

# Trigonometry – Sine, Cosine, and Complimentary Angles

Hw Section 9.2

Name \_\_\_\_\_

#1) Some sine values have the same cosine values as shown in the table below. What do the angles that have the same value have in common?

The sine and cosine functions have the same values when their angles are complementary.

Degree	Sine
10	0.1736
9	0.1564
8	0.1392
7	0.1219
6	0.1045
5	0.0872
4	0.0698
3	0.0523
2	0.0349
1	0.0175
0	0.0000

Degree	Cosine
80	0.1736
81	0.1564
82	0.1392
83	0.1219
84	0.1045
85	0.0872
86	0.0698
87	0.0523
88	0.0349
89	0.0175
90	0.0000

#2) Why does  $\sin(90^\circ - \alpha) = \cos \alpha$ ?

Because  $(90^\circ - \alpha) + \alpha = 90^\circ$   
 $90^\circ = 90^\circ$

Solve the following.

#3)  $\sin(90^\circ) = \cos \underline{0}^\circ$

$$90 + x = 90$$

$$x = 0$$

#4)  $\sin(30^\circ) = \cos \underline{60}^\circ$

$$30 + x = 90$$

$$x = 60$$

#5)  $\sin(60^\circ) = \cos \underline{30}^\circ$

$$60 + x = 90$$

$$x = 30$$

#6)  $\cos(89^\circ) = \sin \underline{1}^\circ$

$$89 + x = 90$$

$$x = 1$$

#7)  $\cos(72^\circ) = \sin \underline{18}^\circ$

$$72 + x = 90$$

$$x = 18$$

#8)  $\cos(18^\circ) = \sin \underline{72}^\circ$

$$18 + x = 90$$

$$x = 72$$

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Solve for the unknown variable.

#9)  $\sin(x + 10)^\circ = \cos(45)^\circ$

$$(x + 10) + 45 = 90$$

$$x + 55 = 90$$

$$x = 35$$

#10)  $\sin(3x - 5)^\circ = \cos(6x - 4)^\circ$

$$(3x - 5) + (6x - 4) = 90$$

$$9x - 9 = 90$$

$$x - 1 = 10$$

$$x = 11$$

#11)  $\sin(x)^\circ = \cos(x)^\circ$

$$x + x = 90$$

$$2x = 90$$

$$x = 45$$

#12)  $\sin\left(\frac{1}{3}x\right)^\circ = \cos\left(\frac{2}{3}x\right)^\circ$

$$\frac{1}{3}x + \frac{2}{3}x = 90$$

$$\frac{3}{3}x = 90$$

$$x = 90$$

#13)  $\sin(2x + 8)^\circ = \cos(3x + 2)^\circ$

$$(2x + 8) + (3x + 2) = 90$$

$$5x + 10 = 90$$

$$5x = 80$$

$$x = 16$$

#14)  $\sin\left(\frac{3}{4}x - 8\right)^\circ = \cos(71)^\circ$

$$\left(\frac{3}{4}x - 8\right) + 71 = 90$$

$$\frac{3}{4}x + 63 = 90$$

$$\frac{1}{3} \cdot \frac{3}{4}x = 27 \cdot \frac{1}{3}$$

$$4 \cdot \frac{1}{4}x = 9 \cdot 4$$

$$x = 36$$

#15) If  $\sin(\alpha) = \cos(\beta)$ , then what must be true about  $\alpha$  and  $\beta$ ?

$$\alpha + \beta = 90, \text{ so } \alpha \text{ and } \beta$$

must be complementary