

Answer Key 12

5.2: 5-10, 13-15, 23-26

6.2: 29-32, 39, 40

6.3: 5-8, 37, 38, 47, 48, 49

5.2

<p>5a)</p> $\sin \frac{7\pi}{6}$ <p>This angle is in quadrant III so the sine will be negative.</p> <p>The reference angle is $\frac{7\pi}{6} - \pi = \frac{\pi}{6}$</p> <p>So $\sin \frac{7\pi}{6} = \frac{-1}{2}$</p>	<p>5b)</p> $\cos \frac{17\pi}{6}$ <p>This angle is co-terminal with</p> $\frac{17\pi}{6} - 2\pi = \frac{5\pi}{6}$ <p>This angle is in quadrant II so the cosine will be negative.</p> <p>The reference angle is $\pi - \frac{5\pi}{6} = \frac{\pi}{6}$</p> <p>So $\cos \frac{17\pi}{6} = \frac{-\sqrt{3}}{2}$</p>
<p>5c)</p> $\tan \frac{7\pi}{6}$ <p>This angle is in quadrant III so the tangent will be positive.</p> <p>The reference angle is $\frac{7\pi}{6} - \pi = \frac{\pi}{6}$</p> <p>So $\tan \frac{7\pi}{6} = \frac{1/2}{\sqrt{3}/2} = \frac{1}{\sqrt{3}}$</p>	<p>6a)</p> $\sin \frac{5\pi}{3}$ <p>This angle is in quadrant IV so the sine will be negative.</p> <p>The reference angle is $2\pi - \frac{5\pi}{3} = \frac{\pi}{3}$</p> <p>So $\sin \frac{5\pi}{3} = \frac{-\sqrt{3}}{2}$</p>
<p>6b)</p> $\cos \frac{11\pi}{3}$ <p>This angle is co-terminal with</p> $\frac{11\pi}{3} - 2\pi = \frac{5\pi}{3}$ <p>This angle is in quadrant IV so the cosine will be positive.</p> <p>The reference angle is $2\pi - \frac{5\pi}{3} = \frac{\pi}{3}$</p> <p>So $\cos \frac{11\pi}{3} = \frac{1}{2}$</p>	<p>6c)</p> $\tan \frac{5\pi}{3}$ <p>This angle is in quadrant IV so the tangent will be negative.</p> <p>The reference angle is $2\pi - \frac{5\pi}{3} = \frac{\pi}{3}$</p> <p>So $\tan \frac{5\pi}{3} = -\frac{\sqrt{3}/2}{1/2} = -\sqrt{3}$</p>

<p>7a) $\sin \frac{11\pi}{4}$</p> <p>This angle is co-terminal with</p> $\frac{11\pi}{4} - 2\pi = \frac{3\pi}{4}$ <p>This angle is in quadrant II so the sine will be positive.</p> <p>The reference angle is $\pi - \frac{3\pi}{4} = \frac{\pi}{4}$</p> <p>So $\sin \frac{11\pi}{4} = \frac{1}{\sqrt{2}}$</p>	<p>7b) $\sin \frac{-\pi}{4}$</p> <p>This angle is in quadrant IV so the sine will be negative.</p> <p>The reference angle is $\frac{\pi}{4}$</p> <p>So $\sin \frac{-\pi}{4} = \frac{-1}{\sqrt{2}}$</p>
<p>7c) $\sin \frac{5\pi}{4}$</p> <p>This angle is in quadrant III so the sine will be negative.</p> <p>The reference angle is $\frac{5\pi}{4} - \pi = \frac{\pi}{4}$</p> <p>So $\sin \frac{5\pi}{4} = \frac{-1}{\sqrt{2}}$</p>	<p>8a) $\cos \frac{19\pi}{6}$</p> <p>This angle is co-terminal with</p> $\frac{19\pi}{6} - 2\pi = \frac{7\pi}{6}$ <p>This angle is in quadrant III so the cosine will be negative.</p> <p>The reference angle is $\frac{7\pi}{6} - \pi = \frac{\pi}{6}$</p> <p>So $\cos \frac{19\pi}{6} = \frac{-\sqrt{3}}{2}$</p>
<p>8b) $\cos \frac{-7\pi}{6}$</p> <p>This angle is co-terminal with</p> $\frac{-7\pi}{6} + 2\pi = \frac{5\pi}{6}$ <p>This angle is in quadrant II so the cosine will be negative.</p> <p>The reference angle is $\pi - \frac{5\pi}{6} = \frac{\pi}{6}$</p> <p>So $\cos \frac{-7\pi}{6} = \frac{-\sqrt{3}}{2}$</p>	<p>8c) $\cos \frac{-\pi}{6}$</p> <p>This angle is in quadrant IV so the cosine will be positive.</p> <p>The reference angle is $\frac{\pi}{6}$</p> <p>So $\cos \frac{-\pi}{6} = \frac{\sqrt{3}}{2}$</p>

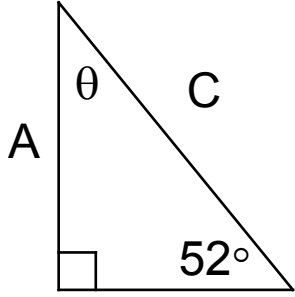
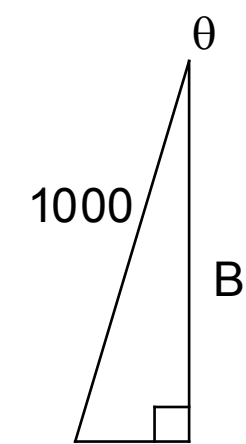
<p>9a) $\cos \frac{3\pi}{4}$</p> <p>This angle is in quadrant II so the cosine will be negative.</p> <p>The reference angle is $\pi - \frac{3\pi}{4} = \frac{\pi}{4}$</p> <p>So $\cos \frac{3\pi}{4} = -\frac{1}{\sqrt{2}}$</p>	<p>9b) $\cos \frac{5\pi}{4}$</p> <p>This angle is in quadrant III so the cosine will be negative.</p> <p>The reference angle is $\frac{5\pi}{4} - \pi = \frac{\pi}{4}$</p> <p>So $\cos \frac{5\pi}{4} = -\frac{1}{\sqrt{2}}$</p>
<p>9c) $\cos \frac{7\pi}{4}$</p> <p>This angle is in quadrant IV so the cosine will be positive.</p> <p>The reference angle is $2\pi - \frac{7\pi}{4} = \frac{\pi}{4}$</p> <p>So $\cos \frac{7\pi}{4} = \frac{1}{\sqrt{2}}$</p>	<p>10a) $\sin \frac{3\pi}{4}$</p> <p>This angle is in quadrant II so the sine will be positive.</p> <p>The reference angle is $\pi - \frac{3\pi}{4} = \frac{\pi}{4}$</p> <p>So $\sin \frac{3\pi}{4} = \frac{1}{\sqrt{2}}$</p>
<p>10b) $\sin \frac{5\pi}{4}$</p> <p>This angle is in quadrant III so the sine will be negative.</p> <p>The reference angle is $\frac{5\pi}{4} - \pi = \frac{\pi}{4}$</p> <p>So $\sin \frac{5\pi}{4} = -\frac{1}{\sqrt{2}}$</p>	<p>10c) $\sin \frac{7\pi}{4}$</p> <p>This angle is in quadrant IV so the sine will be negative.</p> <p>The reference angle is $2\pi - \frac{7\pi}{4} = \frac{\pi}{4}$</p> <p>So $\sin \frac{7\pi}{4} = -\frac{1}{\sqrt{2}}$</p>
<p>13a) $\cos \frac{-\pi}{3}$</p> <p>This angle is in quadrant IV so the cosine will be positive.</p> <p>The reference angle is $\frac{\pi}{3}$</p> <p>So $\cos \frac{-\pi}{3} = \frac{1}{2}$</p>	<p>13b) $\sec \frac{-\pi}{3}$</p> <p>Using the result of 13a)</p> $\sec \frac{-\pi}{3} = \frac{1}{\cos \frac{-\pi}{3}} = \frac{1}{\frac{1}{2}} = 2$

<p>13c) $\sin \frac{-\pi}{3}$</p> <p>This angle is in quadrant IV so the sine will be negative.</p> <p>The reference angle is $\frac{\pi}{3}$</p> <p>So $\sin \frac{-\pi}{3} = \frac{-\sqrt{3}}{2}$</p>	<p>14a) $\tan \frac{-\pi}{4}$</p> <p>This angle is in quadrant IV so the tangent will be negative.</p> <p>The reference angle is $\frac{\pi}{4}$</p> <p>So $\tan \frac{-\pi}{4} = -1$</p>
<p>14b) $\csc \frac{-\pi}{4} = \frac{1}{\sin \frac{-\pi}{4}}$</p> <p>Using the result of 7b)</p> <p>$\frac{1}{\sin \frac{-\pi}{4}} = \frac{1}{\frac{-1}{\sqrt{2}}} = -\sqrt{2}$</p>	<p>14c) $\cot \frac{-\pi}{4} = \frac{1}{\tan \frac{-\pi}{4}}$</p> <p>Using the result of 14a)</p> <p>$\frac{1}{\tan \frac{-\pi}{4}} = \frac{1}{-1} = -1$</p>
<p>15a) $\cos \frac{-\pi}{6}$</p> <p>This angle is in quadrant IV so the cosine will be positive.</p> <p>The reference angle is $\frac{\pi}{6}$</p> <p>So $\cos \frac{-\pi}{6} = \frac{\sqrt{3}}{2}$</p>	<p>15b) $\csc \frac{-\pi}{3} = \frac{1}{\sin \frac{-\pi}{3}}$</p> <p>This angle is in quadrant IV so the sine will be negative.</p> <p>The reference angle is $\frac{\pi}{3}$</p> <p>So $\csc \frac{-\pi}{3} = \frac{1}{-\sin \frac{\pi}{3}} = \frac{1}{\frac{-\sqrt{3}}{2}} = \frac{-2}{\sqrt{3}}$</p>
<p>15c) $\tan \frac{-\pi}{6}$</p> <p>This angle is in quadrant IV so the tangent will be negative.</p> <p>The reference angle is $\frac{\pi}{6}$</p> <p>So $\tan \frac{-\pi}{6} = -\frac{1}{\sqrt{3}}$</p>	

23-26)

t	sin t	cos t	tan t	csc t	sec t	cot t
0	0	1	0	undefined	1	undefined
$\pi/2$	1	0	undefined	1	undefined	0
π	0	-1	0	undefined	-1	undefined
$3\pi/2$	-1	0	undefined	-1	undefined	0

6.2

29) $\sin \frac{\pi}{6} + \cos \frac{\pi}{6} = \frac{1}{2} + \frac{\sqrt{3}}{2} = \frac{1+\sqrt{3}}{2}$	30) $\sin 30^\circ \csc 30^\circ = \sin 30^\circ \frac{1}{\sin 30^\circ} = 1$
31) $\sin 30^\circ \cos 60^\circ + \sin 60^\circ \cos 30^\circ =$ $\frac{1}{2} \cdot \frac{1}{2} + \frac{\sqrt{3}}{2} \cdot \frac{\sqrt{3}}{2} = \frac{1}{4} + \frac{3}{4} = 1$	32) $(\sin 60^\circ)^2 + (\cos 60^\circ)^2 =$ $\left(\frac{\sqrt{3}}{2}\right)^2 + \left(\frac{1}{2}\right)^2 = \frac{3}{4} + \frac{1}{4} = 1$
39)  <p style="text-align: center;">35</p> $\theta = 90^\circ - 52^\circ = 38^\circ$ $\frac{35}{C} = \cos 52^\circ \rightarrow C = \frac{35}{\cos 52^\circ} \approx 56.85$ $\frac{A}{35} = \tan 52^\circ \rightarrow A = 35 \tan 52^\circ \approx 44.80$	40)  <p style="text-align: center;">1000</p> $\theta = 90^\circ - 68^\circ = 22^\circ$ $\frac{A}{1000} = \cos 68^\circ \rightarrow A = 1000 \cos 68^\circ \approx 374.6$ $\frac{B}{1000} = \sin 68^\circ \rightarrow B = 1000 \sin 68^\circ \approx 927.2$

6.3

5) a) $180^\circ - 120^\circ = 60^\circ$ b) $200^\circ - 180^\circ = 20^\circ$ c) $360^\circ - 285^\circ = 75^\circ$	6) a) $180^\circ - 175^\circ = 5^\circ$ b) $360^\circ - 310^\circ = 50^\circ$ c) $730^\circ - 360^\circ(2) = 10^\circ$
7) a) $225^\circ - 180^\circ = 45^\circ$ b) $810^\circ - 360^\circ(2) = 90^\circ$ c) $-105^\circ + 360^\circ = 255^\circ$ $255^\circ - 180^\circ = 75^\circ$	8) a) $180^\circ - 99^\circ = 81^\circ$ b) $-199^\circ + 360^\circ = 161^\circ$ $180^\circ - 161^\circ = 19^\circ$ c) $360^\circ - 359^\circ = 1^\circ$
37) $\sin < 0 \rightarrow$ III or IV $\cos < 0 \rightarrow$ II or III III	38) $\tan \theta < 0 \rightarrow$ II or IV $\sin \theta < 0 \rightarrow$ III or IV IV
47) $\sin \theta = -\frac{4}{5}$ $\cos \theta = \pm \sqrt{1 - \sin^2 \theta} =$ $\pm \sqrt{1 - \frac{16}{25}} = \pm \sqrt{\frac{9}{25}} = \pm \frac{3}{5}$ In quadrant IV cosine is positive so $\left \begin{array}{ll} \sin \theta = -\frac{4}{5} & \cos \theta = \frac{3}{5} \\ \tan \theta = -\frac{4}{3} & \cot \theta = -\frac{3}{4} \\ \csc \theta = -\frac{5}{4} & \sec \theta = \frac{5}{3} \end{array} \right.$	48) $\tan \theta = \frac{4}{3}$ $\sin \theta = \pm \frac{4}{\sqrt{3^2 + 4^2}} = \pm \frac{4}{5}$ $\cos \theta = \pm \frac{3}{\sqrt{3^2 + 4^2}} = \pm \frac{3}{5}$ In quadrant III sine and cosine are negative $\left \begin{array}{ll} \sin \theta = -\frac{4}{5} & \cos \theta = -\frac{3}{5} \\ \tan \theta = \frac{4}{3} & \cot \theta = \frac{3}{4} \\ \csc \theta = -\frac{5}{4} & \sec \theta = -\frac{5}{3} \end{array} \right.$
49) $\cos \theta = \frac{7}{12}$ $\sin \theta = -\sqrt{1 - \frac{49}{144}} = -\sqrt{\frac{95}{144}} = -\frac{\sqrt{95}}{12}$ $\tan \theta = -\frac{\sqrt{95}}{7} \quad \cot \theta = -\frac{7}{\sqrt{95}}$ $\csc \theta = -\frac{12}{\sqrt{95}} \quad \sec \theta = \frac{12}{7}$	

