ) + \sin^2(30^\circ)$

$$\left(\frac{\sqrt{3}}{2}\right)^2 + \left(\frac{1}{2}\right)^2 = \frac{3}{4} + \frac{1}{4} = 1$$

10.  $4 \sin^2(45^\circ) - \cos(180^\circ)$

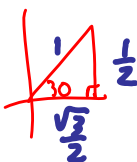
$$4\left(\frac{\sqrt{2}}{2}\right)^2 - (-1)$$

$$2 + 1 = 3$$

11.  $2 \sec(0^\circ) + 4 \cot^2(90^\circ) + \cos 360^\circ$

$$2(1) + 4(0)^2 + (-1)$$

$$= 1$$



$$\sec = \frac{r}{x}$$

$$\begin{pmatrix} 1 \\ 0 \end{pmatrix} \times \frac{1}{1} = 1$$

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Without using your calculator, complete the table for each trig function value:

$r=1$

$\theta$	Sin $\theta$ $\frac{y}{r}$	Cos $\theta$ $\frac{x}{r}$	Tan $\theta$ $\frac{y}{x}$	Csc $\theta$ $\frac{r}{y}$	Sec $\theta$ $\frac{r}{x}$	Cot $\theta$ $\frac{x}{y}$ <del>Tan <math>\theta</math> <math>\frac{y}{x}</math></del>
0°	0	1	0	undef.	1	undef
30°	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{3}}{3}$	2	$\frac{2\sqrt{3}}{3}$	$\sqrt{3}$
45°	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$	1	$\sqrt{2}$	$\sqrt{2}$	1
60°	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\sqrt{3}$	$\frac{2\sqrt{3}}{3}$	2	$\frac{\sqrt{3}}{3}$
90°	1	0	undef	1	undef	0
180°	0	-1	0	undef	-1	undef
270°	-1	0	undef	-1	undef	0
360°	0	1	0	undef	1	undef

(1,0)

(0,1)

(-1,0)

(0,-1)

(1,0)

76.  $a = 12; b = 12\sqrt{3};$   
 $d = 12\sqrt{3}; c = 12\sqrt{6}$

77.  $x = \frac{9\sqrt{3}}{2}; y = \frac{9}{2};$

$z = \frac{3\sqrt{3}}{2}; w = 3\sqrt{3}$

Find the exact value of each part labeled with a variable in each figure.

