

1. Simplify each of the following expressions.

a) $\frac{2ax - 3b - 3a + 2bx}{a^2 - b^2} \div \frac{x^2 - 2x - 3}{3b - 3a + ax - bx}$

e) $\frac{2}{\sqrt{29} + 5}$

i) $\frac{2}{\frac{1}{p} + \frac{1}{q}}$

b) $3\sqrt{8} + 2\sqrt{18} - \sqrt{50}$

f) $\frac{\frac{2}{x} - 3}{5 + \frac{8}{x}}$

c) $(7 - 3\sqrt{2})^2$

g) $\frac{2a^{-2}(-2b^{-2})(-2a^{-2})^{-3}}{(-ab^{-2})^3}$

d) $(6 - 5\sqrt{2})(6 + 5\sqrt{2})$

h) $\frac{x^{-2} - y^{-2}}{x^{-2}y^{-2}}$

2. Find the exact value of $-a^2 + 7a - 2$ if $a = 3 - \sqrt{2}$

3. Completely factor each of the following expressions.

a) $12ax - 4ay + 24bx - 8by$

c) $2amxy - 2anxy + 6bmxy - 6bnxy$

b) $3a^6b - 243a^2b$

d) $5a^2x - 5b^2x + 10a^2cx - 10b^2cx$

4. Solve each of the following equations. Make sure to check your solutions.

a) $x^3 = 12x^2 + 3213x$

d) $\left|\frac{1}{3}x - 2\right| + 1 = 3$

g) $|2x - 1| = |5x + 8|$

b) $3|x + 3| - 5 = 10$

e) $x^2 + 11 = 8x$

c) $2x^2 - 32x = 0$

f) $|2x - 1| + 13 = 5$

5. Solve each of the following formulas.

a) $PV = nRT$ for T

b) $A = \frac{1}{2}h(B + b)$ for h

c) $2x + 3y = 12$ for y

6. Graph the straight lines determined by the equations $y = 2x - 6$ and $y = -2x + 6$ in the same coordinate system. What symmetry do you notice? Can you explain it?

7. Find an equation of the straight line if

a) The line passes through the points $(2, 7)$ and $(4, 1)$.

b) The line passes through $(-6, 2)$ and is perpendicular to the line $2x + 3y = 5$.

8. Find the distance between $(2, 7)$ and $(4, 1)$.

9. Are the straight lines $2x - 5y = 7$ and $y = \frac{5}{2}x + 1$ perpendicular to each other?

10. Graph $y = 8x - x^2 - 15$. Clearly indicate the coordinates of at least five points, including vertex and intercepts.

11. There is a farm where chickens and cows live. There are 79 heads and 262 legs. How many chickens, how many cows?

12. Fraction Problems.

- a) Find $\frac{2}{7}$ of 56. b) 15 is what fraction of 70? c) $\frac{3}{8}$ of what number is 48?

13. Basic Percent Problems.

- a) Find 14% of 1500. b) 135 is what percent of 500? c) 8% of what number is 240?

14. The population of a town is currently 60 000. What would be the population after a year if during the next year, there will be a

- a) 15% decrease b) 15% increase in the population?

15. Find the perimeter and area of the triangle determined by points $A(-3, 4)$, $B(-3, -1)$, and $C(5, -1)$.

16. We invested \$ 5000 in two bank accounts. One account earns 5% interest per year, the other earns 8% interest per year. How much did we invest into each account if the combined interest of the two accounts was \$ 337 after one year?

17. A coat went on an 18% sale. The sale price is \$ 328. Find the original price.

18. Sally got a 6% raise. Now she is making \$ 2650 per month. How much was she making before the raise?

19. The sum of two numbers is 27. Their difference is 11. Find these numbers..

20. The hypotenuse of a right triangle is 106 m long. The difference between the other two sides is 34 m. How long are the missing sides?

21. The attendance in the camp was at first 300. Then, when 15% of the boys left the camp, the attendance dropped to 96%. How many girls were at the camp?