

EQUATIONS AND INEQUALITIES TOPIC TEST

1. Solve for a: $\frac{1}{a} + \frac{1}{c} = \frac{1}{b}$

- a) $\frac{bc}{c-b}$ b) $\frac{c-b}{bc}$ c) bc d) $\frac{bc}{b-c}$ e) none of these

2. Solve the system for y:
$$\begin{aligned} 2x - 4y + 6z &= 22 \\ 4x + 2y - 3z &= 4 \\ 3x + 3y - z &= 4 \end{aligned}$$

- a) -1 b) 2 c) 0 d) 3 e) none of these

3. Solve over R: $\sqrt{12-x} + x = 6$

- a) $\{-3\}$ b) $\{3\}$ c) $\{8\}$ d) $\{3,8\}$ e) none of these

4. Solve for x: $6x^2 + 3x - 3 = 0$

- a) $\{-.5, 1\}$ b) $\{-1, .5\}$ c) $\{.5, 1\}$ d) $\{-.5, -1\}$ e) none of these

5. Solve for x: $|2x-5| < 3$

- a) $(-\infty, 4)$ b) $(1, 4)$ c) $(-\infty, 1) \cup (4, \infty)$
 d) $(1, 2.5) \cup (2.5, 4)$ e) none of these

6. If $P(x) = x^3 - 6x^2 + \dots$ with integral coefficients has a zero of $1 + i\sqrt{5}$, then $P(x) =$

- a) $x^3 - 6x^2 - 14x - 24$ c) $x^3 - 6x^2 + 12x - 24$ e) none of these
 b) $x^3 - 6x^2 + 14x - 24$ d) $x^3 - 6x^2 + 13x - 24$

7. The roots of $\sqrt{35}x^2 - x - \sqrt{35} = 0$ are

- a) rational and equal b) rational and unequal c) irrational d) imaginary e) none of these

16. Write an equation whose roots are two more than the roots of the equation $3x^3 - 2x^2 - 5x + 2 = 0$.

- a) $3x^3 + 16x^2 + 23x + 8 = 0$ c) $3x^3 - 4x^2 - 20x + 16 = 0$ e) none of these
b) $3x^3 - 20x^2 + 39x - 20 = 0$ d) $3x^3 - 4x^2 - 7x + 4 = 0$

17. The circle whose equation is $(x-2)^2 + (y+3)^2 = 4$ is rotated in space so as to form a sphere. Find the volume of the sphere.

- a) $\frac{16\pi}{3}$ b) $\frac{32\pi}{3}$ c) 16π d) 256π e) none of these

18. If $f(x) = 3x^5 + 2x^2 - x + 1$, then $f(2) =$

- a) 31 b) 55 c) 101 d) 103 e) none of these

19. Solve for x : $\sqrt{3x-11} + \sqrt{3x} = \sqrt{12x-23}$ if all expressions are Real.

- a) {20} b) {-3,6} c) {3,6} d) {4,12} e) none of these

20. Solve for the ordered pair (x,y) : $2x + 3iy = 4 + 6i$, where $i = \sqrt{-1}$

- a) (4,2) b) (2,-2) c) (2,2) d) (2,6) e) none of these

21. If $f(x) = \sqrt{(x+1)(x-2)(x-4)}$, for what values of x will $f(x)$ be real?

- a) $x > 4$ or $-1 < x < 2$ b) $x < -1$ or $2 < x < 4$ c) $x \geq 4$ d) $x \in \mathbb{R}$ e) none of these

22. If a and b are integers, which of the following numbers could not be a root of the equation $8x^3 + ax^2 + bx + 4 = 0$?

- a) 1 b) -2 c) 4 d) .5 e) none of these

23. Solve for x in the interval $[0^\circ, 360^\circ)$: $2\cos^2 2x = 1 - \cos 2x$

- a) $\{30^\circ, 90^\circ, 150^\circ, 270^\circ\}$ c) $\{60^\circ, 180^\circ, 300^\circ\}$ e) none of these
b) $\{30^\circ, 90^\circ, 150^\circ\}$ d) $\{30^\circ, 90^\circ, 150^\circ, 210^\circ, 270^\circ, 330^\circ\}$

24. Given the parabola whose equation is $y=2x^2+8x+5$, which of the following statements is(are) TRUE?
 I the vertex is at $(-2,-3)$
 II the graph opens upward
 III the latus rectum has length .5
 IV the relation is a function
- a) I,II only b) I,II,IV only c) II,III,IV only d) all e) none of these
25. Find the value of k in the equation $x^3-6x^2+kx+64=0$, if the roots form a geometric progression.
- a) -24 b) -18 c) -10 d) 12 e) none of these
26. Write an equation whose roots are the reciprocals of the roots of the equation $x^3-2x^2-3x-1=0$.
- a) $x^3-3x^2+2x-1=0$ c) $x^3+3x^2+2x-1=0$ e) none of these
 b) $x^3+3x^2-2x+1=0$ d) $x^3-3x^2-2x-1=0$
27. Solve for x : $(\sqrt[3]{2})(\sqrt{5}) = \sqrt{x}$
- a) 5 b) 100 c) 250 d) 500 e) none of these
28. Solve for x : $\left| \frac{3+x}{2-x} \right| \leq 4$
- a) $x \leq 1$ or $x \geq \frac{11}{3}$ b) $x \leq -\frac{11}{3}$ or $x \geq \frac{11}{3}$ c) $x \leq -1$ or $x \geq 1, x \neq 2$ d) $x \geq 1$ and $x \leq \frac{11}{3}, x \neq 2$ e) none of these
29. Solve for x in the interval $[0^\circ, 360^\circ)$: $4\sin^2\left(\frac{x}{2}\right) = -\cos x + 2$
- a) $\{60^\circ, 300^\circ\}$ b) $\{120^\circ, 240^\circ\}$ c) $\{90^\circ, 270^\circ\}$ d) $\{45^\circ, 135^\circ\}$ e) none of these
30. Solve for the base x if the fraction $\left(\frac{30}{41}\right)_x$ can be completely reduced to $\left(\frac{10}{13}\right)_x$
- a) 6 b) 7 c) 8 d) 9 e) none of these