Date Completed: _____
Mentor Initials: _____

Trigonometry (Advanced)

Multiple Choice

1. A ramp in a skate park is 9 feet long and has a vertical lift of 4 feet. Which of the following expressions is closest to the angle of elevation between the base of the ramp and the horizontal ground?

A $\sin^{-1}\frac{4}{9}$

B. $\cos^{-1}\frac{9}{4}$

C. $\tan^{-1}\frac{9}{4}$

D. $\tan^{-1}\frac{4}{9}$

2. Given that $\sin\beta = \frac{12}{13}$ and $\frac{\pi}{2} < \beta < \pi$, what is the value of $\cos\beta$?

A) $-\frac{13}{12}$

B) $-\frac{5}{13}$

C) $\frac{5}{13}$

D) $\frac{13}{12}$

3. $$\sin(x) = \cos(P - x)$$

In the equation above, the angle measures are in radians and P is a constant. What is the value of P, in radians?

A) 0

B) $\frac{\pi}{4}$

C) $\frac{\pi}{2}$

D) $\frac{3\pi}{4}$

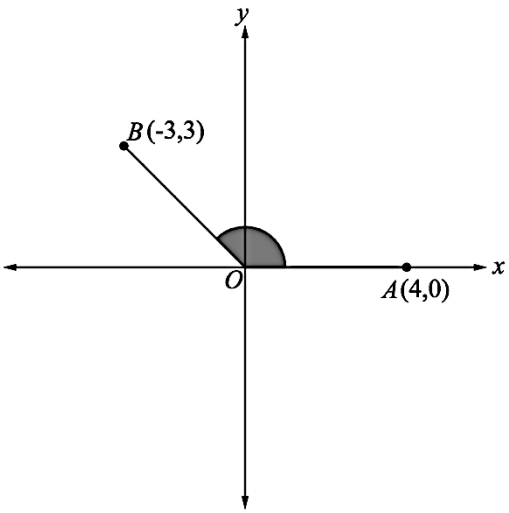
4. In the figure below, what is the measure, in radians, of angle AOB?

A) $\frac{\pi}{4}$

B) $\frac{\pi}{2}$

C) $\frac{3\pi}{4}$

D) $\frac{5\pi}{4}$



5. Given that $\cos\theta = -\frac{\sqrt{3}}{2}$ and $\pi < \theta < \frac{3\pi}{2}$, what is the value of $\tan\theta$?

A) $-\sqrt{3}$

B) $-\frac{\sqrt{3}}{3}$

C) $\frac{\sqrt{3}}{3}$

D) $\sqrt{3}$

6. A 45-foot-long rectangular swimming pool with vertical sides is 5 feet deep at the shallow end and 13 feet deep at the deep end. The bottom of the pool slopes downward at a constant angle from horizontal along the length of the pool. Which of the following expressions gives this constant angle? (Note: For $-\frac{\pi}{2} < x < \frac{\pi}{2}$, $y = \sin x$ if and only if $x = \sin^{-1} y$.)

A) $\tan^{-1}\frac{8}{45}$

B) $\sin^{-1}\frac{2}{5}$

C) $\tan^{-1}\frac{4}{9}$

D) $\sin^{-1}\frac{5}{2}$

7. $\cos x = \frac{5}{13}$

Which of the following answer choices contains an equivalent solution for x in the equation above? **(No Calculator)**

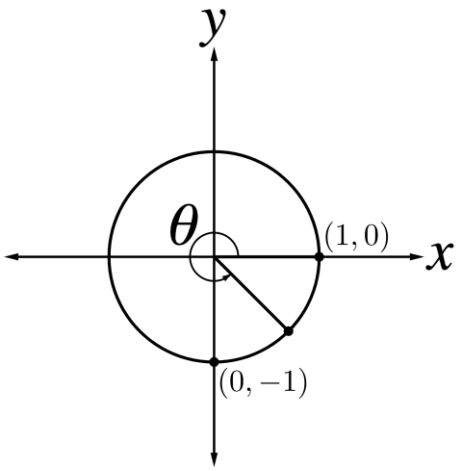
A) $\cos x = \frac{12}{13}$

B) $\sin x = \frac{13}{12}$

C) $\sin x = \frac{5}{12}$

D) $\sin x = \frac{12}{13}$

8.



In the given figure, θ is an angle. If $\cos\theta = \frac{\sqrt{2}}{2}$, what is $\tan\theta$?

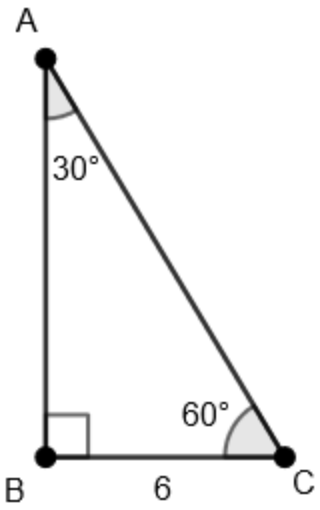
A) 1

B) $\frac{\sqrt{2}}{2}$

C) $-\frac{\sqrt{2}}{2}$

D) -1

9.



In triangle ABC shown, what is $\tan C$? **(No Calculator)**

A) $\frac{1}{2}$

B) $\frac{6}{6\sqrt{3}}$

C) $\frac{6\sqrt{3}}{6}$

D) 6

10. What is the value of $\tan\frac{2\pi}{3}$? **(No Calculator)**

A) $-\sqrt{3}$

B) $-\frac{\sqrt{3}}{3}$

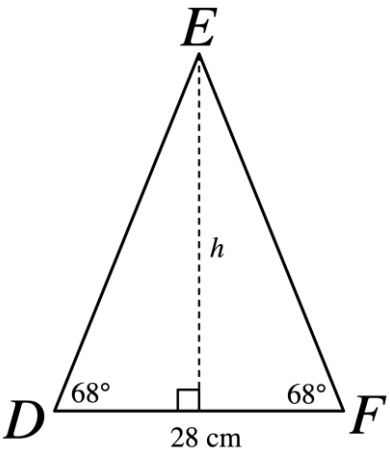
C) $\frac{\sqrt{3}}{3}$

D) $\sqrt{3}$

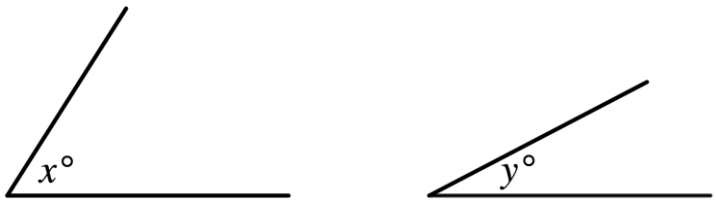
Grid-In

11. In triangle KLM, angle L is a right angle. If $\sin K = .72$, What is the value of $\cos M$? **(No Calculator)**

12. Isosceles triangle ΔDEF has an altitude of h inches, a base of 28 centimeters, and two base angles measuring 68° each, as shown in the figure below. What is the value of h, to the nearest tenth?

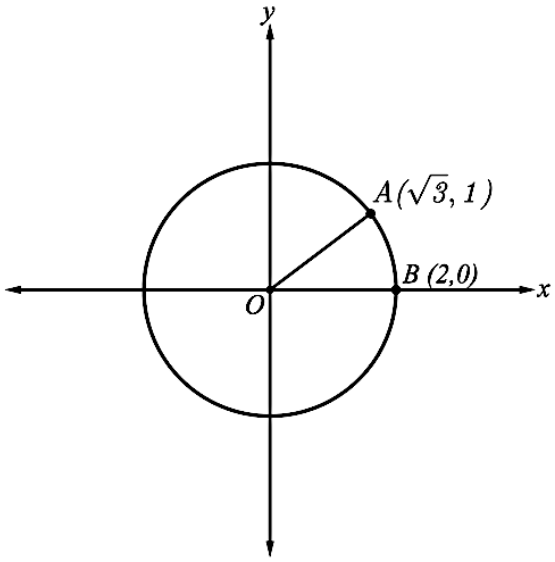


13.

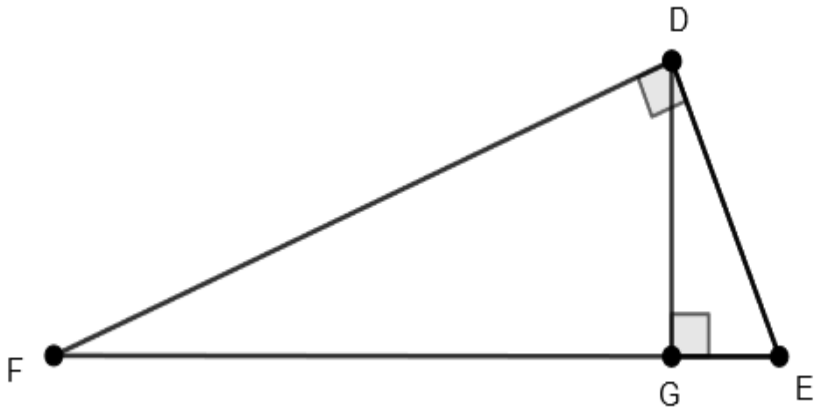


The angles show above are acute and $\sin(x°) = \cos(y°)$. If $x = 6z + 30$ and $y = 2z - 8$, what is the value of z?

14. In the xy-plane, O is the center of the circle below and the angle AOB measures $\frac{\pi}{a}$ radians. What is the value of a? **(No Calculator)**



15.



In the figure, $\overline{DG}$ and $\overline{FE}$ intersect at point G, $DG = 4$, and $EG = 3$. What is the value of $\sin F$?
(No Calculator)