Integer Operations

Adding / Subtracting ⇄
- SS → Add, Keep Sign (Same Sign)
- DS → Subtract, Original Sign of Larger Absolute Value (Different Sign)

Multiplying / Dividing ⇄
- Even → Even Amount of (−) → Answer (+)
- Odd → Odd Amount of (−) → Answer (−)

Add, Subtract, Multiply, or Divide.

1) $-3+(-8)$ SS (−11)

2) $-9+6$ DS (−3)

3) $12+(-7)$ DS (5)

4) $-12-3$ SS (−15)

5) $6-13$ DS (−7)

6) $-8\div(-2)$ DS (−6)

7) $3(-4)$ Odd (−12)

8) $-4(-5)$ Even (20)

9) $-18\div(-6)$ Even (3)

10) $14\div(-7)$ Odd (−2)

Solving One-Step Equations

Solve each equation.

① $\frac{3x}{3} = \frac{-18}{3}$

$x = -6$

② $x + 3 = -8$

$-3 \quad -3$

$x = -11$

③ $\frac{-2(8)}{-2} = \frac{m}{-2}(-2)$

$-16 = m$

④ $-12 = c - 5$

$+5 \quad +5$

$-7 = c$

⑤ $\frac{-20}{-5} = \frac{-5y}{-5}$

$4 = y$

⑥ $\frac{-4(-3)}{-4} = \frac{d}{-4}(-4)$

$12 = d$

Solving Two-Step Equations

Solve each equation.

① $4x - 8 = 12$

$+8 \quad +8$

$\frac{4x}{4} = \frac{20}{4}$

$x = 5$

② $18 - 5f = -2$

$-18 \quad -18$

$\frac{-5f}{-5} = \frac{-20}{-5}$

$f = 4$

③ $-7 = -5x + 8$

$-8 \quad -8$

$\frac{-15}{-5} = \frac{-5x}{-5}$

$3 = x$

④ $2 = -16 - 3m$

$+16 \quad +16$

$\frac{18}{-3} = \frac{-3m}{-3}$

$-6 = m$

Combining Like Terms to Solve Equations

Solve each equation.

① $1\frac{1}{3}x + \frac{1}{6}x = 36$

$\frac{4}{3}x + \frac{1}{6}x = 36$

$\frac{8}{6}x + \frac{1}{6}x = 36$

$\frac{6}{9} \cdot \frac{9}{6}x = \frac{36}{1} \cdot \frac{6}{9}$

$x = 24$

② $-3.5y - 6.2y = -87.3$

$\frac{-9.7y}{-9.7} = \frac{-87.3}{-9.7}$

$y = 9$

③ A city has a population of 12,000. The population has decreased by 25% in the past 15 years. What was the population 15 years ago?

p = population 15 years ago

$p - .25p = 12{,}000$

$\frac{.75p}{.75} = \frac{12{,}000}{.75}$

$p = 16{,}000$ people

Solving Equations with Variables on Both Sides

Solve each equation.

① $3x + 12 = -2x - 13$

$+2x \quad +2x$

$5x + 12 = -13$

$-12 \quad -12$

$\frac{5x}{5} = \frac{-25}{5}$

$\boxed{x = -5}$

② $4x + 6 = 2\frac{1}{2}x + 12$

$-2\frac{1}{2}x \quad -2\frac{1}{2}x$

$1\frac{1}{2}x + 6 = 12$

$-6 \quad -6$

$1\frac{1}{2}x = 6$

$\frac{2}{3} \cdot \frac{3}{2}x = \frac{6}{1} \cdot \frac{2}{3}$

$\boxed{x = 4}$

③ Beth earns a weekly salary of $925 and a 5% commission on her total sales. Robert earns a weekly salary of $1,250 and a 3% commission on sales. What amount of sales, x, will result in them earning the same amount each week?

$.05x + 925 = .03x + 1,250$

$-.03x \quad -.03x$

$.02x + 925 = 1,250$

$-925 \quad -925$

$\frac{.02x}{.02} = \frac{325}{.02}$

$\boxed{x = \$16,250}$

Solving Multi-Step Equations

Solve each equation

① $3(x-5)-5x=-23+6x$

$3x-15-5x=-23+6x$

$-2x-15=-23+6x$

$-6x \quad -6x$

$-8x-15=-23$

$+15 \quad +15$

$-8x=-8$

$-8 \quad -8$

$x=1$

② $-5(x-2)=-25$

$-5x+10=-25$

$-10 \quad -10$

$-5x=-35$

$-5 \quad -5$

$x=7$

③ $3-(x-3)=25$

$3-x+3=25$

$6-x=25$

$-6 \quad -6$

$-x=19$

$-1 \quad -1$

$x=-19$

④ $-3(-7-x)=\frac{1}{2}(x+2)$

$21+3x=\frac{1}{2}x+1$

$-\frac{1}{2}x \quad -\frac{1}{2}x$

$21+2\frac{1}{2}x=1$

$-21 \quad -21$

$\frac{2}{5}\cdot\frac{5}{2}x=-\frac{20}{1}\cdot\frac{2}{5}$

$x=-8$

Equations with No Solution or Infinitely Many Solutions

Solve each equation.

① $3x + 15 = 2x + 10 + x + 5$

$3x + 15 = 3x + 15$

$-3x \qquad -3x$

$15 = 15$

Infinitely Many Solutions

② $3(2x+5) = 2(3x+3)$

$6x + 15 = 6x + 6$

$-6x \qquad -6x$

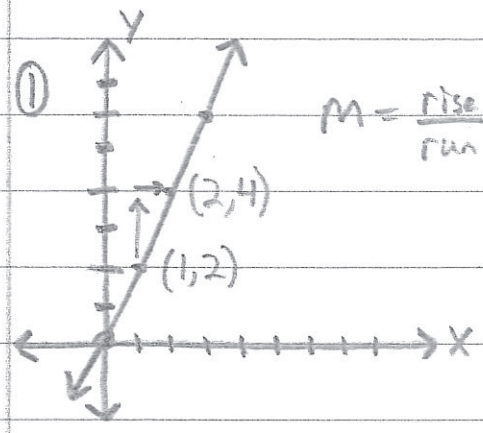
$15 \neq 6$

No Solution

Slope

$$\text{Slope} = m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{Rise}}{\text{Run}}$$

Find the slope

① 

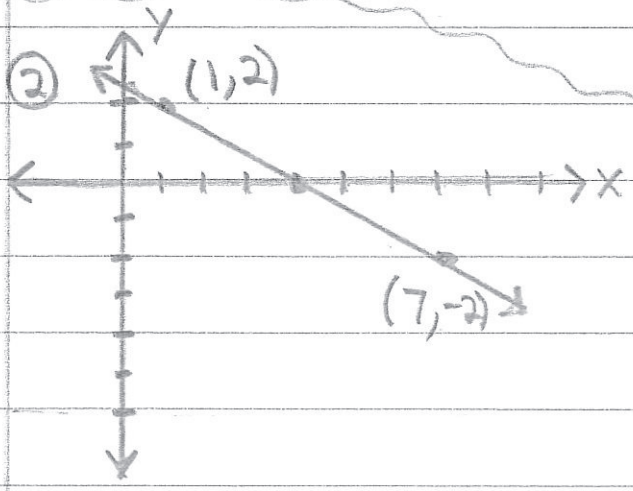
$m = \frac{\text{rise}}{\text{run}} = \boxed{\frac{2}{1} \text{ or } 2}$

$m = \frac{\Delta y}{\Delta x}$

$= \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{4-2}{2-1}$

$= \boxed{\frac{2}{1} \text{ or } 2}$

② 

$m = \frac{\text{rise}}{\text{run}} = \frac{-2}{3} = \boxed{-\frac{2}{3}}$

$m = \frac{\Delta y}{\Delta x}$

$= \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{2-(-2)}{1-7}$

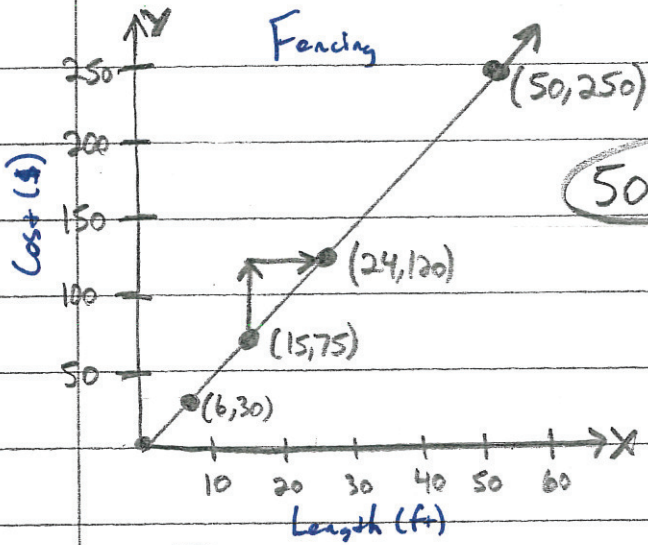
$= \frac{4}{-6}$

$= \boxed{-\frac{2}{3}}$

Analyzing Linear Equations

① Fencing → 6ft, $30 / 15ft, $75 / 24ft, $120

How much does 50ft of fencing cost?



50ft = $250

$m = \frac{\text{rise}}{\text{run}} = \frac{45}{9} = 5$

$y = mx$

$y = 5x$

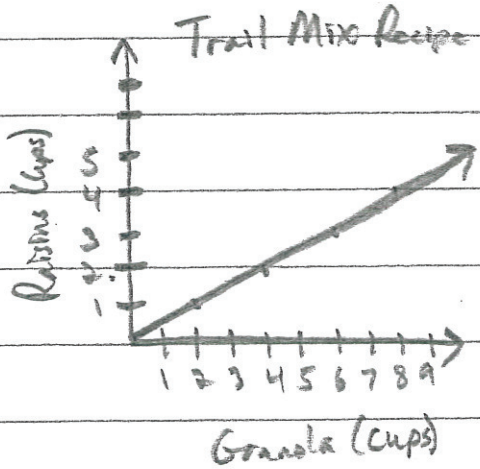
$y = 5(50)$

$y = \$250$

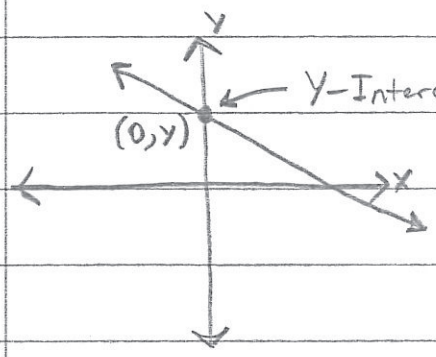
② A recipe for trail mix calls for 1 cup of raisins for every 2 cups of granola. Write an equation and graph a line.

$y = mx$

$y = \frac{1}{2}x$



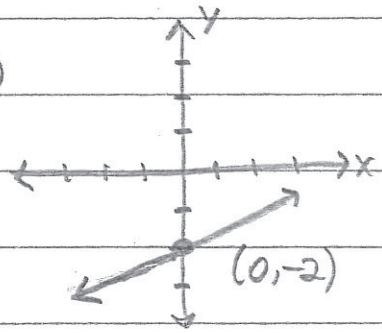
Y-Intercept of a Line



Y-Intercept (y-coordinate when the line crosses the y-axis)

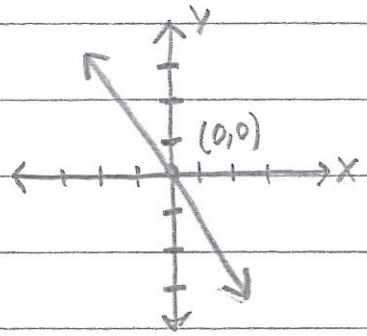
What is the y-intercept?

①



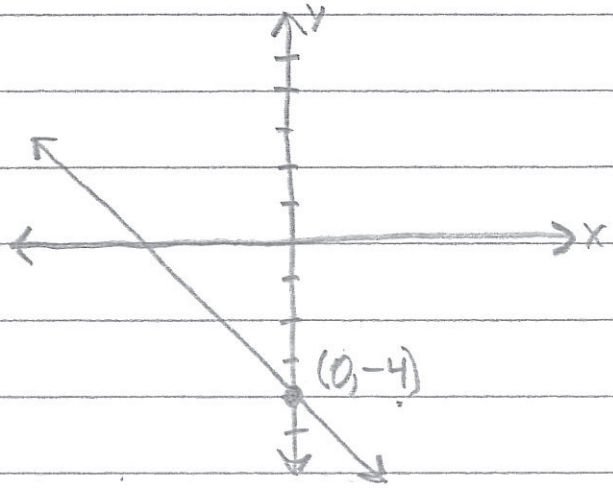
The y-intercept is -2.

②



The y-intercept is 0.

③



The y-intercept is -4.