

College Algebra Practice Placement Test

1. If $f(x) = 3x^2 + 2x - 7$, then $f(-3) = ?$
2. If $g(2) = 9$ and $g(-1) = 15$, write a function that represents $g(x)$.
3. If $\frac{x^{\frac{5}{2}}}{x^{\frac{1}{3}}} = x^k$, then $k = ?$
4. If $a = 4b + 2c$ and $b = 6 - 3c$, then express a in terms of c .
5. For $i = \sqrt{-1}$, if $3i(5 - 2i) = x + 15i$, then $x = ?$
6. Let $f(x) = 2x^2 + 5x - 7$ and $g(x) = x + 3$, then $f \circ g(x) = ?$
7. For all x such that $x^2 + 36 = 0$, $x = ?$
8. For all x such that $\frac{24}{\sqrt{x^2 + 9}} = 6$, $x^2 = ?$
9. If $f(x) = 3x + 8$, then $f^{-1}(x) = ?$
10. Simplify. $\sqrt{a^3} \cdot \sqrt[3]{a^2}$
11. For $i = \sqrt{-1}$, then express $\sqrt{-48x^5}$ in terms of i and simplify.
12. Simplify. $8^{\frac{7}{12}} \cdot 8^{\frac{3}{4}}$
13. What are the roots, where the function equals zero, of the function $f(x) = x^3 + 4x^2 - 9x - 36$?
14. What is the maximum value for the function $f(x) = -2x^2 + 10x - 12$?
15. $\left(\frac{1}{p}\right)^{x^2} = p^{-9}$, for what values of x ?
16. If $i = \sqrt{-1}$, $i + i^2 + i^3 + i^4 + i^5 = ?$
17. What is the sum of the solutions of $2x^2 = 3x + 20$?

18. If $\frac{3x^2 - kx - 4}{x - 4} = 3x + 1$, then $k = ?$

19. The operation $*$ is defined to be: $x * y = 4x - 2y$. If $3 * a = 6$, then $a = ?$

20. If $\log_3 x + \log_3(x - 8) = 2$, then $x = ?$

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(Answers)**

1. $f(x) = 3x^2 + 2x - 7$

$$\begin{aligned} f(-3) &= 3(-3)^2 + 2(-3) - 7 \\ &= 3(9) + 2(-3) - 7 \\ &= 27 - 6 - 7 \\ &= 14 \end{aligned}$$

2. $g(x) = x^2 - 3x + 11$

$$\begin{aligned} g(2) &= (2)^2 - 3(2) + 11 \\ &= 4 - 6 + 11 = 9 \\ g(-1) &= (-1)^2 - 3(-1) + 11 \\ &= 1 + 3 + 11 = 15 \end{aligned}$$

3. $k = \frac{5}{2} - \frac{1}{3}$

$$\begin{aligned} &= \frac{15}{6} - \frac{2}{6} \\ &= \frac{13}{6} \end{aligned}$$

4. $a = 4(6 - 3c) + 2c$

$$a = 24 - 12c + 2c$$

$$a = 24 - 10c$$

5. $3i(5 - 2i) = x + 15i$

$$15i - 6i^2 = x + 15i$$

$$15i - 6(-1) = x + 15i$$

$$15i + 6 = x + 15i$$

$$6 = x$$

6. $f \circ g(x) = 2(x + 3)^2 + 5(x + 3) - 7$

$$= 2(x^2 + 6x + 9) + 5(x + 3) - 7$$

$$= 2x^2 + 12x + 18 + 5x + 15 - 7$$

$$= 2x^2 + 17x + 26$$

7. $x^2 + 36 = 0$

$$x^2 = -36$$

$$\sqrt{x^2} = \pm \sqrt{-36}$$

$$x = \pm 6i$$

8. $\frac{24}{\sqrt{x^2 + 9}} = 6$

$$24 = 6\sqrt{x^2 + 9}$$

$$4 = \sqrt{x^2 + 9}$$

$$(4)^2 = (\sqrt{x^2 + 9})^2$$

$$16 = x^2 + 9$$

$$7 = x^2$$

$$9. f(x) = 3x + 8$$

$$y = 3x + 8$$

$$x = 3y + 8$$

$$x - 8 = 3y$$

$$\frac{x-8}{3} = y$$

$$f^{-1}(x) = \frac{x-8}{3}$$

$$11. \sqrt{-48x^5}$$

$$= \sqrt{-2^4 \cdot 3x^5}$$

$$= 2^2 x^2 i \sqrt{3x}$$

$$= 4x^2 i \sqrt{3x}$$

$$13. f(x) = x^3 + 4x^2 - 9x - 36$$

$$0 = x^3 + 4x^2 - 9x - 36$$

$$0 = x^2(x+4) - 9(x+4)$$

$$0 = (x+4)(x^2-9)$$

$$0 = (x+4)(x-3)(x+3)$$

$$x+4 = 0 \quad x-3 = 0 \quad x+3 = 0$$

$$x = -4 \quad x = 3 \quad x = -3$$

$$x = \{-4, -3, 3\}$$

$$15. \left(\frac{1}{p}\right)^{x^2} = p^{-9}$$

$$\left(\frac{1}{p}\right)^{x^2} = \left(\frac{1}{p}\right)^9$$

$$x^2 = 9$$

$$x = \pm 3$$

$$17. 2x^2 = 3x + 20$$

$$2x^2 - 3x - 20 = 0$$

$$(2x+5)(x-4) = 0$$

$$2x+5 = 0 \quad x-4 = 0$$

$$x = -\frac{5}{2} \quad x = 4$$

$$\text{Sum} = -\frac{5}{2} + 4 = \frac{3}{2}$$

$$10. \sqrt{a^3} \cdot \sqrt[3]{a^2}$$

$$= a^{\frac{3}{2}} \cdot a^{\frac{2}{3}}$$

$$= a^{\frac{3}{2} + \frac{2}{3}}$$

$$= a^{\frac{13}{6}}$$

$$= \sqrt[6]{a^{13}}$$

$$= a^2 \sqrt[6]{a}$$

$$12. 8^{\frac{7}{12}} \cdot 8^{\frac{3}{4}}$$

$$= 8^{\frac{7}{12} + \frac{3}{4}} = 8^{\frac{16}{12}}$$

$$= 8^{\frac{4}{3}} = (\sqrt[3]{8})^4$$

$$= (2)^4 = 16$$

$$14. f(x) = -2x^2 + 10x - 12$$

$$\frac{-b}{2a} = \frac{-10}{2(-2)} = \frac{10}{4} = \frac{5}{2}$$

$$f\left(\frac{5}{2}\right) = -2\left(\frac{5}{2}\right)^2 + 10\left(\frac{5}{2}\right) - 12$$

$$= -2\left(\frac{25}{4}\right) + 10\left(\frac{5}{2}\right) - 12$$

$$= -\frac{25}{2} + 25 - 12 = \frac{1}{2}$$

$$\text{Maximum Value} = \left(2\frac{1}{2}, \frac{1}{2}\right)$$

$$16. i + i^2 + i^3 + i^4 + i^5$$

$$= i + (-1) + (-i) + (1) + (i)$$

$$= i$$

$$18. \frac{3x^2 - kx - 4}{x - 4} = 3x + 1$$

$$3x^2 - kx - 4 = (3x + 1)(x - 4)$$

$$3x^2 - kx - 4 = 3x^2 - 12x + x - 4$$

$$3x^2 - kx - 4 = 3x^2 - 11x - 4$$

$$-kx = -11x$$

$$k = 11$$

$$19. 4(3) - 2(a) = 6$$

$$12 - 2a = 6$$

$$-2a = -6$$

$$a = 3$$

$$20. \log_3 x + \log_3(x - 8) = 2$$

$$\log_3(x^2 - 8x) = 2$$

$$x^2 - 8x = 3^2$$

$$x^2 - 8x - 9 = 0$$

$$(x - 9)(x + 1) = 0$$

$$x - 9 = 0 \quad x + 1 = 0$$

$$x = 9 \quad x = -1$$