

REMEMBER : NOTA means "none of the above choices"

1. If $f(x) = x^2 + 3$ and the domain of $f(x)$ is the set of positive integers, then the range of $f(x)$ is
 - a) { reals ≥ 1 }
 - b) { reals ≥ 3 }
 - c) { integers ≥ 4 }
 - d) { integers ≥ 3 }
 - e) NOTA

2. What is the area of a triangle with $m \angle ABC = 60^\circ$, $AB = 4\sqrt{3}$ and $BC = 8$?
 - a) 24 sq. units
 - b) 72 sq. units
 - c) 64 sq. units
 - d) 48 sq. units
 - e) NOTA

3. A 5'6" tall woman sights the top of a building which is 80 feet from where she is standing. If her angle of sight is 26° , then find the height of the building to the nearest inch.
 - a) 105 in.
 - b) 297 in.
 - c) 468 in.
 - d) 534 in.
 - e) NOTA

4. SIMPLIFY : $(4 \text{ cis}217^\circ)(7 \text{ cis}98^\circ)(.5 \text{ cis}53^\circ)$
 - a) 14 cis378 $^\circ$
 - b) 14 cis8 $^\circ$
 - c) 11.5 cis368 $^\circ$
 - d) 28 cis378 $^\circ$
 - e) NOTA

5. What is the center of the conic whose equation is $4x^2 + 9y^2 - 24x + 36y = 0$?
 - a) (-2,3)
 - b) (-3,2)
 - c) (2,-3)
 - d) (3,-2)
 - e) NOTA

6. Let $A = 3 + 7 + 11 + \dots + 79$ and $B = 2 + 6 + 10 + \dots + 82$. Find the value of $B - A$.
 - a) 59
 - b) 62
 - c) 79
 - d) 83
 - e) NOTA

7. If $\vec{a} = \langle -2, 5, -1 \rangle$ and $\vec{b} = \langle 3, -4, 2 \rangle$, then find the \vec{c} such that

$$\vec{c} = 2\vec{a} - \vec{b} .$$

- a) $\langle 1, 1, 1 \rangle$ c) $\langle -1, 6, 0 \rangle$ e) NOTA
 b) $\langle -7, 14, -4 \rangle$ d) $\langle -7, 14, 0 \rangle$

8. Find all values of x which satisfy the conditions

$$0^\circ \leq x \leq 270^\circ \text{ and } 2\sin^2 x + \sin x = 1 .$$

- a) $30^\circ, 270^\circ$ c) $30^\circ, 150^\circ, 270^\circ$ e) NOTA
 b) $30^\circ, 150^\circ$ d) $150^\circ, 270^\circ$

9. Given the function $g(x) = |3\sin x - 2| + 5$, then determine the maximum value of $g(x)$.

- a) 10 c) 6 e) NOTA
 b) 8 d) cannot be determined

10. Which of the following is not a root of $2x^5 + x^4 - 10x^3 - 5x^2 + 8x + 4 = 0$?

- a) 2 b) 1 c) $\frac{1}{2}$ d) -1 e) NOTA

11. SOLVE the following for $0^\circ \leq y < 360^\circ$:

$$(\tan y - 1)^2 + (\cos y - \sin y)^2 = 0$$

- a) 45° b) 135° c) $45^\circ, 225^\circ$ d) $45^\circ, 135^\circ$ e) NOTA

12. Solve the system: $3x + 2y = 17$ Then find the value of $5x + y$.
 $2x - y = 11$

- a) $\frac{28}{5}$ b) $\frac{186}{7}$ c) $\frac{141}{7}$ d) $\frac{194}{7}$ e) NOTA

13. SIMPLIFY : $\ln e^{3x+2} - \log_8 8^{4-x} + \ln e^{2x+7}$
a) $4x + 5$ b) $6x + 5$ c) $4x + 13$ d) $5x + 7$ e) NOTA
14. If $f(x) = f(x - 2) + x^2$ and $f(3) = -8$, then find $f(9)$.
a) 73 b) 93 c) 172 d) 147 e) NOTA
15. A ranger in his tower sights a cabin along a line which is 42° East of North. He knows that the cabin is 6.3 miles from the tower. From his tower he also sights a mountain peak 73° West of North. He also knows that the mountain peak is a distance of 9.8 miles from his tower. How far is the cabin from the mountain peak to the nearest hundredth of a mile? (assume that all three points are at the same level)
a) 14.37 miles c) 10.29 miles e) NOTA
b) 13.71 miles d) 9.14 miles
16. SOLVE : $\text{Log}_6 (x^2 + 5x) = 2$
a) 4, -9 b) -4, 9 c) 4 d) 9 e) NOTA
17. Which of the following is the equation of a parabola with focus at (3,5) and vertex at (3,1)?
a) $y = 12(x - 3)^2$ c) $(y - 1) = 12(x - 3)^2$ e) NOTA
b) $(x - 3)^2 = 4(y - 1)$ d) $(x - 3)^2 = 16(y - 1)$
18. SIMPLIFY : $\frac{\sin^3 x - \cos^3 x}{\sin x - \cos x}$
a) $1 + \frac{\sin 2x}{2}$ c) $-\cos 2x$ e) NOTA
b) $2 - (\sin x)(\cos x)$ d) 1

19. SOLVE for x : $\sum_{i=2}^4 (ix - 3) = 27$

- a) 5.5 b) $\frac{10}{3}$ c) 4 d) 5 e) NOTA

20. If θ is an acute angle and $\cos \theta = \frac{x+1}{x+9}$, find $\sin \theta$.

- a) $\frac{8}{x+9}$ c) $\frac{2\sqrt{x+4}}{x+9}$ e) NOTA
b) $\frac{x+8}{x+9}$ d) $\frac{4\sqrt{x+5}}{x+9}$

21. SIMPLIFY : $\frac{\sin^2(30^\circ) - \cos^3(120^\circ)}{\frac{1}{2^3}[\sin^2(38^\circ) + \cos^2(38^\circ)]}$

- a) $\frac{64}{3}$ b) $\frac{3}{64}$ c) 3 d) 1 e) NOTA

22. Find the longest side of a triangle with 2 angles of 35° and 68° and its shortest side equals 22. (Give answer to nearest tenth)

- a) 37.4 b) 35.3 c) 13.0 d) 12.9 e) NOTA

23. The vectors $\langle 3, -9 \rangle$ and $\langle -2, 6 \rangle$ are each perpendicular to which of the following vectors ?

- a) $\langle 12, 4 \rangle$ c) $\langle 3, -1 \rangle$ e) NOTA
b) $\langle -8, 2 \rangle$ d) choices a and c

24. SOLVE over the reals : $e^{\ln|x^2+5|} - \ln e^{2x+3} = \ln e^{-3}$

- a) $1 \pm \sqrt{6}$ c) $-1 \pm \sqrt{6}$ e) NOTA
b) $1 \pm 2\sqrt{6}$ d) \emptyset

25. If a triangle has sides $AB = 14.6$, $BC = 21.4$ and $m \angle C = 43^\circ$, then this information indicates that there are
- a) 2 triangles c) no triangle e) NOTA
b) 1 triangle d) not enough information given
26. The rectangular coordinates $(-5, 12)$ can be converted to the following polar coordinates. (give angle to the nearest degree)
- a) $(13, 67^\circ)$ c) $(13, 113^\circ)$ e) NOTA
b) $(-13, 23^\circ)$ d) $(13, 123^\circ)$
27. Find the 16th term of the sequence $17 + 29x, 15 + 26x, 13 + 23x, \dots$
- a) $47 + 74x$ c) $-13 + 74x$ e) NOTA
b) $-13 + -16x$ d) $-15 + -19x$
28. SOLVE for $0^\circ \leq \theta < 180^\circ$: $\frac{1}{2} \sin 2x + \cos^2 x = 0$
- a) $45^\circ, 90^\circ$ c) $90^\circ, 135^\circ, 180^\circ$ e) NOTA
b) $90^\circ, 135^\circ$ d) $45^\circ, 90^\circ, 135^\circ$
29. If $S = 4 + 2 + 1 + \dots$ and $T = 9 + 3 + 1 + \dots$. Then find $S - T$.
- a) $\frac{-11}{2}$ b) $\frac{13}{2}$ c) $\frac{25}{2}$ d) $\frac{43}{2}$ e) NOTA
30. Which of the following equals $\sin x$?
- a) $(\cos x)(\cot x)(\sec x)$ c) $(\sin x)(\cot x)$ e) NOTA
b) $(\cos x + \sin x)^2 - 1$ d) $(\cos x)(\tan x)$