

TEST: 5.1 – 5.3—Calculator Permitted

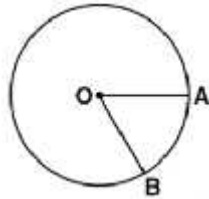
Angles, angle measure, applications of angles, &amp; Circular Functions.

Part I: Short Answer—Show all work. No work, no credit.

- \_\_\_\_\_ 1. The terminal side of an angle in standard position lies in quadrant IV of the coordinate grid. The radian measure of this angle could be which of the following?

(A)  $\frac{6f}{5}$     (B)  $\frac{3f}{4}$     (C)  $-\frac{2f}{3}$     (D)  $-\frac{7f}{3}$     (E)  $\frac{16f}{11}$

- \_\_\_\_\_ 2. In circle  $O$  below, the length of the radius  $\overline{OB}$  is 5 feet, and the length of arc  $\widehat{AB}$  is 5 feet.



The measure of central angle  $\angle AOB$  is which of the following?

(A) 1 radian    (B)  $60^\circ$     (C) greater than  $60^\circ$     (D)  $f$  radians    (E) 5 radians

- \_\_\_\_\_ 3. Through how many radians does the minute hand of a clock turn in 48 minutes?

(A)  $\frac{6f}{5}$     (B)  $\frac{7f}{5}$     (C)  $\frac{9f}{5}$     (D)  $\frac{8f}{5}$     (E)  $\frac{4f}{5}$

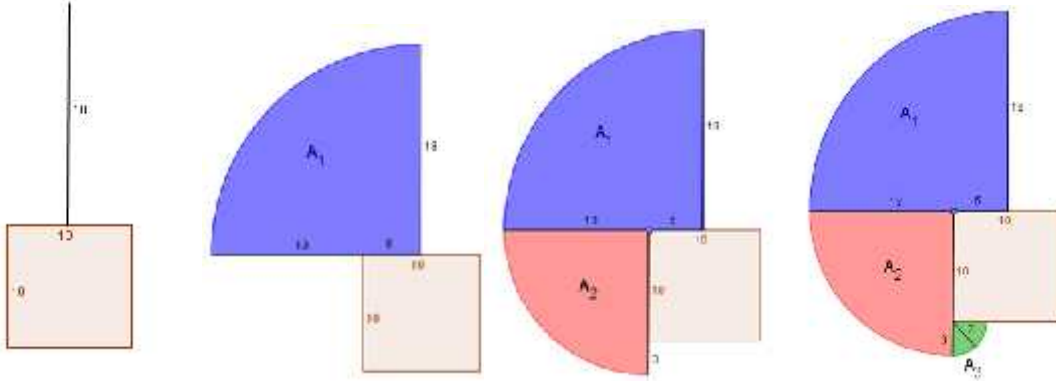
\_\_\_\_\_ 4.  $\sec\left(\frac{-47537f}{6}\right) =$

(A)  $-\frac{\sqrt{3}}{2}$     (B)  $\frac{2\sqrt{3}}{3}$     (C)  $-\frac{1}{2}$     (D)  $-2$     (E)  $-\frac{2\sqrt{3}}{3}$

- \_\_\_\_\_ 5. The platform of a large merry-go-round is 200 feet in **diameter**. To the nearest **mile per hour**, how fast does a person standing on the outer edge of the platform travel if the merry-go-round makes 6 revolutions per minute? (Hint: someone who's actual foot is actually 1 foot long has a foot that is actually  $\frac{1}{5280}$  of a mile long!)

(A) 50 mph    (B) 21 mph    (C) 43 mph    (D) 214 mph    (E) 62 mph

- \_\_\_\_\_ 6. A goat is tethered to the side of a square 10ft x 10ft shed. The tethering rope is 18 feet long and tied to a post in the middle of one of the sides. To the nearest square foot, what is the **total area** (on both sides) available for the goat to graze? Assume the shed is in the middle of a 100ft x 100ft field. **One side** of the goats grazing area is illustrated in the diagram below.



- (A) 394    (B) 502    (C) 789    (D) 1577    (E) 2205

- \_\_\_\_\_ 7. A wedge-shaped piece of pizza is cut from a 12-inch diameter Archimedian Pizza (main topping is sand, perfectly round, & sliced perfectly through the center). The angle measure of the pointy-piece from the center of the pizza measures  $38^\circ$ . If  $A$  is the surface area of the slice and  $P$  is the perimeter of the slice, to the nearest whole number, what is the value of  $A + P$ ?

- (A) 28    (B) 245    (C) 30    (D) 296    (E) 33

- \_\_\_\_\_ 8. The terminal ray of an angle  $\theta$  passes through the point  $(-24, -215)$ . If  $0^\circ \leq \theta < 360^\circ$ , what is  $\theta$ ?
- (A)  $186.369^\circ$     (B)  $83.630^\circ$     (C)  $96.369^\circ$     (D)  $263.630^\circ$     (E)  $206.369^\circ$

- \_\_\_\_\_ 9. If  $\sin \theta = -0.4$ , then  $\sin(-\theta) + \csc \theta =$

- (A) 0    (B) -2.9    (C) 2.1    (D) -2.1    (E) 2.9

Part II: Free Response

Show all work below. Avoid intermediate rounding error. Box your final answers, with units when appropriate.

10. If  $\sec \theta = -6$  and  $\cot \theta > 0$

(a) Draw the reference triangle for  $\theta$  in the correct quadrant. Show your arc and angle  $\theta$ .

(b) Find the **simplified, exact, rationalized** value of  $\csc \theta$ .

(c) Find the **simplified, exact, rationalized** value of  $\tan \theta$ .

(d) Find the reference angle,  $\theta_{ref}$ , for  $\theta$  in degrees. **Show the equation you are solving** and report 3 decimals.

(e) To three decimals, find the value of  $\theta$  such that  $\theta \in [0^\circ, 360^\circ)$ . Show the computations that lead to your answer.

(f) In terms of  $\theta$ , what is the slope of terminal ray?