

COLLEGE ALGEBRA

Part I:

1. Simplify $\left(\frac{2a^{-3}}{b^2}\right)^{-2}$.
2. Find the equation of the line with a slope of $-1/2$ that contains the point $(8, -1)$.
3. Solve
$$\begin{aligned} 6x - 2y &= 8 \\ -5x + 6y &= 2 \end{aligned}$$
4. If $\sin\theta = \frac{1}{2}$ and $\tan\theta > 0$, $\cos\theta = ?$
5. For $f(x) = x^2 - 2x$, find $f(a+3)$.
6. For $\sin\theta = \frac{\sqrt{3}}{2}$ and $\cos\theta > 0$, $\cot\theta = ?$
7. $\log_8 2 = ?$
8. Solve $x^2 + 7x = 44$.
9. Solve $\sqrt{3x-1} = 12$
10. What is the domain of the function $f(x) = \sqrt{x-4}$?

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Part II:

1. Simplify $(3x^4y^{-3})^{-3}$ a) $3x$ b) $\frac{y^9}{27x^{12}}$ c) $\frac{27y^9}{x^{12}}$ d) $\frac{27x^{12}}{y^9}$
2. What is the equation of the line with slope $2/3$ that contains the point $(6,1)$? a) $y = \frac{2}{3}x - 5$ b) $y = \frac{2}{3}x + 5$
c) $y = \frac{2}{3}x$ d) $y = \frac{2}{3}x - 3$
3. Solve the system of equations.
$$\begin{aligned} x + y &= 6 \\ 3x - 2y &= -2 \end{aligned}$$

a) $(-3.3, -4)$ b) $(1,5)$ c) $(2, 4)$ d) $(0,6)$
4. If $\cos\theta = \frac{\sqrt{3}}{2}$, and $0 < \theta < \pi$, $\csc\theta = ?$
a) 2 b) -2 c) $\frac{2}{\sqrt{3}}$ d) -1

5. For $f(x) = 3x^2 - x$, find $f(b-1)$.
 a) $3x^2b - xb - 3x^2 + x$
 b) $3b^2 - 7b + 4$ c) $3b^2 - b - 2$ d) $3b^2 - 7b + 2$
6. If $\sec \theta = 5/4$, and $\sin \theta < 0$, $\tan \theta = ?$
 a) $-3/4$ b) $3/5$ c) $-1/2$ d) $3/4$
7. $\log_4 \frac{1}{64} = ?$ a) -0.23 b) -3 c) $1/3$ d) $-1/3$
8. Solve $(x+3)(x-10) = -12$.
 a) $\{-3, 10\}$ b) $\{-15, -2\}$ c) $\{6\}$ d) $\{-2, 9\}$
9. Solve $\frac{-10}{x^2 - 2x - 8} + \frac{5}{x+2} = 3$
 a) $\{2/3, 3\}$ b) $\{-4, -2\}$ c) $\{-3/2, -3\}$ d) $\{2, 4\}$
10. What is the domain of the function $g(x) = \ln(x+1)$?
 a) $x > 0$ b) $x < 0$ c) $x > -1$ d) $x \geq -1$

Note: There is only one right answer, but there may be several ways to get there. One way is given below.

Solutions to College Algebra Part I:

1. Raise each factor inside the parentheses to the exponent, then simplify any remaining negative exponents.

$$\frac{2^{-2} a^6}{b^{-4}} \quad \text{remember} \quad \left(\frac{ab}{c}\right)^m = \frac{a^m b^m}{c^m} \quad \text{and}$$

$$\frac{\mathbf{a^6 b^4}}{\mathbf{4}} \quad \left(\frac{p}{q}\right)^{-n} = \left(\frac{q}{p}\right)^n$$

2. Use the point-slope form with $m = -1/2$ and $(x_1, y_1) = (8, -1)$.

Point-slope form $y - y_1 = m(x - x_1)$
 $y - (-1) = -1/2(x - 8)$

and solve for y. $y + 1 = -1/2x + 4$
 $\mathbf{y = -1/2x + 3}$

3. Multiply the first equation by 3, and add it to the second equation to eliminate the y-variables. Then substitute in one of the original equations to find y.

$$\begin{array}{r} 3(6x - 2y = 8) \qquad \qquad \qquad 18x - 6y = 24 \\ -5x + 6y = 2 \qquad \qquad \qquad -5x + 6y = 2 \\ \hline 13x = 26 \qquad \qquad \qquad -5(2) + 6y = 2 \\ \mathbf{x = 2} \qquad \qquad \qquad \mathbf{y = 2} \end{array}$$

4. Since $\tan \theta$ is positive, $\sin \theta$ and $\cos \theta$ must have the same sign, positive because of the given $\sin \theta$ value. The angle that corresponds to $\sin \theta = \frac{1}{2}$ is 30° , and $\cos 30^\circ = \frac{\sqrt{3}}{2}$.
5. Replace the x 's on the right-side with $(a + 3)$ and simplify.

$$f(a+3) = (a+3)^2 - 2(a+3)$$

$$= a^2 + 6a + 9 - 2a - 6$$

$$= \mathbf{a^2 + 4a - 3}$$
6. Since both $\sin \theta$ and $\cos \theta$ are positive, θ must be in quadrant I. The angle that corresponds to $\sin \theta = \frac{\sqrt{3}}{2}$ in quad I is $\pi/3$.
 And, $\cos \pi/3 = \frac{1}{2}$.
7. To solve a logarithm, think of it like an inverse exponential.
 Ask $8^? = 2$. The answer is $1/3$, because $8^{1/3} = 2$.
8. Set the equation equal to zero so that you can factor and use the Zero-Factor Property.

$$x^2 + 7x - 44 = 0$$

$$(x+11)(x-4) = 0$$

$$\mathbf{x = -11 \quad x = 4}$$
9. Square both sides to remove the radical, then isolate the x .

$$3x - 1 = 12^2$$

$$3x = 144 + 1$$

$$\mathbf{x = 145/3}$$
10. Because functions are defined for Real Numbers, the radicand must be non-negative. Write this as an inequality and solve for x .

$$x - 4 \geq 0$$

$$\mathbf{x \geq 4}$$

Solutions to College Algebra Part II:

- 1) B 2) D 3) A 4) A 5) B 6) A 7) B 8) D
 9) A 10) C