CALCULATOR IS ALLOWED ON THIS PAGE
Topic 1: Trig Identity Basics

1. Use $\sin^2 x + \cos^2 x = 1$ to create the other 2 identities:
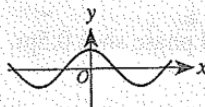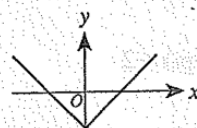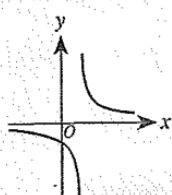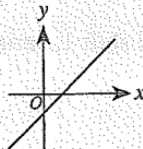
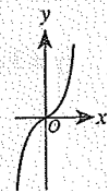Use the ratio $\sin x = \frac{3}{4}$ to answer the following questions

  2. cos x   3. sec x

  4. tan x   5. csc x

Topic 2: Standardized Test Questions (continued on the next page)

SAT/ACT Questions

(18) A function f is an *odd* function if and only if $f(-x) = -f(x)$ for every value of x in the domain of f. One of the functions graphed in the standard (x,y) coordinate plane below is an odd function. Which one?
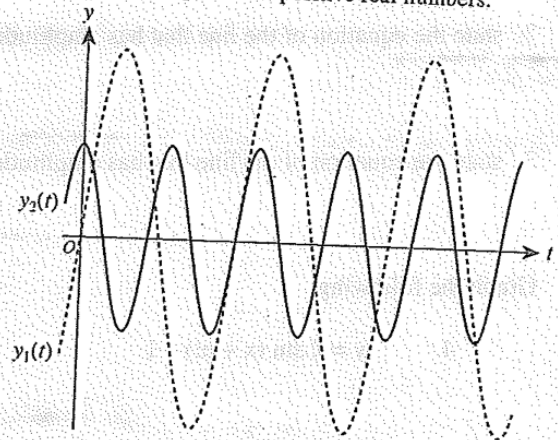
A.   D.

B.   E.

C.

(20) The equations of the 2 graphs shown below are $y_1(t) = a_1 \sin(b_1 t)$ and $y_2(t) = a_2 \cos(b_2 t)$, where the constants b_1 and b_2 are both positive real numbers.

Which of the following statements is true of the constants a_1 and a_2 ?

A. $0 < a_1 < a_2$
B. $0 < a_2 < a_1$
C. $a_1 < 0 < a_2$
D. $a_1 < a_2 < 0$
E. $a_2 < a_1 < 0$

(19) A function P is defined as follows:
    for $x > 0$, $P(x) = x^5 + x^4 - 36x - 36$
    for $x < 0$, $P(x) = -x^5 + x^4 + 36x - 36$

What is the value of $P(-1)$?
A. -70
B. -36
C.   0
D.   36
E.   70

(21) For x such that $0 < x < \frac{\pi}{2}$, the expression

$$\frac{\sqrt{1 - \cos^2 x}}{\sin x} + \frac{\sqrt{1 - \sin^2 x}}{\cos x}$$ is equivalent to:

F.   0
G.   1
H.   2
J. $-\tan x$
K. $\sin 2x$

Notebook Check: _____

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Topic 2: Trig. Identities

Simplify the following:

12. $\dfrac{\sin x}{\tan x}$

13. $\dfrac{\sec x}{\tan x}$

14. $(\sin x + \cos x)^2 - (\sin x - \cos x)^2$

Topic 3: Verifying Trig. Identities

15. $\sin x + \sin x \cdot \cot^2 x = \csc x$

16. $\dfrac{1 - \sin x}{\cos x} = \sec x - \tan x$

17. $\tan x = \sqrt{\sec^2 x - 1}$

18. $\sin^2 x + \cos^2 x = \csc^2 x - \cot^2 x$

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Topic 1: Trig Identity Basics

1. Use $\sin^2 x + \cos^2 x = 1$ to create the other 2 identities:

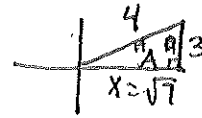$$\tan^2 x + 1 = \sec^2 x \qquad \cot^2 x + 1 = \csc^2 x$$

Use the ratio $\sin x = \frac{0}{H} \frac{3}{4}$ to answer the following questions

$x = \sqrt{7}$

2. $\cos x$ $\frac{\sqrt{7}}{4}$

3. $\sec x$ $\frac{4\sqrt{7}}{7}$

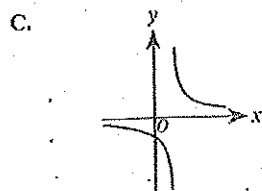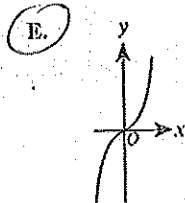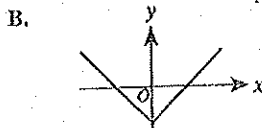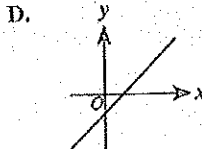4. $\tan x$ $\frac{3\sqrt{7}}{7}$

5. $\csc x = \frac{4}{3}$

$x^2 + 3^2 = 4^2$
$x^2 + 9 = 16$
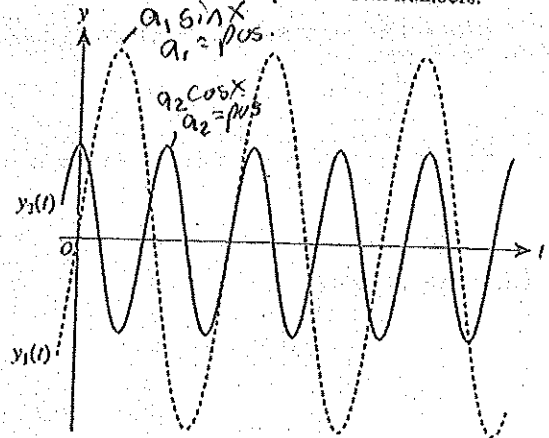$x^2 = 7$
$x = \sqrt{7}$

Topic 2: Standardized Test Questions (continued on the next page)

SAT/ACT Questions

18. A function f is an *odd* function if and only if $f(-x) = -f(x)$ for every value of x in the domain of f. One of the functions graphed in the standard (x,y) coordinate plane below is an odd function. Which one?

A.
D.
B.
E.
C.

19. A function P is defined as follows:
   for $x > 0$, $P(x) = x^5 + x^4 - 36x - 36$
   for $x < 0$, $P(x) = -x^5 + x^4 + 36x - 36$
What is the value of $P(-1)$?

A. −70
B. −36
C. 0
D. 36
E. 70

Notebook Check: _____

20. The equations of the 2 graphs shown below are $y_1(t) = a_1 \sin(b_1 t)$ and $y_2(t) = a_2 \cos(b_2 t)$, where the constants b_1 and b_2 are both positive real numbers.

$a_1 \sin x$
$a_1 = pos$
$a_2 \cos x$
$a_2 = pos$

$y_2(t)$

$y_1(t)$

Which of the following statements is true of the constants a_1 and a_2 ?

A. $0 < a_1 < a_2$
B. $0 < a_2 < a_1$
C. $a_1 < 0 < a_2$
D. $a_1 < a_2 < 0$
E. $a_2 < a_1 < 0$

21. For x such that $0 < x < \frac{\pi}{2}$, the expression
$\frac{\sqrt{1 - \cos^2 x}}{\sin x} + \frac{\sqrt{1 - \sin^2 x}}{\cos x}$ is equivalent to:

$\sin x \qquad \cos x$

F. 0
G. 1
H. 2
J. $-\tan x$
K. $\sin 2x$

$1 + 1 = 2$

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Topic 2: Trig. Identities

7. Use $\sin^2 x + \cos^2 x = 1$ to create the other 2 identities:

Use the ratio $\sin x = \frac{3}{4}$ to answer the following questions

    8. cos x   9. sec x

    10. tan x   11. csc x

Simplify the following:

12. $\dfrac{\sin x}{\cot x}$

(A) $\dfrac{\frac{O}{H}}{\frac{A}{A}} = \dfrac{O}{H} \cdot \dfrac{A}{O} = \dfrac{A}{H} = \cos x$

(B) $\dfrac{\frac{\sin x}{1}}{\frac{\sin x}{\cos x}} = \dfrac{\sin x}{1} \cdot \dfrac{\cos x}{\sin x} = \cos x$

13. $\dfrac{\sec x}{\tan x}$

(A) $\dfrac{\frac{H}{A}}{\frac{O}{A}} = \dfrac{H}{A} \cdot \dfrac{A}{O} = \dfrac{H}{O} = \csc x$

(B) $\dfrac{\frac{1}{\cos x}}{\frac{\sin x}{\cos x}} = \dfrac{1}{\cos x} \cdot \dfrac{\cos x}{\sin x} = \dfrac{1}{\sin x} = \csc x$

14. $(\sin x + \cos x)^2 - (\sin x - \cos x)^2$

Square both - FOIL

$\sin^2 x + 2\sin x \cos x + \cos^2 x -$
$[\sin^2 x - 2\sin x \cos x + \cos^2 x]$

$4\sin x \cos x$

Topic 3: Verifying Trig. Identities

15. $\sin x + \sin x \cdot \cot^2 x = \csc x$

$\sin x \left[\sin x + \dfrac{\sin x}{1} \cdot \dfrac{\cos^2 x}{\sin^2 x} = \dfrac{1}{\sin x} \right]$

$\sin^2 x + \cos^2 x = 1$

$1 = 1$ ✓

pythag. identity ↗

16. $\left[\dfrac{1 - \sin x}{\cos x} = \sec x - \tan x \right] =$ $\cos x \left[\dfrac{1 - \sin x}{\cos x} = \dfrac{1}{\cos x} - \dfrac{\sin x}{\cos x} \right] \Rightarrow 1 - \sin x = 1 - \sin x$ ✓

17. $(\tan x)^2 = \left(\sqrt{\sec^2 x - 1} \right)^2$

$\tan^2 x = \sec^2 x - 1$
$\tan^2 x + 1 = \sec^2 x$ ← pythag identity
$\sec^2 x = \sec^2 x$ ✓

18. $\sin^2 x + \cos^2 x = \csc^2 x - \cot^2 x$

$1 = \csc^2 x - \cot^2 x =$ $\left[1 = \dfrac{1}{\sin^2 x} - \dfrac{\cos^2 x}{\sin^2 x} \right] \cdot \sin^2 x$

$\sin^2 x = 1 - \cos^2 x$
$\sin^2 x + \cos^2 x = 1$
$1 = 1$