

Following are sample questions from the Algebra and Trigonometry examinations.

ALGEBRA

1. Simplify:

a) $\frac{\frac{1}{3} + \frac{1}{4}}{\frac{1}{6}}$ b) $3(3n+1) - (n+1)$ c) $\frac{(-2xy^2)^2}{4y^3}$ d) $\frac{1 + \frac{1}{y}}{\frac{1}{y} + \frac{1}{y^2}}$

e) $\frac{\sqrt{6} - \sqrt{12}}{\sqrt{3}} - \sqrt{2}$ f) $\frac{x^{\frac{1}{3}}y^{\frac{2}{3}}}{(2xy)^{\frac{1}{2}}}$ g) $\frac{a+ab}{a}$

h) $\frac{1}{x + \sqrt{x^2 + 1}} + \frac{1}{x - \sqrt{x^2 + 1}}$ i) $(3^{-2} + x^2)^{-1}$

2. Add, multiply, or divide, as indicated.

a) $(3x^2y)(7x^3y^5)$ b) $2a^2(5a-6)$ c) $\frac{x^3 - 6x^2 + 8x}{x-4}$
d) $(x+1)(x+2)(x+3)$ e) $x^2(2x^3 - 2x + 5) + (x^5 - x^4 + x^2 + 2)$

3. Factor:

a) $6x^2 + 13x + 6$ b) $a^2 - (b-a)^2$ c) $a^2 + ab + ac + bc$

4. Factor:

a) $10x^2 + 4x - 14$ b) $2x^3 + 3x^2 + x$
c) $(x+2)^2 3(x+3)^2 - (x+3)^3 2(x+2)$ d) $x^3 + 8$

5. Solve for x .

a) $6 = 3x - 5$ b) $\frac{x+2}{x+1} = 3$ c) $x(x+2) = 6(x+2)$

6. Solve for x and y in $\begin{cases} 5x + 4y = 2 \\ 7x - 3y = -23 \end{cases}$.

7. Factories A, B, and C produce 500, 800, and 1200 cars per week, respectively. What percentage of the cars would be produced by Factory A? What percentage of the cars would be produced by Factory A if Factory A were to double its production?

8. Three hamburgers and two soft drinks cost 293 cents while two hamburgers and three soft drinks cost 247 cents. Find the cost of one drink.

9. Find the equation of the line that contains the points $(-2, 3)$ and $(1, -2)$.

10. Sketch the points, x , on the x -axis satisfying $|2x - 3| < 7$.

11. Simplify:

a) $\frac{x^2 + 5x - 1}{2x + 1} - \frac{3}{2}x$

b) $1 + x[2 - x(3 - x(5 + x))]$

c) $\sqrt{xy} \left(\sqrt{\frac{x}{y}} - \sqrt{\frac{y}{x}} \right)$

d) $\left(25 \frac{c^{-6}}{d^{-4}} \right)^{\frac{3}{2}}$

e) $\frac{(a+b)^2 - a^2 - b^2}{a+b}$

f) $10^{\log_{10} x}$

g) $F(3) - F(1)$ where $F(t) = \frac{2}{3}(t-1)^{\frac{3}{2}} + c$

h) $\frac{(x^2 + 1)\frac{1}{2}x^{\frac{1}{2}} - x^{\frac{1}{2}}2x}{1 - 3x^2}$

i) $\frac{\sqrt[3]{16x^2y}}{\sqrt[3]{6x}}$

12. Add, multiply, or divide:

a) $\frac{1}{(x+1)(x+2)} + \frac{-1}{(x+2)(x+3)}$

b) $(b^2 + b)(b^{-2} + b^{-1})$

c) $(x^3 + 2) \div (x^2 + 3x + 2)$

13. Solve for x :

a) $\frac{5(x-2) - 3(x-4)}{x-2} = 2$

b) $(x+1)^2 - x^2 = 0$

c) $x(x-1) \leq 6$

d) $\sqrt{x+2} - \sqrt{x-3} = 1$

e) $2x^3 + 5x^2 - 4x - 3 = 0$

f) $(1+x)^4 = 2$

g) $\frac{x^2 + 1}{x^2 - 1} = y$

h) $\log_y x + \log_y (x+3) = 1$

14. Find (x, y) satisfying:

a) $\frac{2}{x} + \frac{2}{y} = 6$
 $\frac{3}{x} + \frac{2}{y} = 3$

b) $xy = 12$
 $x + 3y = 13$

15. Find numbers a , b , and c such that the graph of the parabola $y = ax^2 + bx + c$ passes through $(-1, 1)$, $(0, 1)$, and $(1, 2)$.

16. Sketch well labeled graphs of:

a) $y = -\frac{1}{2}x + 1$

b) $y = \sqrt{x}$

c) $y = \frac{x+1}{x-1}$

17. Find the point of the line $y = 2x - 5$ that is nearest the origin.

18. The height of a garage door is 6.8 feet greater than the width. The diagonal of the door is 10 feet. What are the dimensions of the door?