

November 7

Why is the identity  
 $\sin^2\theta + \cos^2\theta = 1$   
called a  
Pythagorean Identity?

1. What is the horizontal shift in for the function  $y = 4\sin(3x-6)+7$ ?

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

(B) 2

(C) 3

(D) 4

(E) 6

$$HS = \frac{-c}{b} = \frac{-(-6)}{3} = 2$$

$$\frac{2\pi}{b} = \text{Period}$$

2. What is the length of one cycle for the function  $y = -5\tan(\pi x - 4)$

(A)  $2\pi$

(B)  $\pi$

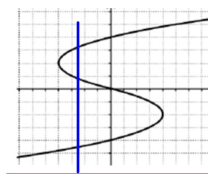
(C) 2

(D) 1

(E) None of these

$$\text{Period} = \frac{\pi}{b} = \frac{\pi}{\pi} = 1$$

3.



Above is the graph of a relation. Which statement about the graph is true?

- I. The graph is a function.
- II. The inverse of the graph is a function.
- III. The graph does not pass the horizontal line test.

(A) I only

(B) II only

(C) III only

(D) I and II only

(E) None of these

4. For what angle are  $\sin \theta$  and  $\cos \theta$  are equal?

(A)  $\theta = \frac{\pi}{2}$

(B)  $\theta = \frac{\pi}{3}$

(C)  $\theta = \frac{\pi}{4}$

(D)  $\theta = \frac{\pi}{5}$

(E)  $\theta = \frac{\pi}{6}$

5. A circle in the standard  $(x, y)$  coordinate plane has the equation  $(x+2)^2 + (y-2)^2 = 5$ . What is the radius of the circle?

(A) -2

(B)  $\sqrt{2}$

(C) 2

(D)  $\sqrt{5}$

(E) 5

$$(x - h)^2 + (y - k)^2 = r^2$$

$$r^2 = 5$$

$$r = \sqrt{5}$$

6. The numbers 84 and 96 are both divisible by  $n$ , a real positive integer. Neither 18 or 16 is divisible by  $n$ . What is the sum of the digits of  $n$ ?

(A) 1

(B) 3

(C) 4

(D) 5

(E) 6

$$84 = 2(42) = 2(6)(7) = 2^2(3)(7)$$

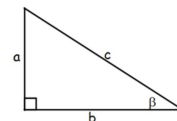
$$96 = 2(48) = 2(6)(8) = 2^5(3)$$

$$n = 12$$

$$1 + 2 = 3$$

$$> 2^2(3) = 12$$

7. The right triangle pictured on the right has side lengths  $a$ ,  $b$ , and  $c$ . What is the value of  $\sin \beta$ ?



(A)  $\frac{a}{b}$

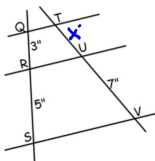
(B)  $\frac{a}{c}$

(C)  $\frac{b}{a}$

(D)  $\frac{b}{c}$

(E)  $\frac{c}{a}$

8. Three parallel lines are intersected by transversals, as shown on the right. The points of intersection are labeled.  $\overline{QR}$  measures 3 inches,  $\overline{RS}$  measures 5 inches, and  $\overline{UV}$  measures 7 inches. What is the length of  $\overline{TU}$  in inches?



(A) 3 (B) 4 (C) 5

(D)  $\frac{21}{5}$  (E)  $\frac{16}{5}$

$$\frac{3}{5} = \frac{x}{7}$$

$$21 = 5x$$

$$x = \frac{21}{5}$$

9. Jen has built a straight slide from her tree house to her sand box. The top of the slide, directly above the base of the tree house, is 9 feet from the ground. The slide touches the ground 12 feet from the base of the tree house. What is the length of the slide, in feet?

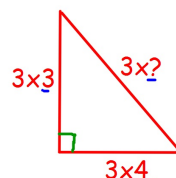
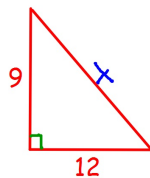
(A)  $3\sqrt{7}$

(B)  $6\sqrt{3}$

(C) 15

(D) 25

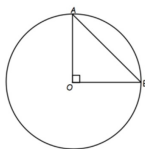
(E) 108



? = 5  
side = 15

$$9^2 + 12^2 = x^2$$

10. In the figure on the right, the circle centered at  $O$  has radii  $\overline{OA}$  and  $\overline{OB}$ .  $\triangle AOB$  is a right isosceles triangle. If the area of  $\triangle AOB$  is 18 square units, what is the area of the circle, in units?



(A)  $12\pi$

(B)  $18\pi$

(C)  $36\pi$

(D)  $72\pi$

(E)  $81\pi$

$$18 = .5(b)(h)$$

$$18 = .5r^2$$

$$36 = r^2$$

$$6 = r$$

$$A = \pi r^2$$

$$A = \pi(6)^2$$

$$A = 36\pi$$