

1) If $\tan X = \frac{13}{84}$ and angle X terminates in the third quadrant, then what is the value of $\sec X$?

- A) $\frac{85}{84}$ B) $\frac{85}{13}$ C) $-\frac{84}{13}$ D) $-\frac{85}{84}$ E) $-\frac{85}{13}$

2) Change $y - 2x = 4$ to polar.

- A) $r = \frac{4}{2 \sin \theta \cos \theta}$ B) $r = \frac{4}{\cos \theta - 2 \sin \theta}$ C) $r = \frac{4}{\sin \theta - 2 \cos \theta}$

3) Which of the following statements is true for all values of X ?

- A) $1 - \cos x = \sin x$ B) $\cos^2 x - \sin^2 x = -1$ C) $\frac{\cos x}{\sin x} = \tan x$
D) $\cos 2x = 2 \cos^2 x - 1$ E) $\cot x \cos x = \sin x$

4) What is the direction angle of the vector $u = -9i + 15j$?

- A) 149° B) 121° C) 59° D) 169° E) 109°

5) What is the solution set in the interval $0 \leq x < 2\pi$ for the equation: $\cos^2 x - \cos x = 2$

- A) $\frac{\pi}{3}$ B) π C) $\frac{2\pi}{3}, \frac{4\pi}{3}$ D) $\frac{\pi}{3}, \frac{5\pi}{3}, \pi$ E) $\frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}, \pi$

6) Which of the following vectors, u , satisfies $\|u\| = 145$?

- A) $u = 85i - 120j$ B) $u = -51i + 131j$ C) $u = -144i - 17j$
D) $u = -60i - 90j$ E) $u = -85i + 107j$

7) If $\cos X = \frac{8}{17}$ and angle X terminates in the first quadrant, what is the value of $\cos 2x$?

- A) $\frac{16}{17}$ B) $\frac{240}{289}$ C) $\frac{256}{289}$ D) $-\frac{161}{289}$ E) $-\frac{16}{17}$

8) In which quadrant does angle X terminate if $\cos X < 0$ and $\csc X < 0$?

- A) first B) second C) third D) fourth

9) Change 255° to radians.

- A) $\frac{17\pi}{24}$ B) $\frac{17\pi}{36}$ C) $\frac{7\pi}{5}$ D) $\frac{19\pi}{17}$ E) $\frac{17\pi}{12}$

10) Which of the following is a true statement?

- A) $\tan x = \frac{\csc x}{\sec x}$ B) $\sin 2x = 2 \sin x$ C) $\cos \frac{1}{2}x = \sqrt{\frac{1 + \sin x}{2}}$
D) $\sec^2 x - \tan^2 x = 1$ E) $\frac{1}{\cos x} = \csc x$

11) If the sides of a triangle measure 36 and 77 and 85, what is the area of this triangle?

- A) 1386 B) 1530 C) 3772.5 D) 1285 E) None of these

12) Simplify: $\tan (\csc^{-1} (\frac{41}{9}))$

- A) $\frac{40}{9}$ B) $\frac{41}{40}$ C) $\frac{49}{40}$ D) $\frac{9}{49}$ E) $\frac{9}{40}$

13) Convert $r = \frac{12}{\sec \theta}$ into an equation in rectangular form.

- A) $x^2 + y^2 = 12y$ B) $x^2 + y^2 = 12$ C) $x^2 = 144x$
D) $x = 12$ E) $x^2 + y^2 = 12x$

14) In which quadrant does the point $(-6, -240^\circ)$ reside?

- A) first B) second C) third D) fourth

15) Which of the following ellipses has a focus at $(5, 6)$?

- A) $\frac{(x-5)^2}{25} + \frac{(y-6)^2}{16} = 1$ B) $\frac{(x-5)^2}{16} + \frac{(y-1)^2}{25} = 1$
C) $\frac{(x+1)^2}{25} + \frac{(y-6)^2}{9} = 1$ D) $\frac{(x-1)^2}{25} + \frac{(y-6)^2}{9} = 1$
E) $\frac{(x-5)^2}{9} + \frac{(y+1)^2}{25} = 1$

16) Convert $\frac{11\pi}{9}$ radians to degrees.

- A) 220° B) 110° C) 3.7° D) 330°

17) What is the focus of the parabola with equation: $(x-5)^2 = -20(y-10)$?

- A) $(5, 10)$ B) $(-5, -5)$ C) $(5, 5)$ D) $(10, 10)$ E) $(0, 5)$

18) What is the sum of this infinite geometric series: $100 + 10 + 1 + \frac{1}{10} + \dots$

- A) 1000 B) $\frac{999}{10}$ C) 200 D) $\frac{1000}{9}$ E) 112

19) Which of the following is coterminal with the angle whose measure is 265° ?

- A) 85° B) 105° C) -95° D) 565° E) -85°

20) Which of the following has an asymptote of $y = 2x$?

A) $\frac{x^2}{4} - \frac{y^2}{1} = 1$ B) $\frac{x^2}{16} - \frac{y^2}{4} = 1$ C) $\frac{y^2}{16} - \frac{x^2}{4} = 1$

D) $\frac{y^2}{2} - \frac{x^2}{1} = 1$ E) $\frac{x^2}{4} - \frac{y^2}{36} = 1$

21) Given that a triangle has sides of length 18, 20 and 24, find the measure of the angle opposite the side of length 24.

- A) 78° B) 102° C) 42° D) 85° E) None of these

22) Find the sum: $\sum_{n=3}^6 (20 - 3n)$

- A) 57 B) 24 C) 26 D) 306 E) 204

23) Change the complex number $-6 + 6i$ to polar form.

A) $12 (\cos 45^\circ + i \sin 45^\circ)$ B) $6\sqrt{2} (\cos 135^\circ + i \sin 135^\circ)$

C) $6\sqrt{2} (\cos 315^\circ + i \sin 300^{15^\circ})$ D) $12 (\cos 135^\circ + i \sin 135^\circ)$

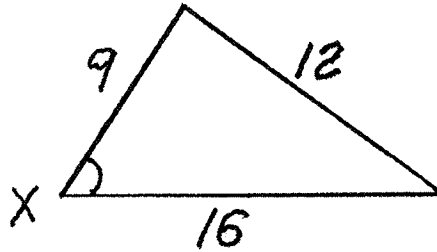
24) What type of sequence is: $48, 36, 27, \frac{81}{4}, \dots$?

- A) geometric B) arithmetic C) neither geometric or arithmetic

25) If $\mathbf{u} = -8\mathbf{i} + 15\mathbf{j}$, then find a unit vector in the same direction as \mathbf{u} .

- A) $\frac{8}{17}\mathbf{i} + \frac{15}{17}\mathbf{j}$ B) $\frac{8}{23}\mathbf{i} - \frac{15}{23}\mathbf{j}$ C) $\frac{15}{23}\mathbf{i} + \frac{8}{23}\mathbf{j}$
D) $-\frac{15}{17}\mathbf{i} - \frac{8}{17}\mathbf{j}$ E) $-\frac{8}{17}\mathbf{i} + \frac{15}{17}\mathbf{j}$

26) What is the measure of angle X in the triangle to the right, to the nearest degree?



- A) 44° B) 34° C) 98° D) 54° E) 48°

27) If $f(x) = 9 + 5 \sin\left(\frac{11\pi x}{27}\right)$, then find the value of $f(4.6)$.

- A) 9.5 B) 6.3 C) 7.1 D) -1.5 E) 0

28) Which of the following is a focus for $\frac{(x-8)^2}{36} - \frac{(y-6)^2}{64} = 1$?

- A) (8, 6) B) (8, 16) C) (-2, 6) D) (10, 6) E) (8, -10)

29) Find the following sum: $6 + 10 + 14 + 18 + 22 + \dots + 282$

- A) 10080 B) 19740 C) 9870 D) 6768 E) 5020

30) What is the 105th term of the sequence: 17, 23, 29, 35, 41, 47, 53, ...?

- A) 1785 B) 857 C) 648 D) 635 E) 641

32) Write $\sin 6x \cos 4x - \cos 6x \sin 4x$ in terms of a single trigonometric function.

- A) $\cos 10x$ B) $\cos 2x$ C) $\sin 2x$ D) $\sin^2 x$ E) $\sin 10x$

33) What is the period of the curve $y = 8 + 10 \sin \left(\frac{2}{5} \pi x \right)$?

- A) 20 B) $\frac{1}{5}$ C) $\frac{4}{5}$ D) 5 E) $\frac{4\pi}{5}$

34) If $\mathbf{u} = 6\mathbf{i} - 24\mathbf{j}$ and $\mathbf{v} = k\mathbf{i} + 2\mathbf{j}$ are parallel, then $k = ??$

- A) 8 B) -8 C) $\frac{1}{2}$ D) $-\frac{1}{2}$ E) -2

35) If $\sin x = \frac{a}{4}$, then $\sin^{-1} \left(\frac{a}{4} \right) = ??$

- A) x B) $\frac{1}{x}$ C) $\frac{4}{a}$ D) $4x$ E) $\frac{4}{x}$

36) How many terms does the series $\sum_{n=11}^{123} (6n - 1)$ contain?

- A) 123 B) 112 C) 102 D) 113 E) None of these

37) What is the measure of the angle marked X in the triangle to the right, to the nearest degree?

- A) 40° B) 50° C) 60° D) 70°

