

KEY

Section 7.4: Evaluating and Graphing Sine and Cosine

Essential Question: How do you find a reference angle?
How do you find the exact value of sine or cosine?

CHECK YOUR MODE!!

If using TI-83 or higher...
CHECK your **MODE**: θ is measured in either radians or degrees

- Press the **MODE** key
- Arrow down to degree or radian (depending on problem)
- Highlight** the correct mode and then press **enter**
- Exit to the main screen by pressing **Clear** or **Quit**

If using TI-30...

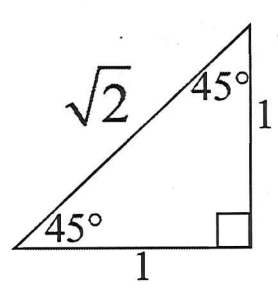
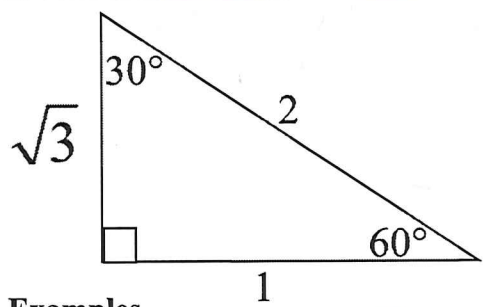
- Press the **DRG** key
- Arrow left/right to degree (DEG) or radian (RAD)
- Once your choice is underlined select by pressing **ENTER** (the equal key)
- At the bottom-right of screen your selection will be visible

SINE AND COSINE

Use a calculator to find the following values. *CHECK MODE

- 1) $\sin 42^\circ = .6691$
- 2) $\sin 37.3^\circ = .6060$
- 3) $\cos 160^\circ = -.9397$
- 4) $\cos 17^\circ 20' = 17^\circ + \frac{20}{60} = \cos 17.33^\circ = .9546$
- 5) $\sin 2.3 = .7457$ (Radians)
- 6) $\cos 1.2 = .3624$ (Radians)

SPECIAL ANGLES using 30-60-90 Δ 's and 45-45-90 Δ 's



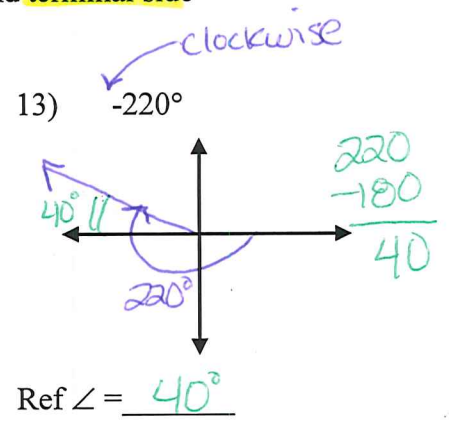
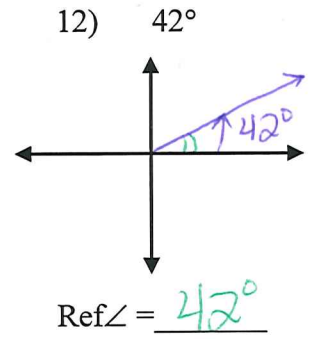
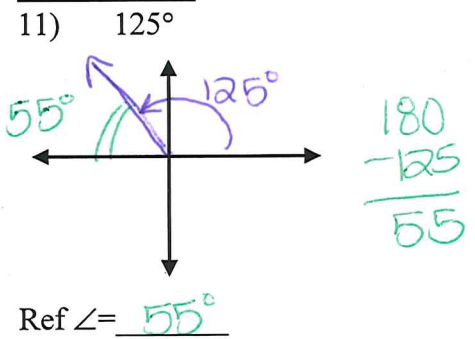
$\sin \theta = \frac{\text{opposite}}{\text{hyp.}}$
 $\cos \theta = \frac{\text{adjacent}}{\text{hyp.}}$

Examples

- 7) $\cos 60^\circ = \frac{\text{adj}}{\text{hyp}} = \frac{1}{2}$
- 8) $\sin 30^\circ = \frac{\text{opp}}{\text{hyp}} = \frac{1}{2}$
- 9) $\sin 45^\circ = \frac{\text{opp}}{\text{hyp}} = \frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{2}$
- 10) $\cos 30^\circ = \frac{\text{adj}}{\text{hyp}} = \frac{\sqrt{3}}{2}$

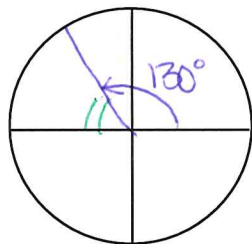
REFERENCE ANGLE: an ACUTE angle formed with the x-axis and terminal side

EXAMPLES



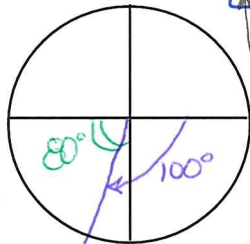
Express the following in terms of a reference angle.

14) $\sin 130^\circ = \boxed{\sin 50^\circ}$



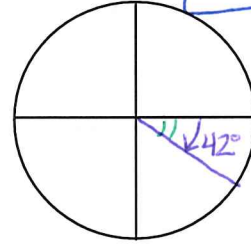
In 2nd Q
 $\sin \theta = y$ -value
 & y is positive

15) $\sin(-100^\circ) = \boxed{-\sin 80^\circ}$

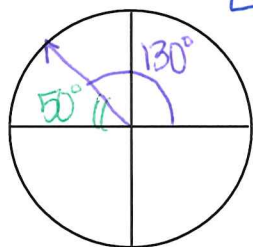


3rd Q
 $\sin \theta = y$ -value
 y is neg.

16) $\sin(-42^\circ) = \boxed{-\sin 42^\circ}$

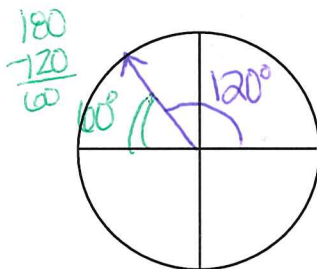


17) $\cos 130^\circ = \boxed{-\cos 50^\circ}$



$\cos \theta = x$ -value
 in 2nd Q
 x is negative

18) $\cos 120^\circ$



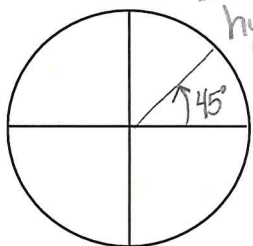
$1200 - 3(360) = 120^\circ$
 $\cos 1200^\circ = \cos 120^\circ$

$\cos 120^\circ = \boxed{-\cos 60^\circ}$
 Q2 $\rightarrow x$ is neg

Examples: Find the exact value of each. NO DECIMALS!

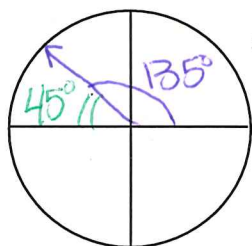
*Look @ special triangles

19) $\sin 45^\circ = \frac{\text{opp}}{\text{hyp}} = \frac{1 \cdot \sqrt{2}}{\sqrt{2} \cdot \sqrt{2}} = \boxed{\frac{\sqrt{2}}{2}}$



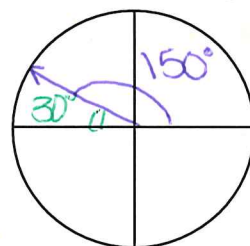
$\boxed{\frac{\sqrt{2}}{2}}$

20) $\cos 135^\circ = -\cos 45^\circ = \frac{\text{adj}}{\text{hyp}} = -\frac{1}{\sqrt{2}} = \boxed{-\frac{\sqrt{2}}{2}}$



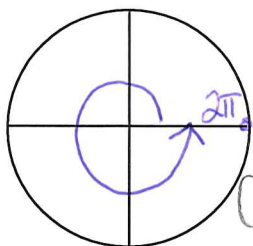
$\boxed{-\frac{\sqrt{2}}{2}}$

21) $\sin 150^\circ = \sin 30^\circ = \frac{\text{opp}}{\text{hyp}} = \frac{1}{2} = \boxed{\frac{1}{2}}$



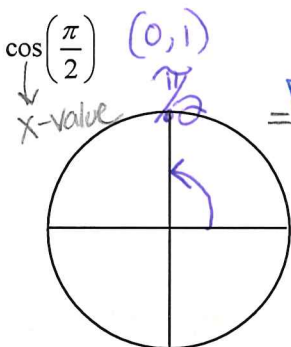
$\boxed{\frac{1}{2}}$

22) $\sin 2\pi = \boxed{0}$

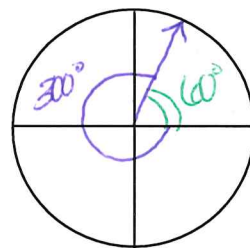


(x, y)
 $(1, 0)$
 (\cos, \sin)

23) $\cos\left(\frac{\pi}{2}\right) = \boxed{0}$



24) $\sin(-300^\circ) = \sin 60^\circ = \frac{\text{opp}}{\text{hyp}} = \frac{\sqrt{3}}{2} = \boxed{\frac{\sqrt{3}}{2}}$



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

MATH IS AWESOME!

Section 7.4 Summary:

A reference angle is always from the terminal side to the x -axis and must be less than 90° . If taking the $\sin \theta$ then positive in quadrant 1 & 2, if $\cos \theta$ then positive in quadrant 1 & 4. The exact value of $\sin \theta$ and $\cos \theta$ can be found by first finding the reference \angle then use special Δ 's.