

PSU Math Relays
Trigonometry Team

Team Member 4
2018

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1. If $\cos(\theta) = \frac{\sqrt{3}}{2}$ and $\tan(\theta) < 0$, what does $\csc(\theta)$ equal?
a. $\frac{2}{\sqrt{3}}$ b. 2 c. -2 d. $-\frac{1}{2}$ e. a.n.g.
2. $\sec^2(\theta)\csc^2(\theta)$ is equal to:
a. $\sin^2(\theta) + \cos^2(\theta)$ b. $\frac{1}{\sin^2(\theta)} + \frac{1}{\cos^2(\theta)}$ c. $1 + 2\sin^2(\theta)$ d. $\tan^2(\theta)$ e. a.n.g.
3. Evaluate $\sin\left(\frac{5\pi}{12}\right)$
a. $\frac{\sqrt{6} + \sqrt{2}}{4}$ b. $\frac{\sqrt{6} - \sqrt{2}}{4}$ c. $\frac{1 + \sqrt{2}}{2}$ d. $\frac{\sqrt{2}}{2}$ e. a.n.g.
4. Evaluate $2\sin^2(15^\circ) + 2\sin^2(75^\circ)$
a. $\sin(30^\circ) + \sin(150^\circ)$ b. $\sin^2(180^\circ)$ c. 2 d. 4 e. a.n.g.
5. Evaluate $\sin\left(\frac{11\pi}{6}\right)\cos\left(\frac{\pi}{6}\right)$
a. 0 b. $\frac{\sqrt{3}}{4}$ c. $-\frac{\sqrt{3}}{4}$ d. 1 e. a.n.g.
6. Evaluate $\sin(47^\circ)\cos(28^\circ) + \cos(47^\circ)\sin(28^\circ)$
a. $\frac{1 + \sqrt{2}}{2}$ b. $\frac{\sqrt{6} - \sqrt{2}}{4}$ c. $\frac{\sqrt{6} + \sqrt{2}}{4}$ d. $\frac{\sqrt{2}}{2}$ e. a.n.g.
7. Evaluate $\cos(165^\circ)$
a. $\frac{\sqrt{2} - \sqrt{6}}{4}$ b. $\frac{\sqrt{2} + \sqrt{6}}{4}$ c. $\frac{-\sqrt{2} - \sqrt{6}}{4}$ d. $\frac{-\sqrt{2}}{4}$ e. a.n.g.
8. If angle $\hat{A} = 60^\circ$, length of side $AB = 5$, and length of side $AC = 7$, then the length of the side BC is equal to:
a. 39 b. $74 + 35\sqrt{3}$ c. $74 - 35\sqrt{3}$ d. 109 e. a.n.g.

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9. If $\tan(\theta) = \frac{3}{4}$ and $\pi < \theta < \frac{3\pi}{2}$, evaluate $\cos\left(\frac{\theta}{2}\right)$
- a. $\frac{3}{\sqrt{10}}$ b. $\frac{-3}{\sqrt{10}}$ c. $\frac{1}{\sqrt{10}}$ d. $\frac{-1}{\sqrt{10}}$ e. a.n.g.
10. If $\sin(\theta) = \frac{1}{2}$ and $\tan(\theta) < 0$, what does $\sec(\theta)$ equal?
- a. $\frac{\sqrt{3}}{2}$ b. 2 c. $-\frac{\sqrt{3}}{2}$ d. $-\frac{1}{2}$ e. a.n.g.
11. $\cot(\theta) + \frac{\sin(\theta)}{1 + \cos(\theta)}$ is equal to:
- a. $\sin(\theta)$ b. $\cos(\theta)$ c. $\csc(\theta)$ d. $\sec(\theta)$ e. a.n.g.
12. Evaluate $\sin\left(\frac{7\pi}{12}\right)$
- a. $\frac{\sqrt{6} - \sqrt{2}}{4}$ b. $\frac{\sqrt{6} + \sqrt{2}}{4}$ c. $\frac{1 + \sqrt{2}}{2}$ d. $\frac{\sqrt{2}}{2}$ e. a.n.g.
13. Evaluate $\cos^2(75^\circ) - \sin^2(75^\circ)$
- a. 1 b. 0 c. $-\frac{\sqrt{3}}{2}$ d. $\frac{\sqrt{3}}{2}$ e. a.n.g.
14. Evaluate $\sin\left(\frac{3\pi}{4}\right)\cos\left(\frac{3\pi}{4}\right)$
- a. -0.5 b. 0.5 c. -1 d. 1 e. a.n.g.
15. Evaluate $\cos(75^\circ)$
- a. $\frac{\sqrt{6}}{2}$ b. $\frac{\sqrt{6} - \sqrt{2}}{4}$ c. $\frac{\sqrt{6} + \sqrt{2}}{4}$ d. $\frac{\sqrt{2}}{2}$ e. a.n.g.
16. $\frac{[\sin(\theta) + \cos(\theta)]^2}{1 + \sin(2\theta)}$ is equal to:
- a. $\frac{1}{1 + \sin(2\theta)}$ b. 0 c. $1 + \csc(2\theta)$ d. 1 e. a.n.g.

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17. Evaluate $\sin(47^\circ)\cos(58^\circ) + \cos(47^\circ)\sin(58^\circ)$

- a. $\frac{\sqrt{6} + \sqrt{2}}{4}$ b. $\frac{\sqrt{6} - \sqrt{2}}{4}$ c. $\frac{1 + \sqrt{2}}{2}$ d. $\frac{\sqrt{2}}{2}$ e. a.n.g.

18. If $\cos(\theta) = -\frac{\sqrt{3}}{2}$ and $\tan(\theta) < 0$, what does $\csc(\theta)$ equal?

- a. $\frac{2}{\sqrt{3}}$ b. 2 c. -2 d. $-\frac{1}{2}$ e. a.n.g.

19. $[\tan(\theta) + \cot(\theta)]$ is equal to:

- a. $\sin(\theta) + \cos(\theta)$ b. $\csc(\theta) + \sec(\theta)$ c. $\frac{\sec(\theta)}{\cos(\theta)}$ d. $2\csc(2\theta)$ e. a.n.g.

20. Evaluate $\sin\left(\frac{\pi}{12}\right)$

- a. $\frac{\sqrt{6} + \sqrt{2}}{4}$ b. $\frac{\sqrt{6} - \sqrt{2}}{4}$ c. $\frac{1 + \sqrt{2}}{2}$ d. $\frac{\sqrt{2}}{2}$ e. a.n.g.

21. Find the amplitude and period of the function $y = -2\cos(6x)$

- a. $\left(-2, \frac{\pi}{3}\right)$ b. $\left(2, \frac{\pi}{6}\right)$ c. $\left(\frac{1}{2}, \frac{\pi}{3}\right)$ d. $\left(-2, \frac{\pi}{6}\right)$ e. a.n.g.

22. If $\cos(\theta) = \frac{1}{8}$ and $-\frac{\pi}{2} < \theta < \frac{\pi}{2}$, then $\cos\left(\frac{\theta}{2}\right)$ equals to:

- a. $\frac{1}{16}$ b. $\frac{1}{4}$ c. $\frac{\sqrt{7}}{4}$ d. $\frac{3}{4}$ e. a.n.g.

23. If a triangle has length of three sides 3, 5, and 6 respectively, then the area of the triangle is

- a. $\sqrt{7(1)(2)(4)}$ b. $\sqrt{14(8)(9)(11)}$ c. $\sqrt{7(10)(12)(13)}$ d. 10.50 e. a.n.g.

24. A circle has an area of $4\pi \text{ cm}^2$. Find the length of an arc subtended by a central angle of 1 radian.

- a. 1 cm b. 2 cm c. 4 cm d. 8 cm e. a.n.g.

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25. If $0 < \theta < \pi$ and $\theta = \cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$, then θ is equal to:

- a. 30^0 b. 60^0 c. 120^0 d. 150^0 e. a.n.g.

26. $\sin(2\theta)\tan(\theta) + \frac{2}{\sec^2(\theta)}$ is equal to:

- a. 1 b. $4\cos^2(\theta)$ c. 0 d. 2 e. a.n.g.

27. Evaluate $\sin\left(\frac{4\pi}{3}\right)$

- a. $\frac{\sqrt{6} + \sqrt{2}}{4}$ b. $\frac{\sqrt{6} - \sqrt{2}}{4}$ c. $\frac{1}{2}$ d. $\frac{\sqrt{3}}{2}$ e. a.n.g.

28. $\cos(75^0)\cos(45^0) + \sin(75^0)\sin(45^0)$ is equal to:

- a. $\frac{1}{2}$ b. $\frac{\sqrt{3}}{2}$ c. $-\frac{1}{2}$ d. $-\frac{\sqrt{3}}{2}$ e. a.n.g.

29. Evaluate $\cos(195^0)$

- a. $\frac{\sqrt{2} - \sqrt{6}}{4}$ b. $\frac{\sqrt{2} + \sqrt{6}}{4}$ c. $\frac{-\sqrt{2} - \sqrt{6}}{4}$ d. $\frac{-\sqrt{2}}{4}$ e. a.n.g.

30. $2\cos(45^0)\cos(15^0)$ is equal to;

- a. 1 b. $\frac{\sqrt{3} - 1}{2}$ c. $\frac{\sqrt{3} + 1}{2}$ d. $\frac{\sqrt{6}}{4}$ e. a.n.g.

31. Find the area of an equilateral triangle inscribed in the unit circle.

- a. $2 + \sqrt{3}$ b. $\frac{3\sqrt{3}}{4}$ c. $\frac{3\sqrt{3}}{2}$ d. $2\sqrt{3}$ e. a.n.g.

32. $\tan(15^0)$ is equal to:

- a. $2 - \sqrt{3}$ b. $\frac{1}{2\sqrt{3}}$ c. $2 + \sqrt{3}$ d. $\frac{\sqrt{3}}{4}$ e. a.n.g.