7. Given $\sin\theta = -\frac{1}{5}$ and $\tan\theta < 0$, find $\cos\theta$.

(a) $-\frac{\sqrt{26}}{5}$ (b) $\frac{\sqrt{26}}{5}$ (c) $-\frac{2\sqrt{6}}{5}$ (d) $\frac{2\sqrt{6}}{5}$ (e) None of these

1—M—Answer: d

6. Determine the period: $f(x) = 3\sin(4x - \pi)$

(a) 3π (b) $\frac{\pi}{2}$ (c) 2π (d) $\frac{3\pi}{2}$ (e) None of these

1—M—Answer: b

12. Describe the horizontal shift of the graph of g with respect to the graph of f:

$g(x) = 4\sin\left(2x - \frac{\pi}{3}\right)$ and $f(x) = 4\sin(2x)$

(a) $\frac{\pi}{6}$ units to the left (b) $\frac{\pi}{6}$ units to the right (c) $\frac{2\pi}{3}$ units to the left

(d) $\frac{2\pi}{3}$ units to the right (e) None of these

1—M—Answer: b

26. To sketch the graph of the cosecant function, it is convenient to first sketch the graph of the _____ function.

(a) sine (b) cosine (c) tangent

(d) cotangent (e) secant

1—M—Answer: a

29. Which of the following is a vertical asymptote to the graph of $y = -\tan\left(x - \frac{\pi}{3}\right)$?

(a) $x = \frac{\pi}{3}$ (b) $x = \frac{\pi}{2}$ (c) $x = \frac{3\pi}{2}$

(d) $x = \frac{5\pi}{6}$ (e) None of these

1—M—Answer: d

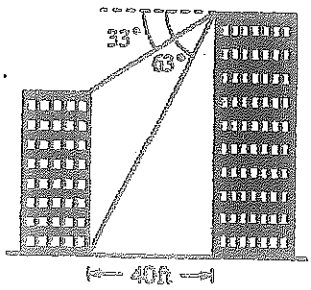
14. Evaluate: $\cos\left[\arctan\left(-\frac{2}{3}\right)\right]$

(a) $3\sqrt{13}$ (b) $\frac{3\sqrt{13}}{13}$ (c) $-\frac{2\sqrt{13}}{13}$ (d) $\frac{2\sqrt{13}}{13}$ (e) None of these

1—M—Answer: b

6. The angle of depression from the top of one building to the foot of a building across the street is 63°. The angle of depression to the top of the same building is 33°. The two buildings are 40 feet apart. What is the height of the shorter building?

2—O—Answer: 52.5 feet



1

B

20. Convert to radians: $240°$

(a) $\frac{3\pi}{4}$ (b) $\frac{43200}{\pi}$ (c) $\frac{3\pi}{2}$ (d) $\frac{4\pi}{3}$ (e) None of these

1—M—Answer: d

6. Find an angle θ that is coterminal to $\frac{11\pi}{4}$ such that $0 \leq \theta < 2\pi$.

1—O—Answer: $\frac{3\pi}{4}$

14. Give the exact value of $\sec \pi$.

(a) Undefined (b) -1 (c) 1

(d) $\frac{1}{2}$ (e) None of these

1—M—Answer: b

16. Find the exact value of $\cot(-150°)$.

(a) $\sqrt{3}$ (b) $-\frac{1}{2}$ (c) $-\frac{1}{\sqrt{3}}$ (d) 1 (e) None of these

1—M—Answer: a

31. The central angle θ of a circle with radius 9 inches subtends an arc of 20 inches. Find θ:

(a) 2.22° (b) 127.32° (c) 0.45° (d) 25.78° (e) None of these

1—M—Answer: b

22. A regular pentagon is inscribed in a circle of radius 36 inches. Find the length of the sides of the pentagon. (Round to three decimal places)

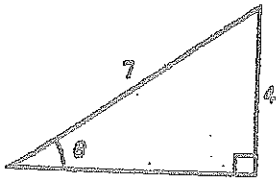
(a) 38.892 in. (b) 39.431 in. (c) 42.321 in. (d) 44.472 in. (e) None of these

1—M—Answer: c

2. Using the right triangle, find $\cot \theta$.

(a) $\frac{4}{7}$ (b) $\frac{7}{4}$ (c) $\frac{\sqrt{33}}{4}$

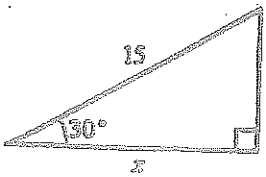
(d) $\frac{4}{\sqrt{33}}$ (e) None of these



1—M—Answer: c

30. Find x for the triangle shown at the right.

1—O—Answer: $\frac{15\sqrt{3}}{2}$



C

16. Factor and simplify: $\sec^2 x \csc^2 x - \sec^2 x - \csc^2 x + 1$

(a) 1 (b) $\cot^4 x$ (c) $\cot^2 x(\sec^2 x + 1)$

(d) $\tan^4 x$ (e) None of these

2—M—Answer: a

14. Factor and simplify: $\cot^4 x + 2\cot^2 x + 1$

(a) $\tan^4 x$ (b) $\csc^2 x$ (c) $\sec^4 x$

(d) $\csc^4 x$ (e) None of these

1—M—Answer: d

1. Find all solutions in the interval $[0, 2\pi)$: $\cos 2x + \sin x = 0$

(a) $0, \frac{\pi}{4}, \frac{3\pi}{4}$ (b) $\frac{\pi}{2}, \frac{7\pi}{6}, \frac{11\pi}{6}$ (c) $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{3\pi}{2}$

(d) $0, \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$ (e) None of these

1—M—Answer: b

27. Rewrite as a sum: $\sin 7x \sin 3x$

(a) $\frac{1}{2}(\sin 4x + \cos 10x)$ (b) $\frac{1}{2}(\sin 10x + \sin 4x)$ (c) $\frac{1}{2}(\cos 4x - \cos 10x)$

(d) $\sin 2x + \cos 5x$ (e) None of these

1—M—Answer: c

32. Find all solutions in the interval $[0, 2\pi)$: $2\cos\left(\frac{x}{2}\right) - \sqrt{3} = 0$

1—O—Answer: $\frac{\pi}{3}$

33. Determine the number of solutions for each of the following triangles.

(a) $C = 58°$, $c = 50$, $a = 67$

(b) $A = 107°$, $b = 17$, $a = 25$

(c) $B = 27°$, $a = 78$, $b = 28$

1—O—Answer: (a) 0 solutions (b) 1 solution (c) 0 solutions

20. Given a triangle with $a = 16$, $b = 19$, and $C = 63°$, find A.

(a) 66.5° (b) 50.5° (c) 23.5° (d) 94° (e) None of these

1—M—Answer: b

P D

57. Find the square roots: $49\left(\cos\frac{\pi}{3}+i\sin\frac{\pi}{3}\right)$

(a) $-\frac{7}{2}+\frac{7\sqrt{3}}{2}i,\ \frac{7}{2}-\frac{7\sqrt{3}}{2}i$

(b) $4.9+6.5i,\ 4.9-6.5i$

(c) $\frac{7\sqrt{3}}{2}+\frac{7}{2}i,\ -\frac{7\sqrt{3}}{2}-\frac{7}{2}i$

(d) $-\frac{7}{2}-\frac{7\sqrt{3}}{2}i,\ \frac{7}{2}+\frac{7\sqrt{3}}{2}i$

(e) None of these

1—M—Answer: c

65. Find the fourth roots: $81i$

(a) $\pm 3,\ \pm 3i$

(b) $3\left(\cos\frac{\pi}{8}+i\sin\frac{\pi}{8}\right),\ 3\left(\cos\frac{17\pi}{8}+i\sin\frac{17\pi}{8}\right),\ 3\left(\cos\frac{33\pi}{8}+i\sin\frac{33\pi}{8}\right),\ 3\left(\cos\frac{49\pi}{8}+i\sin\frac{49\pi}{8}\right)$

(c) $3\left(\cos\frac{\pi}{2}+i\sin\frac{\pi}{2}\right),\ -3\left(\cos\frac{\pi}{2}+i\sin\frac{\pi}{2}\right),\ 3\left(\cos\frac{3\pi}{2}+i\sin\frac{3\pi}{2}\right),\ -3\left(\cos\frac{3\pi}{2}+i\sin\frac{3\pi}{2}\right)$

(d) $3\left(\cos\frac{\pi}{8}+i\sin\frac{\pi}{8}\right),\ 3\left(\cos\frac{5\pi}{8}+i\sin\frac{5\pi}{8}\right),\ 3\left(\cos\frac{9\pi}{8}+i\sin\frac{9\pi}{8}\right),\ 3\left(\cos\frac{13\pi}{8}+i\sin\frac{13\pi}{8}\right)$

(e) None of these

1—M—Answer: d

29. Multiply: $[5(\cos 15^\circ+i\sin 15^\circ)][12(\cos 23^\circ+i\sin 23^\circ)]$

(a) $60(\cos 345^\circ+i\sin 345^\circ)$

(b) $60(\cos 38^\circ+i\sin 38^\circ)$

(c) $17(\cos 38^\circ+i\sin 38^\circ)$

(d) $17(\cos 345^\circ+i\sin 345^\circ)$

(e) None of these

1—M—Answer: b

19. Rewrite in standard form: $10\left(\cos\frac{2\pi}{3}+i\sin\frac{2\pi}{3}\right)$

(a) $5\sqrt{3}+5i$

(b) $10\sqrt{3}i$

(c) $5+5\sqrt{3}i$

(d) $-5+5\sqrt{3}i$

(e) None of these

1—M—Answer: d

15. Rewrite in trigonometric form: $-2+3i$

(a) $\sqrt{13}(\cos 56.3^\circ+i\sin 56.3^\circ)$

(b) $\sqrt{13}(\cos 123.7^\circ+i\sin 123.7^\circ)$

(c) $\sqrt{13}(\cos 236.3^\circ+i\sin 236.3^\circ)$

(d) $\sqrt{13}(\cos 303.7^\circ+i\sin 303.7^\circ)$

(e) None of these

1—M—Answer: b

46. Evaluate: $[3(\sqrt{2}-\sqrt{2}i)]^4$

(a) -1296

(b) $1296-1296i$

(c) -81

(d) $12+12i$

(e) None of these

1—M—Answer: a

E

31. Given a triangle with $A = 71°$, $b = 10$, and $c = 19$, find the area.

1—O—Answer: 89.8 square units

22. Given a triangle with $a = 121$, $b = 82$, and $c = 90$, find the area.

(a) 9922 (b) 4961 (c) 523.2
(d) 3689.7 (e) None of these

1—M—Answer: d

10. Given $\cos\theta = -\frac{7}{9}$ and $\tan\theta < 0$, find $\sin 2\theta$.

(a) $-\frac{14}{9}$ (b) $-\frac{56\sqrt{2}}{81}$ (c) $-\frac{32}{81}$ (d) $\frac{49}{81}$ (e) None of these

1—M—Answer: b