

Advanced High School Trigonometry

Mathematics · Answer Key · 25 Questions

1. What is the exact value of $\sin(15^\circ)$ using the angle subtraction formula?

A) $(\sqrt{6} - \sqrt{2})/4$

B) $(\sqrt{6} + \sqrt{2})/4$

C) $(\sqrt{3} - 1)/2$

D) $(\sqrt{2} - \sqrt{3})/4$

2. For the function $f(x) = 3\cos(2x - \pi) + 1$, what is the correct period?

A) π

B) 2π

C) 4π

D) $\pi/2$

3. Which expression is equivalent to $(1 - \cos(2\theta)) / \sin(2\theta)$?

A) $\tan(\theta)$

B) $\cot(\theta)$

C) $\sin(\theta)$

D) $\sec(\theta)$

4. What is the domain of the function $f(x) = \sec(x)$?

A) $x \neq n\pi, n \in \mathbb{Z}$

B) $x \neq (2n+1)\pi/2, n \in \mathbb{Z}$

C) $x \neq 2n\pi, n \in \mathbb{Z}$

D) All real numbers

5. If $\tan(\theta) = 3/4$ and θ is in the third quadrant, what is the value of $\cos(\theta)$?

A) $4/5$

B) $3/5$

C) $-4/5$

D) $-3/5$

6. Which identity represents the double-angle formula for $\cos(2\theta)$ in terms of \sin only?

A) $1 - 2\sin^2(\theta)$

B) $2\sin^2(\theta) - 1$

C) $1 + 2\sin^2(\theta)$

D) $\cos^2(\theta) - \sin^2(\theta)$

7. What is the general solution for the equation $\sin(x) = 1/2$?

A) $x = n\pi + (-1)^n(\pi/6)$

B) $x = 2n\pi \pm \pi/6$

C) $x = n\pi + \pi/6$

D) $x = n\pi - \pi/6$

8. The range of the inverse function $f(x) = \arccos(x)$ is defined as:

A) $(-\pi/2, \pi/2)$

B) $[0, \pi]$

C) $[-\pi/2, \pi/2]$

D) $(0, \pi)$

9. Using the harmonic addition theorem, express $3\sin(x) + \cos(x)$ in the form $R\sin(x + \theta)$.

A) $2\sin(x + \pi/6)$

B) $2\sin(x + \pi/3)$

C) $3\sin(x + \pi/6)$

D) $2\sin(x - \pi/6)$

10. What is the derivative of $f(x) = \tan(x)$?

A) $\sec(x)$

B) $\sec^2(x)$

C) $\csc^2(x)$

D) $-\sec^2(x)$

11. For a triangle with sides a, b, c and angle C opposite to side c , what is the Cosine Rule?

A) $c^2 = a^2 + b^2 - 2ab \cos(C)$

B) $c^2 = a^2 + b^2 + 2ab \cos(C)$

C) $a^2 = b^2 + c^2 - 2bc \cos(A)$

D) $c^2 = a^2 + b^2 - ab \cos(C)$

12. Which value is equal to $\sin(75^\circ)\cos(15^\circ) + \cos(75^\circ)\sin(15^\circ)$?

A) 0

B) 1

C) 0.5

D) $\sqrt{3}/2$

13. What is the period of the function $y = \tan(bx)$?

- A) $b/?$
- B) $?$ / b**
- C) $2?$ / b
- D) $?$ b

14. If $\sec^2(?) - \tan^2(?) = k$, what is the value of k ?

- A) 0
- B) 1**
- C) $\sec(?)$
- D) $\tan(?)$

15. The value of $\sin(\arccos(x))$ for $|x| \leq 1$ is:

- A) $\sqrt{1 - x^2}$**
- B) $1 - x^2$
- C) x
- D) $1/\sqrt{1 - x^2}$

16. Which of the following is an odd function?

- A) $f(x) = \cos(x)$
- B) $f(x) = \sec(x)$
- C) $f(x) = \sin(x)$**
- D) $f(x) = |\sin(x)|$

17. If $0 \leq ? < 2?$, how many solutions exist for $\sin(2?) = 1/2$?

- A) 1
- B) 2
- C) 4**
- D) 8

18. The identity $\cos(A + B) + \cos(A - B)$ is equal to:

- A) $2\cos(A)\cos(B)$**
- B) $2\sin(A)\sin(B)$
- C) $2\cos(A)\sin(B)$
- D) $2\sin(A)\cos(B)$

19. What is the limit of $\sin(x)/x$ as x approaches 0?

- A) 0
- B) 1**
- C) ?
- D) undefined

20. If $\cot(\theta) = -\frac{2}{3}$ and $\frac{\pi}{2} < \theta < \pi$, what is the value of $\sin(\theta)$?

- A) $\frac{2}{3}$
- B) $\frac{5}{6}$**
- C) $\frac{7}{6}$
- D) $\frac{11}{6}$

21. Which expression is equivalent to $\csc^2(\theta) - 1$?

- A) $\sec^2(\theta)$
- B) $\tan^2(\theta)$
- C) $\cot^2(\theta)$**
- D) $\sin^2(\theta)$

22. What is the exact value of $\cos\left(\frac{11\pi}{12}\right)$?

- A) $-\frac{\sqrt{6} + \sqrt{2}}{4}$**
- B) $\frac{\sqrt{6} - \sqrt{2}}{4}$
- C) $-\frac{\sqrt{6} - \sqrt{2}}{4}$
- D) $\frac{\sqrt{6} + \sqrt{2}}{4}$

23. The function $y = \sin(x)$ is increasing on which interval within $[0, 2\pi]$?

- A) $(0, \pi)$
- B) $(0, \frac{\pi}{2})$ and $(\frac{3\pi}{2}, 2\pi)$**
- C) $(\frac{\pi}{2}, \frac{3\pi}{2})$
- D) $(0, 2\pi)$

24. Simplify $\sin\left(\theta + \frac{3\pi}{2}\right)$.

- A) $\cos(\theta)$
- B) $-\cos(\theta)$**
- C) $\sin(\theta)$
- D) $-\sin(\theta)$

25. What is the amplitude of the function $y = -4\sin(x) + 2$?

- A) -4
- B) 4**
- C) 2
- D) 6