

Practice Problems

1. Arithmetic Operations

Expand and simplify the following:

1. $(-6ab)(0.5ac)$
2. $-(2x^2y)(-xy^4)$
3. $2x(x - 5)$
4. $(4x - 1)(3x + 7)$
5. $x(x - 1)(x + 2)$

2. Fractions

Simply the following:

1. $\frac{2 + 8x}{2}$
2. $\frac{1}{1 + 5} + \frac{2}{x - 3}$
3. $u + 1 + \frac{u}{u + 1}$
4. $\left(\frac{-2r}{s}\right)\left(\frac{s^2}{-6t}\right)$
5. $\frac{1 + \frac{1}{c - 1}}{1 - \frac{1}{c - 1}}$
6. $1 + \frac{1}{1 + \frac{1}{1 + x}}$

3. Exponents

Simply the following:

1. $\frac{x^9(2x)^4}{x^3}$

2. $\frac{a^n \times a^{2n+1}}{a^{n-2}}$

3. $3^{-1/2}$

4. $64^{4/3}$

5. $(x^{-5}y^3z^{10})^{-3/5}$

4. Solving Equations

Solve the following equations (you may use factorization or the quadratic formula)

1. $\frac{1}{2}x = \frac{4}{3}(x - 3)$

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

3. $\frac{4}{3x + 1} = 1$

4. $x^2 - 7x + 12 = 0$

5. $x^2 + 3x = 10$

6. $\frac{x^2 + 5x - 6}{x^2 + 1} = 0$

5. Linear Functions

1. The price of X is \$10. The price of Y is \$5. Sally only consumes goods X and Y and has an income of \$100 to spend on the two goods.
 - a. Sally's budget can be represented by a linear function (called the budget line). Write down and graph Sally's budget line.
 - b. Indicate (in your diagram) the bundles of goods that are worth less than Sally's income. Indicate the bundles of goods that are worth more than Sally's income.
 - c. The government now implements a policy where the first 5 units of Good X are available at no charge. Write down and graph Sally's new budget line (be sure to show the free units).

2. Audrey has a friend Bud who has developed a homebrewed beer. Bud is also an economist who knows his demand schedule and supply schedule precisely. They are:

$$\text{Demand: } P = 10 - 0.01Q$$

$$\text{Supply: } P = 4 + 0.02Q$$

- a. Graph the demand and supply curve.
 - b. Indicate the point where demand equals supply.
 - c. What are the coordinates of the point where demand equals supply?
3. Logan only consumes wine and haircuts. Last week, Logan had an income of \$100 and the prices of wine (per bottle) and haircuts were \$2 and \$1 respectively. Logan decided to consume 10 bottles of wine.
 - a. Logan's weekly budget can be represented by a linear function (called the budget line). Write down Logan's budget line and give the coordinates of Logan's chosen bundle.
 - b. Now Logan had a setback, this week his income fell to \$90. But there was good news for Logan - the price of wine fell to \$1 per bottle. Write down Logan's new budget line.
 - c. Prove that Logan's originally chosen bundle is also satisfies the new budget line.
 - d. In the same diagram and with haircuts on the y-axis, draw Logan's old and new budget line.

Answers to Practice Problems

1. Arithmetic Operations

1. $-3a^2bc$

2. $2x^3y^5$

3. $2x^2 - 10x$

4. $12x^2 + 25x - 7$

5. $x^3 + x^2 - 2x$

2. Fractions

1. $1 + 4x$

2. $\frac{3x + 7}{x^2 + 2x - 15}$

3. $\frac{u^2 + 3u + 1}{u + 1}$

4. $\frac{rs}{3t}$

5. $\frac{c}{c - 2}$

6. $\frac{3 + 2x}{2 + x}$

3. Exponents

1. $16x^{10}$

2. a^{2n+3}

3. $\frac{1}{\sqrt{3}}$

4. $\frac{1}{256}$

5. $\frac{x^3}{y^{\frac{9}{5}}z^6}$

4. Solving Equations

1. $x = \frac{24}{5}$

2. $x = \frac{-3}{11}$

3. $x = 1$

4. $x = 3, 4$

5. $x = -5, 2$

6. $x = -6, 1$