# Arithmetic | Algebra

## Homework

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# Preface

This homework book is a static version of the WebWork online homework assignments that accompany the textbook Arithmetic | Algebra for the math remedial course MAT 0650 at New York City College of Technology, CUNY.

# Contents

# Chapter 1

# Homework Integers

1. Evaluate:

   (a) $5 + 10 =$
   (b) $-9 + 6 =$
   (c) $-5 + (-10) =$
   (d) $19 + (-13) =$
   (e) $-18 - 12 =$
   (f) $-19 + (-24) =$
   (g) $11 - 25 =$
   (h) $-23 - (-15) =$

2. Evaluate:

   (a) $33 + (-29) + (-15) + 69 =$
   (b) $36 + (-31) + (-13) =$
   (c) $34 - (-33) - (-17) =$
   (d) $34 - (-31) - (-15) + 63 =$

3. Multiply:

   (a) $6(-2) =$
   (b) $(-5)(-11) =$
   (c) $(-12)(0) =$
   (d) $(10)(-13) =$

4. Multiply:

   (a) $130 \times 24 =$
   (b) $-127 \times 15 =$

5. Divide or state that the division is undefined:

(a) $\frac{9}{-3} =$ (b) $\frac{-336}{-7} =$

6. Divide or state that the division is undefined:

(a) $\frac{-6}{0} =$ (b) $\frac{0}{-1} =$

7. Divide:

(a) $114 \div 6 =$
(b) $-92 \div 4 =$
(c) $-104 \div -8 =$
(d) $-147 \div -7 =$
(e) $203 \div -7 =$

8. Evaluate each exponential expression:

(a) $(-6)^2 =$
(b) $-6^2 =$

9. Evaluate the following expressions without using a calculator. Simplify your answers as much as possible:

(a) $4^1 =$
(b) $0^4 =$
(c) $-4^3 \cdot -2^2 =$

10. Use the order of operations to evaluate:

(a) $2(-2) - 5(-1) =$
(b) $3(-3)^2 - 4(-1)^2 =$
(c) $5 \cdot 2 - 2^2 =$
(d) $7^2 - 12 \div 2^2 \cdot 4 - 4 =$
(e) $[12-(13-11)]-[9-(5-11)] =$
(f) $3 \cdot 3 - 2 + 3 \cdot 2 =$
(g) $8 - 1[-5(3-2) - 3(5-4)] =$

## Optional Problems

11. A book contains 13 sections with 60 pages each. To find the total number of pages in the book we must: Multiply or Divide? The book has _____ pages.

12. A book company has received an order for 5400 books. If there are 36 books in each box, to find out how many boxes are needed we must: Multiply or Divide? The company needs _____ boxes.

13. The temperature is $15$ degrees. It dropped $12$ degrees from the temperature two days ago. The temperature two days ago was _____ degrees.

14. An elevator started at floor $41$. It then went down $13$ floors, then up $7$ floors and then down $5$ floors. The elevator is at _____ floor.

15. Uprise Bakery delivers a selection of cakes to its 9 customers. Each customer receives the same number of cakes. If the delivery truck is loaded with 171 cakes, each customer will receive _____ cakes.

16. Jesse's zoo has 6 monkeys. Each morning he brings a total of 102 bananas which are shared equally by his monkeys. Each monkey gets _____ of the bananas.

# Chapter 2

# Homework Fractions

1. Simplify:

   (a) $\frac{12}{14}=$

   (b) $\frac{32}{36}=$

   (c) $\frac{30}{5}=$

2. Multiply the following fractions. Reduce your answer if possible.

   (a) $\frac{7}{11} \cdot \frac{11}{12}=$

   (b) $\frac{3}{11} \cdot \frac{5}{6}=$

   (c) $\frac{6}{10} \cdot \frac{10}{15}=$

3. Find the reciprocal of the number and reduce your answer.

   (a) Reciprocal of $-\frac{51}{21} =$

   (b) Reciprocal of $\frac{20}{5} =$

   (c) Reciprocal of $\frac{12}{21} =$

   (d) Reciprocal of $-55 =$

   (e) Reciprocal of $\frac{1}{2} =$

   (f) Reciprocal of $\frac{12}{2} =$

4. Divide the fractions below and reduce your answers.

   (a) $\frac{2}{3} \div \frac{5}{6} =$

   (b) $\frac{2}{5} \div \frac{6}{7} =$

   (c) $\frac{2}{3} \div \frac{5}{9} =$

   (d) $-\frac{1}{3} \div \frac{3}{5} =$

(e) $\frac{3}{10} \div -\frac{10}{15} =$

(f) $\frac{5}{12} \div \frac{3}{16} =$

(g) $\frac{5}{6} \div \frac{4}{9} =$

(h) $\frac{5}{9} \div \frac{7}{12} =$

5. Divide or state that the division is undefined.

(a) $-\frac{1}{3} \div \left(-\frac{2}{3}\right) =$

(b) $13 \div \left(-\frac{1}{4}\right) =$

6. Add the following fractions. Reduce your answer and use mixed fraction form instead of improper fractions.

(a) $\frac{2}{17} + \frac{6}{17} =$

(b) $\frac{5}{10} + \frac{1}{10} =$

(c) $\frac{13}{14} + \frac{10}{14} =$

(d) $\frac{13}{18} + \frac{11}{18} =$

7. This problem will help you discover the relationships between the greatest common factor and the least common multiple of different pairs of numbers.

   (a) What is the product of 11 and 12? What is the greatest common factor of 11 and 12? What is the least common multiple of 11 and 12?

   (b) What is the product of 25 and 10? What is the greatest common factor of 25 and 10? What is the least common multiple of 25 and 10?

   (c) What is the product of 70 and 80? What is the greatest common factor of 70 and 80? What is the least common multiple of 70 and 80?

   (d) What pattern do you notice between the product of the two numbers, their GCF, and their LCM?

8. Add the following fractions. Reduce your answer and use mixed fraction form instead of improper fractions.

(a) $\frac{1}{2} + \frac{5}{14} =$

(b) $\frac{3}{5} + \frac{1}{2} =$

(c) $\frac{1}{14} + \frac{7}{10} =$

9. Perform the following operations and reduce your answer.

   (a) $-\frac{1}{5} - (-\frac{2}{3}) =$

   (b) $\frac{1}{3} - \frac{1}{2} =$

   (c) $-\frac{1}{2} + 2 =$

   (d) $-1 + (-\frac{1}{3}) =$

10. Write each improper fraction as a mixed number in simplest form.

    (a) $\frac{13}{4} =$

    (b) $\frac{32}{5} =$

    (c) $\frac{52}{15} =$

11. Write each improper fraction as a mixed number in simplest form.

    (a) $\frac{32}{16} =$

    (b) $\frac{35}{25} =$

    (c) $\frac{33}{15} =$

    (d) $\frac{28}{20} =$

    (e) $\frac{39}{24} =$

12. Change to improper fractions.

    (a) $6\frac{1}{2} =$

    (b) $8\frac{1}{3} =$

    (c) $4\frac{3}{5} =$

## Optional Problems

13. Write the factor tree for $30$.

14. Consider this list of numbers: $50, 18, 94, 77, 17, 29, 41$. Determine:

    (a) All prime numbers.

    (b) All composite numbers.

15. Courtney walks 5 laps around a $\frac{1}{4}$ mile track, If 1 mile is 5280 feet.

    (a) How long is one lap (in feet)?

    (b) How far did Courtney walk all together (in feet)?

16. Nick uses $\frac{1}{4}$ cup of vinegar for every 1 cup of olive oil when making salad dressing. How many cups of vinegar will Nick need if he uses 5 cups of olive oil in his salad dressing? Give your answer as a mixed fraction.

# Chapter 3

# Homework Decimal Numbers

1. Perform the given operation:

   (a) $5.411 + 66.23 =$
   (b) $52.87 - 7.925 =$
   (c) $5.5 \times 0.3 =$
   (d) $54 \div 0.5 =$
   (e) $98.4 \div 2.4 =$
   (f) $85.15 \div 13 =$
   (g) $65.46 \div 45 =$
   (h) $50.46 \div 92 =$

2. Change the following fractions to decimals. If your answer is a repeating decimal, round to 3 decimal places:

   (a) $\frac{7}{10} =$
   (b) $\frac{10}{50} =$
   (c) $\frac{7}{20} =$
   (d) $\frac{17}{25} =$
   (e) $\frac{81}{50} =$
   (f) $\frac{22}{5} =$
   (g) $\frac{54}{40} =$

3. Express each of the following as a fraction in simplest form:

   (a) $0.75 =$
   (b) $0.6 =$
   (c) $0.35 =$
   (d) $0.36 =$

4. Convert the given percent into:

   i) A decimal.
   ii) A reduced fraction.

(a) $81\%$
(b) $40\%$
(c) $85\%$
(d) $70\%$
(e) $4\%$

5. Convert the given number into:

   i) A percent.

   ii) A reduced fraction.

(a) $0.6$
(b) $0.45$
(c) $0.68$
(d) $1.64$
(e) $1.1$

# Chapter 4

# Homework Evaluating Expressions

1. Evaluate each of the following expressions if $x = 3, y = 6, z = -6$.
   (a) $x + 12 =$
   (b) $x + 3y + z =$
   (c) $(x - 12) + 3(y + z) =$
   (d) $100x + yz =$
2. Evaluate the expression $\frac{1}{2}h\left(B + b\right)$ when $h = 8,\ B = 3,\ b = 6$.
3. Evaluate the expression $\frac{1}{4}\left(x + 1\right)^2 - 7$ when $x = -5$.
4. Evaluate the expressions for $x = 15$ and $y = 60$.
   (a) $\frac{150}{x + y} =$ (b) $\frac{y - x}{5} =$
5. Evaluate the expressions for $x = 5$, $y = 8$ and $z = 0$.
   (a) $18 - 4xz =$ (b) $15xy =$
6. Evaluate the expressions for $x = 8$, $y = 11$ and $z = 1$.

(a) $x + 8 =$
(b) $2z - 8 =$
(c) $xyz =$
(d) $y + z =$

7. Evaluate each algebraic expression for the given value(s).

   (a) $x^2 + 8x$, for $x = 6$.
   (b) $x^2 - x + 7$, for $x = 3$ .
   (c) $6 + 3(x - 5)^3$, for $x = 7$.
   (d) $x^2 - 3(x - y)$, for $x = 7$ and $y = 2$.
   (e) $1 + 3x$, for $x = 4$.
   (f) $x - y$, for $x = 8$ and $y = 7$.

8. Answer each of the following questions by True or False for $a = 3, b = 4, c = 5$

   (a) $(a + b) + c = a + (b + c)$
   (b) $(a - b) - c = a - (b - c)$
   (c) $(a - b) + c = a - (b + c)$
   (d) $(a \div b) \div c = a \div (b \div c)$
   (e) $(a \div b) \times c = a \div (b \times c)$
   (f) $(a \times b) \times c = a \times (b \times c)$

# Chapter 5

# Homework Properties Of Exponents

1. Simplify the expression: $y^2 \cdot y^7 =$
2. Evaluate: $(3b^{14})(4b^{11}) =$
3. Multiply using the product rule and write your answer using positive exponents only:

   (a) $(x^4)(x^6) =$
   (b) $(4a^2)(-3a^8) =$
   (c) $5ab^4(-2a^3b^3) =$
   (d) $(4x^5y^4)(4xy^2) =$
   (e) $(6a^{12}b^6)(3a^2b^3) =$
   (f) $(2x^4y^3z^6)(6x^2yz^6) =$

4. Divide using the quotient rule and write your answer using positive exponents only:

   (a) $\dfrac{a^{19}}{a^{15}} =$
   (b) $\dfrac{14a^{20}b^{20}}{7ab^{17}} =$
   (c) $\dfrac{36x^{12}y^{15}z^{17}}{6x^9y^{13}z^{13}} =$

5. Rewrite the following expression without parentheses. Simplify your answer:

(a) $(cf)^6 =$

(b) $\left(\frac{2}{3}\right)^3 =$

(c) $\left(\frac{a}{b}\right)^5 =$

(d) $\left(\frac{3}{w^6}\right)^4 =$

6. Use the zero-exponent rule to simplify:

(a) $8^0 =$

(b) $-5^0 =$

(c) $\left(\frac{6}{7}\right)^0 =$

(d) $(2x)^0 =$

(e) $2x^0 =$

7. Simplify the expression: $y^3 \cdot y^{-6} =$

8. Write the expression with positive exponents and simplify: $a^5 b^{-2} =$

9. Simplify. Write your answer using positive exponents only:

(a) $(b^2)^{-2} =$

(b) $(-3x^2)^2 =$

(c) $(2x^2 y^{-4})^{-3} =$

10. Simplify the expression:

(a) $\left(\frac{2p}{q^8}\right)^3 =$

(b) $\left(-\frac{3a}{b^3}\right)^4 =$

(c) $\left(\frac{18a^2b^2}{3a^3b^{-3}}\right)^2 =$

(d) $\left(\frac{x^2y^{-3}}{3}\right)^{-2} =$

# Chapter 6

# Homework Scientific Notation

1. Write in decimal notation without the use of exponents:

   (a) $6.1 \times 10^{-3} =$
   (b) $-6.263 \times 10^{10} =$
   (c) $7.5 \times 10^{0} =$
   (d) $5.7 \times 10^{5} =$

2. Write the number in scientific notation:

   (a) $737100000 =$
   (b) $0.0000000795 =$
   (c) $328000000 =$

3. Choose the greater number in each pair:

   (a) $0.00045$ or $4.5 \times 10^{-3}$
   (b) $6.25 \times 10^{4}$ or $6300$

4. Perform the computation and write the result in scientific notation:

   (a) $(1.5 \times 10^{6})(2.7 \times 10^{7}) =$
   (b) $(-6.6 \times 10^{-3})(7.0 \times 10^{-6}) =$
   (c) $(7.3 \times 10^{7})(5.2 \times 10^{-5}) =$

5. Perform the computation and write the result in scientific notation:

   (a) $\dfrac{1.36 \times 10^{6}}{1.7 \times 10^{6}} =$

(b) $\dfrac{-3.965 \times 10^{-5}}{6.1 \times 10^{5}} =$

(c) $\dfrac{1.87 \times 10^{3}}{1.7 \times 10^{-4}} =$

6. Perform the computation and write the result in scientific notation:

(a) $\dfrac{(4.2 \times 10^{7})(5.0 \times 10^{6})}{7.0 \times 10^{10}} =$

(b) $\dfrac{(7.2 \times 10^{8})(8.0 \times 10^{6})}{9.0 \times 10^{-3}} =$

7. Perform the computation and write the result in scientific notation:

(a) $\dfrac{(6.4 \times 10^{7})(8.0 \times 10^{-3})}{4.0 \times 10^{10}} =$

(b) $\dfrac{(4.2 \times 10^{-8})(8.0 \times 10^{-8})}{6.0 \times 10^{6}} =$

## Optional Problems

8. The mass of one hydrogen atom is $1.67 \times 10^{-24}$ gram. Find the mass of 40,000 hydrogen atoms. Express the answer in scientific notation.

# Chapter 7

# Homework Polynomials

1. Find the degree of the given polynomial:
   (a) $3x^2 - 4x + 1$
   (b) $-5x^4 + 2x^2 + 5x + 9$
   (c) $4 - x^7$
2. Evaluate each polynomial for the given value of $x$:
   (a) $4 + 5(x - 4)^3$, for $x = 6$.
   (b) $x^2 - 4\big(x - x^3\big)$, for $x = -7$.
3. Evaluate each polynomial for the given value of $x$:
   (a) $x^2 + 9x$, for $x = 5$.
   (b) $x^2 - x + 7$, for $x = 3$.
4. Evaluate each algebraic expression for the given value(s):
   (a) $6 + 3x$, for $x = 6$.
   (b) $9x - 9y$, for $x = 5$ and $y = 3$.
5. Consider the function $f(x) = x^3 + 2x^2 - 5x - 30$. Find:
   (a) $f(3) =$
   (b) $f(0) =$
   (c) $f(-2) =$
6. Consider the function $g(x) = 2x^2 - x - 10$. Find:

(a) $g(3) =$ (c) $g(0) =$
(b) $g(-2) =$

7. Consider $f(x) = x^3 + 3x^2 + 2x$. Find:

(a) $f(-2) =$ (c) $f(3) =$
(b) $f(0) =$

## Optional Problems

8. Consider $-4x^3 + 3x^2 + x + 3$.

(a) Determine the coefficient and the degree of each term.
(b) The degree of the polynomial is _____.
(c) The leading term is _____.
(d) The leading coefficient is _____.

9. Consider $5x^4 + x^8 - x - 3$.

(a) Determine the coefficient and the degree of each term.
(b) The degree of the polynomial is _____.
(c) The leading term is _____.
(d) The leading coefficient is _____.

10. Consider $3x^5 + x^2 + x - 1$.

(a) Determine the coefficient and the degree of each term.
(b) The degree of the polynomial is _____.
(c) The leading term is _____.
(d) The leading coefficient is _____.

11. Consider $-2x^6 + (-4)\,x^3$.

(a) Determine the coefficient and the degree of each term.
(b) The degree of the polynomial is _____.
(c) The leading term is _____.
(d) The leading coefficient is _____.

# Chapter 8

# Homework Adding and Subtracting Polynomial Expressions

1. Simplify the given expression:
   (a) $2x + 6 + 9 - 7x + 6x - 2$
   (b) $5x^5 - 2x^4y^7 - 6y^4 - x^5y^6 - 4x^4y^7 - 5x^5y^6 + 5x^5 - 5y^4$
2. Add:
   (a) $(x^2 + 4x + 2) + (3x^2 - 4x - 5)$
   (b) $(5x^2 - 2x - 4) + (-4x^2 + 2x - 2)$
   (c) $(7x^3 + 4x^2 - 6x + 1) + (6x^3 + 5x^2 - 4x + 5)$
   (d) $(5x^4 - 6x^2 - 6) + (2x^4 - 9)$
   (e) $(4x^5 + 4x^3 + x^2 + 3) + (4x^5 - x^3 + 5x^2 + 3)$
   (f) $(6a^4b^2 + 4a^2b^3 - 3) + (7a^4b^2 - 6a^2b^3 - 4)$
   (g) $(6x^8y^4 + 6x^7y^6 - 2x^6y - 2) + (2x^8y^4 - 5x^7y^6 + 4x^6y - 4)$
3. Subtract:
   (a) $(4x^2 + 4x - 6) - (-5x^2 - 4x - 9)$
   (b) $(-x^4 + 1) - (5x^4 - 5x^2 - 4)$
   (c) $(5t^7 - 4t^5 + 4t^4 + 3) - (-7t^7 + 3t^5 + 6t^4)$
   (d) $(3x^5 + x^4y^2 + y^2) - (5x^5 + 5x^4y^2 + 5y^2)$

(e) $(2a^6b^4 + 3a^4b^5 + 5) - (-5a^6b^4 - 5a^4b^5 + 2)$

4. Subtract $2a^2 - 3a$ from $4a + 2$

5. Subtract $4xy + 5y^2$ from $6x^2 + 4y^2$

6. Subtract $p^2 + q^2$ from $2pq - 3p^2$

# Chapter 9

# Homework Multiplying Polynomial Expressions

1. Distribute:
   (a) $4(3x+1) =$
   (b) $4x(2x+3) =$
   (c) $6xy(4x-2y) =$
   (d) $3ab^3(4a^2b^3-ab) =$
   (e) $3x^3(4x^5+2x^4+1) =$
   (f) $-6x^3(3x^5-3x^3-2) =$
2. Use FOIL to remove parentheses, and write your answer in simplified form by collecting like terms:
   (a) $(x+4)(x+2) =$
   (b) $(2x-1)(x+3) =$
   (c) $(x+2)(x-2) =$
   (d) $(5x-2)(5x+2) =$
3. Square the binomial:
   (a) $(x-5)^2 =$
   (b) $(2x-4)^2 =$
   (c) $(2x-3y)^2 =$
   (d) $(4x+8)^2 =$

4. Multiply:

   (a) $(x-5)(x^2+2x+2) =$

   (b) $(x+1)(x^2-3x+1)=$

   (c) $(2x-1)(x^2-3x+6)=$

5. Carry out the following multiplication, writing your final answer without parentheses: $-8x^3(x-3)(5x) =$

6. Multiply and simplify your answer:

   (a) $-2a^2b^3+2a(a^2+3ab^3)-4a^3=$

   (b) $3xy^2(5x^3y^3-2xy)-50x^4y^5+5x^2y^3 =$

   (c) $3x^2y^4-4(-4x^2y^4-5) =$

# Chapter 10

# Homework Dividing Polynomials

1. Simplify:

   (a) $\frac{14x^9y^7}{2x^5y^3}=$

   (b) $\frac{-8x^5y^3}{-4x^2y^3}=$

   (c) $\frac{-10x^6y^7z^{10}}{2xy^2z^5}=$

   (d) $\frac{2x^9y^8z^2}{-10x^3y^4}=$

2. Simplify:

   (a) $\frac{27x^{10}-18x^8}{3x^2}=$

   (b) $\frac{18x^{13}y^7+30x^6y^{10}}{-3x^4y^6}=$

   (c) $\frac{70x^8y^{11}+21x^2y^{12}}{7xy^7}=$

   (d) $\frac{50x^9y^{10}-15x^{10}y^6}{-5x^9y^6}=$

   (e) $\frac{42x^{12}y^{10}z^5-63x^7y^8+14x^9y^{12}}{7x^4y^6}=$

   (f) $\frac{-8x^{11}y^{11}+80x^9y^{11}-72x^{10}y^7}{8x^9y^7}=$

   (g) $\frac{56x^7y^{10}-80x^8y^{11}-8x^5y^8}{-8x^5y^8}=$

(h) $\dfrac{-8x^6y^{14} - 16x^{14}y^9z^3 + 2x^5y^7}{-2x^5y^7} =$

(i) $\dfrac{72x^6y^7 - 27x^4y^7 - 9x^3y^6z}{9x^3y^6} =$

# Chapter 11

# Homework Simplifying Square Roots

1. Simplify:

   (a) $\sqrt{32} =$
   (b) $\sqrt{27} =$
   (c) $\sqrt{18} =$
   (d) $\sqrt{50} =$
   (e) $\sqrt{72} =$
   (f) $\sqrt{300} =$
   (g) $2\sqrt{24} =$
   (h) $\sqrt{420} =$
   (i) $\sqrt{375} =$
   (j) $-\sqrt{96} =$
   (k) $\sqrt{27000} =$

2. Change the radical $5\sqrt{27}$ into simplest radical form $A\sqrt{C}$, where $A$ and $C$ are integers.

   $A =$ _____ and $C =$ _____

3. Change the radical $\frac{2}{3}\sqrt{80}$ into simplest radical form $\frac{A}{B}\sqrt{C}$, where $A$, $B$, and $C$ are integers.

   $A =$ _____, $B =$ _____, and $C =$ _____

4. Simplify:

   (a) $5\sqrt{7} + 7\sqrt{7} =$
   (b) $\sqrt{180} - \sqrt{80} =$ ___$\times\sqrt{5}$
   (c) $-3\sqrt{2} + \sqrt{8} =$
   (d) $\sqrt{5} - 3\sqrt{45} =$
   (e) $-2\sqrt{18} - 3\sqrt{8} + 2\sqrt{9} =$
   (f) $2\sqrt{28} + 5\sqrt{54} - 4\sqrt{24} =$

5. Simplify $\frac{3}{5}\sqrt{5} + \frac{1}{2}\sqrt{20}$.
6. Simplify $4\sqrt{2}\left(4\sqrt{12} + 7\sqrt{6}\right)$.
7. Simplify $\sqrt{3}\left(\sqrt{13} + \sqrt{7}\right)$.
8. Simplify $(-5\sqrt{3})(4\sqrt{5})$.
9. Simplify $\sqrt{147y^8}$.
10. Simplify $5\sqrt{28a^5b^4}$.
11. Simplify:

    (a) $-3(2\sqrt{8}) =$
    (b) $(2\sqrt{6})(-3\sqrt{2}) =$
    (c) $-6a\sqrt{36a^4b^9} =$
    (d) $2b^3\sqrt{8ab^3} =$
    (e) $(\sqrt{3x^2})(\sqrt{6x^6}) =$
    (f) $(\sqrt{9x^3})(y\sqrt{x^4}) =$
    (g) $(2\sqrt{12y^3})(4\sqrt{2y}) =$
    (h) $(3a\sqrt{49b^4})(-5b\sqrt{3a^5}) =$

12. Simplify:

    (a) $\sqrt{\dfrac{6 \cdot 12}{2}} =$
    (b) $\dfrac{\sqrt{32}\sqrt{18}}{\sqrt{9}} =$
    (c) $\dfrac{2\sqrt{25}}{\sqrt{16}} =$
    (d) $\dfrac{\sqrt{72}}{2\sqrt{2}} =$

# Chapter 12

# Homework Factoring a Monomial from a Polynomial, GCF

1. Find the greatest common factor of the given expressions:

   (a) $30a^3$ and $25a^6$
   (b) $6a^4b^2$ and $9a^4b^2$
   (c) $24x^5y$ and $18x^5y^2$
   (d) $7x^4y$ and $21x^3yz$

2. Factor out the greatest common factor:

   (a) $y^2 + y =$
   (b) $15b^5 + 10b^3 =$
   (c) $4a^2b^4 + 20ab - 4a =$
   (d) $24x^3y^5 + 16xy^7 =$
   (e) $15x^2 - 21x =$
   (f) $10x^4y^3 + 15x^3y^2 - 35xy =$

3. Factor out the negative of the greatest common factor:

   (a) $-35x^2 - 14x =$
   (b) $-12x^5 + 8x^4 =$
   (c) $-6x^2y - 8xy^2 =$
   (d) $-9y^2 + 3y =$

4. Factor the binomial in common:

   (a) $7a(a - 3b) - 4(a - 3b) =$
   (b) $5s^4(4s + 3) - (4s + 3) =$
   (c) $3a(s - 2t) + 2b(s - 2t) + 4(s - 2t) =$

5. Factor by grouping:

(a) $b^2 + 4b + 7b + 28 =$

(b) $t^3 + 5t^2 + 3t + 15 =$

(c) $a^2 + 4a + 3ab + 12b =$

(d) $x^2 + 5xy + 2x + 10y =$

(e) $b^2 - 3b + 2b - 6 =$

(f) $6ac - 9bc + 2a - 3b =$

(g) $ac + a - 6bc - 6b =$

(h) $12as - 14bs + 30at^2 - 35bt^2 =$

# Chapter 13

# Homework Factoring the Difference of Two Squares

1. Factor completely:

   (a) $x^2 - 36 =$
   (b) $x^2 - 4 =$
   (c) $16x^2 - 9 =$
   (d) $36x^2 - 49y^2 =$
   (h) $4x^2 - 25 =$
   (i) $36x^2 - 49y^2 =$

2. Factor completely:

   (a) $4x^3 - 25x =$
   (b) $3x^4 - 27x^2 =$
   (c) $3x^3 - 27x =$
   (d) $27t^3 - 12t =$
   (e) $48x^6y^2 - 147y^2 =$
   (f) $162x^4y^2 - 32y^2 =$
   (g) $3x^3y - 27xy =$
   (h) $162x^5y^2 - 512xy^2 =$
   (i) $16s^3t - 100st =$
   (j) $243x^5y^2 - 1875xy^2 =$
   (k) $3x^5y^2 - 48xy^2 =$
   (l) $64x^4y^2 - 324y^2 =$

## Optional Problems

3. Factor completely:

   (a) $p^3 - pq^2 - p^2q + q^3 =$
   (e) $16x^8 - 9y^8 =$
   (f) $25x^{12} - 16 =$
   (g) $x^4 - 81 =$

# Chapter 14

# Homework Factoring Trinomials and Mixed Fatoring

1. Factor completely using the $ac$-method.

   (a) $y^2 + 3y + 2 =$
   (b) $t^2 + 10t + 24 =$
   (c) $b^2 + 15b + 54 =$
   (d) $t^2 + 5t + 6 =$
   (e) $x^2 - 16x + 64 =$
   (f) $x^2 - x - 30 =$
   (g) $x^2 - x - 12 =$
   (h) $x^2 + 4x + 4 =$
   (i) $b^2 + 2b - 48 =$
   (j) $t^2 - 18t + 32 =$

2. Factor completely using the $ac$-method. If the polynomial does not factor, write "Does not factor."

   (a) $2x^2 + 7x + 3 =$
   (b) $2x^2 + 3x - 2 =$
   (c) $5x^2 - 16x - 16 =$
   (d) $5x^2 - 13x + 6 =$
   (e) $3x^2 + 4x + 10 =$
   (f) $36x^2 - 12x + 1 =$
   (g) $3y^2 - 11y - 4 =$
   (h) $3t^2 + 10t + 3 =$
   (i) $4x^2 - 19x + 12 =$

3. Factor completely:

   (a) $6b^4 - 12b^3 + 42b^2 =$
   (b) $5x^2 - 40x + 80 =$
   (c) $x^7 - 6x^6 + 9x^5 =$
   (d) $x^3 - 2x^2 - 24x =$
   (e) $8x^3 + 14x^2 - 49x =$
   (f) $27t^2 + 36t + 12 =$
   (g) $6x^3 + 27x^2 + 30x =$
   (h) $5y^3 - 12y^2 - 9y =$

## Optional Problems

4. $16a^2 - 40ab + 25b^2 =$
5. $x^2 + 6xy + 81y^2 =$

# Chapter 15

# Homework Equations and their Solutions

1. Is $x = 2$ a solution of the equation $3 + 3x - 8 = 10 - 2x$?
2. Is $x = -3$ a solution of the equation $15 - 2x = -4 + 5x + 40$?
3. Is $x = 6$ a solution of the equation $x^2 - 3x = 2(2x - 3)$?
4. Is $x = -1$ a solution of the equation $\frac{1}{5}(x - 1) = \frac{2}{5} + x$?
5. Is $x = -4$ a solution of the equation $5x - 2x^2 + 1 = x^2 + 2x - 5$?

# Chapter 16

# Homework Solving Linear Equations

1. Solve the equation:

   (a) $2 - x = 19$

   (b) $x - 2 = -19$

   (c) $-2 - x = -19$

   (d) $a + 6 = -5$

   (e) $6x = -54$

   (f) $-5a = 45$

   (g) $4x = 12$

   (h) $\frac{6}{7}x = \frac{7}{4}$

2. Solve the equation:

   (a) $5x + 6 = 26$

   (b) $2s - 2 = 2$

   (c) $5x + 1 = 11$

   (d) $7y + 4 = -3$

   (e) $3 - 5x = -27$

   (f) $6y + 3 = y - 2$

   (g) $9x - 9 = 4x - 8$

   (h) $5x - 20 = -(10x + 14)$

   (i) $9x - (4x - 3) = 78$

   (j) $-3(t - 2) - 13 = 1(t + 1)$

   (k) $2y - 2(3y - 1) = -1 - 4(2 - y)$

   (l) $2(-1 - x) = 3(-2 + 2x) + 6$

   (m) $\frac{1}{3}x + 9 = 10$

# Chapter 17

# Homework Solving Linear Equations, Decimals, Rationals

1. Consider the equation $4.8 = 0.3x + 1.5$.

   To clear the decimals, we need to multiply on both sides by _____

   When we clear the decimals, we get the following equation:

   _____ = _____

   $4.8 = 0.3x + 1.5$ has solution: $x =$ _____

2. Consider the equation $0.34 = 0.12x + 0.7$.

   To clear the decimals, we need to multiply on both sides by _____

   When we clear the decimals, we get the following equation:

   _____ = _____

   $0.34 = 0.12x + 0.7$ has solution: $x =$ _____

3. Consider the equation $0.052 = 0.006x + 0.01$.

   To clear the decimals, we need to multiply on both sides by _____

   When we clear the decimals, we get the following equation:

   _____ = _____

   $0.052 = 0.006x + 0.01$ has solution: $x =$ _____

4. Consider the equation $3x + 3.6 = 3.4x + 8$.
   To clear the decimals, we need to multiply on both sides by _____
   When we clear the decimals, we get the following equation:

   _____ = _____

   $3x + 3.6 = 3.4x + 8$ has solution: $x =$ _____

5. Consider the equation $x - 10.7 = 0.1x - 8$.
   To clear the decimals, we need to multiply on both sides by _____
   When we clear the decimals, we get the following equation:

   _____ = _____

   $x - 10.7 = 0.1x - 8$ has solution: $x =$ _____

6. Consider the equation $9x - 3.8 = 8.2x - 3$.
   To clear the decimals, we need to multiply on both sides by _____
   When we clear the decimals, we get the following equation:

   _____ = _____

   $9x - 3.8 = 8.2x - 3$ has solution: $x =$ _____

7. Consider the equation $0.09x + 0.4 = 0.2x - 0.15$.
   To clear the decimals, we need to multiply on both sides by _____
   When we clear the decimals, we get the following equation:

   _____ = _____

   $0.09x + 0.4 = 0.2x - 0.15$ has solution: $x =$ _____

8. Solve the equation:

   (a) $0.06x = -0.3$
   (b) $0.4(g - 9) = 0.7(g - 5)$
   (c) $0.3x + 0.9(900 - x) = 755$

9. Determine: $\mathrm{LCM}(12, 9, 18) =$ _____

Using the LCM to clear the denominators of $-\frac{5x}{12}+\frac{1}{9}=\frac{7}{18}$, we get the following equation:

_____ = _____.

$-\frac{5x}{12}+\frac{1}{9}=\frac{7}{18}$ has solution: $x=$ _____

10. Solve the equation:

(a) $\frac{x}{3}+\frac{2}{3}=\frac{x}{9}$

(b) $\frac{4x}{5}=\frac{5x}{6}-2$

(c) $\frac{x}{2}=\frac{x}{4}+2$

(d) $\frac{3x}{4}-x=\frac{x}{28}+\frac{9}{7}$

(e) $\frac{1}{4}y+2=\frac{1}{8}y$

# Chapter 18

# Homework Word Problems for Linear Equations

1. Translate the phrase into an algebraic expression.
   (a) $4$ less than a number $y$
   (b) $3$ subtracted from a number $k$
   (c) 7 less than three times a number
   (d) 5 times a variable subtracted from 20
   (e) twice the difference of 13 and a number
   (f) twice a variable is added to 6
   (g) the price of $x$ chocolate bars at $\$3.5$ and $y$ lollipops at $\$2$
2. Given a rectangle that is 38 cm longer than it is wide. Express the perimeter (in cm) of the rectangle in terms of its width $w$.
3. You start 50 miles east of Pittsburgh and drive east at a constant speed of 65 miles per hour. (Assume that the road is straight and permits you to do this.) Find a formula for $d$, your distance from Pittsburgh, in terms of $t$ the number of hours of travel.
4. A flight costs \$11,500 to operate, regardless of the number of passengers. Each ticket costs \$115. Express profit $P$ in terms of the number of passengers $n$ on the flight.
5. Write an equation that expresses the word problem. Then find the unknown number.

(a) If six is subtracted from twice an unknown number, the difference is fourteen.

(b) Multiplying an unknown number by four is equal to adding eight to twice the unknown number.

(c) Subtracting twelve from three times a number is equal to adding five to the same number.

(d) When five times an unknown number is increased by twelve, the result is the unknown number.

6. You want to buy a book that costs $\$25$. If you get a discount of $30\%$, how much do you have to pay?

7. The price of a computer after discount is $\$1,400$. If the discount is $20\%$, what was the original sale price?

8. An engineer wants to split a 500-foot cable into two pieces of different sizes. The size of the longer piece should be three times the size of the shorter piece. How long are the two pieces?

9. Joe drives 100 miles in 2.5 hours. At the same rate, how many miles will he be able to travel in 6 hours?

10. If 3 pounds of oranges cost $\$2.70$, how much will 10 pounds cost?

11. The perimeter of a rectangle is 54 in. The length is five times the width increased by 3 in. Find the dimensions of the rectangle.

12. If a gardener needs to fence an area that has the shape of a rectangle. It is three times as long as it is wide. He spends $\$800$ on a fence that costs $\$10$ per linear foot. What are the dimensions of the area?

# Chapter 19

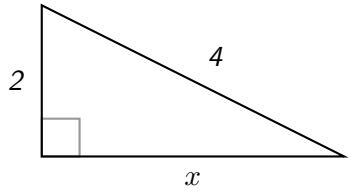
# Homework Rewriting Formulas

1. Solve for $l$: $A = lw$
2. Solve for $p_2$: $p_1v_1 = p_2v_2$
3. Solve for $m$: $F = \dfrac{mv^2}{r}$
4. Solve for $b$: $A = \dfrac{1}{2}bh$
5. Solve for $x$: $2x + 3y = 5$
6. Solve for $y$: $5x - 6y = 3$
7. Solve for $n$: $L = a + (n + 1)d$
8. Solve for $M$: $P = C + MC$
9. Solve for $l$: $P = 2\pi r + 4l$
10. Solve for $M$: $u = \dfrac{M + V}{V}$
11. Solve for $g$: $V = k + gt$

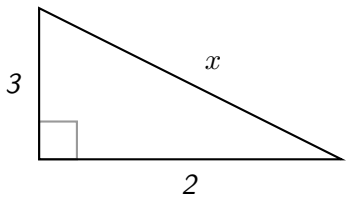
# Chapter 20

# Homework Solving Quadratic Equations by Factoring

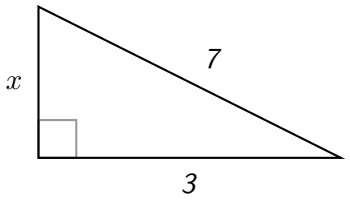
1. Solve the quadratic equation by factoring:
   (a) $x^2 + x - 12 = 0$
   (b) $x^2 = 10x - 25$
   (c) $-8p^2 = 12p$
   (d) $9x^2 = 4$
   (e) $x^2 - 9 = 0$
   (f) $2y^2 = 5y$
   (g) $36 = 25x^2$
2. Solve the quadratic equation by factoring:
   (a) $6x^2 - 53x - 9 = 0$
   (b) $5x^2 + 9 = 46x$
   (c) $3x^2 = 20x + 25$
   (d) $5x^2 - 12x - 20 = 9x$
   (e) $8x^2 - 10x - 14 = 11$
3. Find $x$:



4. Find $x$:




5. Find $x$:



# Chapter 21

# Homework Linear Inequalities

1. Solve the inequality and graph the solution:

   (a) $5x + 5 < -3$

   (b) $4 - 4x > 7$

   (c) $10 - x \geq 5$

   (d) $4(x - 3) > 7(x - 2)$

   (e) $3(x + 5) \leq 5x + 3$

   (f) $-9x - 7 \geq 8x - 58$

   (g) $5x + 4 \leq 9x + 20$

   (h) $2x + 3 > 4x + 7$

   (i) $3x - 3 < 4x - 5$

   (j) $-2(x + 1) \leq 3x - 2$

# Chapter 22

# Homework Simplifying, Multiplying and Dividing Rational Expressions

1. Simplify:
   (a) $\dfrac{18x^4y^3}{24x^2y^4}$
   (b) $\dfrac{40x^5y^7z^2}{-12y^{11}z}$
   (c) $\dfrac{-10a^3b^2c^3}{15ab^4c^5}$
   (d) $\dfrac{3x+9}{x^2+9x+18}$
2. Multiply and simplify:
   (a) $\dfrac{24a^2b}{8b} \cdot \dfrac{21ab^2}{14b^3}$
   (b) $\dfrac{3x^6}{35y^6} \cdot \dfrac{15xy}{9x^6y^2}$
   (c) $\dfrac{-t^3v^2}{15t^4} \cdot \dfrac{3tv}{-6v^3}$
   (d) $\dfrac{-7x^2y^2}{12x^2y} \cdot \dfrac{24xy^5}{-14x^3y^5}$
   (e) $\dfrac{8}{9x+18} \cdot \dfrac{3x+6y}{14}$

(f) $\dfrac{2x-10}{5x+15} \cdot \dfrac{x+3}{x-5}$

3. Divide and simplify:

(a) $-\dfrac{30ab^5}{7c} \div -\dfrac{9a^2c}{b^3c^3}$

(b) $\dfrac{2xy^2}{5x^2} \div \dfrac{1}{25xy^3}$

(c) $-\dfrac{36x^3}{7y^2} \div (-4x^3)$

(d) $\dfrac{2}{y-5} \div \dfrac{4}{3y-15}$

(e) $\dfrac{x^2-3x}{8} \div \dfrac{x-3}{-4}$

4. Perform the indicated operations:

$$\frac{6xy^3}{3x^2} \cdot \frac{6xy^5}{26y} \div \frac{3y^2z^2}{13x}$$

# Chapter 23

# Homework Adding and Subtracting Rational Expressions

1. Perform the indicated operation. Simply the result, if possible.

   (a) $\dfrac{2}{4x} + \dfrac{4}{4x}$

   (b) $\dfrac{x+4}{x} + \dfrac{4x+3}{x}$

   (c) $\dfrac{3x}{x+5} + \dfrac{3x+2}{x+5}$

   (d) $\dfrac{9x}{4x+3} - \dfrac{5x+2}{4x+3}$

   (e) $\dfrac{6x-3}{2x+1} - \dfrac{2x-5}{2x+1}$

2. Perform the indicated operation. Simply the result, if possible.

   (a) $\dfrac{2x}{4y} + \dfrac{x}{3y}$

   (b) $\dfrac{3}{2x} + \dfrac{5}{6y}$

   (c) $\dfrac{2}{xy} + \dfrac{6}{x^2}$

   (d) $\dfrac{4}{5x^2} + \dfrac{1}{x}$

(e) $\dfrac{3}{4b} - \dfrac{5}{6}$

(f) $\dfrac{2a}{5b} - \dfrac{1}{4a^2}$

(g) $\dfrac{2}{15x^2} - \dfrac{5}{6x}$

(h) $z + \dfrac{z}{7} + \dfrac{7}{z}$

(i) $\dfrac{3}{x} + \dfrac{2}{3} - \dfrac{1}{3x}$

# Chapter 24

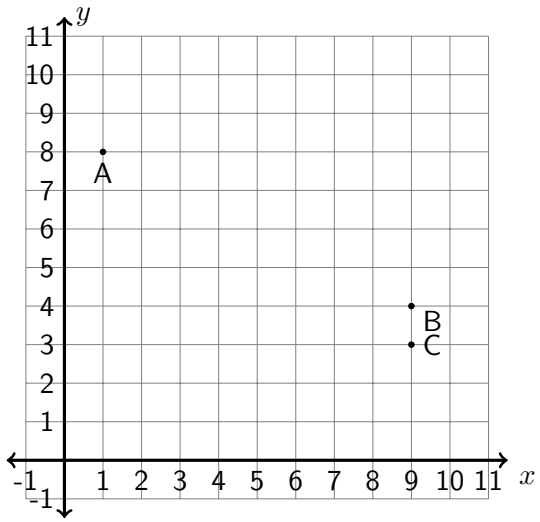
# Homework Solving Fractional Equations

1. Solve the fractional equation by cross multiplication:
   (a) $\frac{w}{6} = 20$
   (b) $\frac{1}{x-2} = \frac{2}{x+7}$
   (c) $\frac{1}{x-8} = \frac{5}{x+7}$
   (d) $\frac{x+3}{2x+5} = \frac{2}{3}$
2. Solve the equation:
   (a) $\frac{3}{5x} - \frac{2}{5} = \frac{7}{x}$
   (b) $\frac{1}{x} = \frac{-3}{3x} - 6$
   (c) $\frac{9}{7}k + \frac{9}{7} = -2 - \frac{3}{5}k$
   (d) $\frac{2}{n} + \frac{1}{4} = \frac{4}{n}$
   (e) $\frac{8}{x} + \frac{2}{2x} = 3$

# Chapter 25

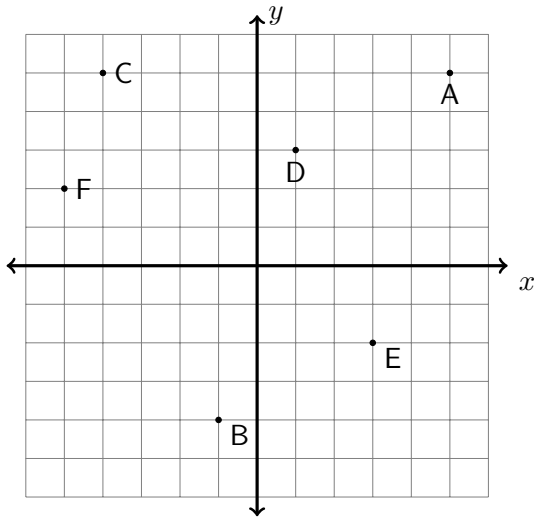
# Homework Rectangular Coordinate System

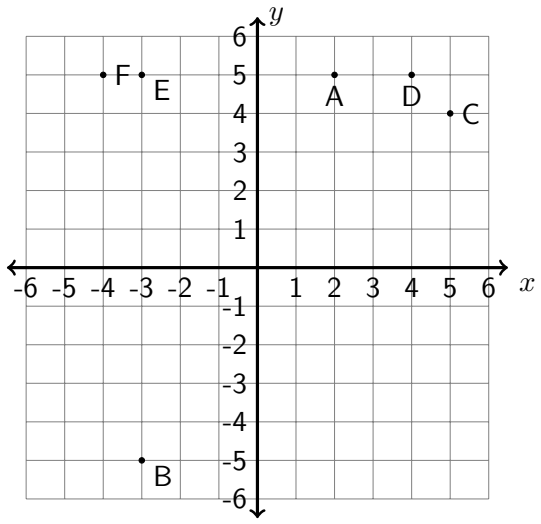
1. In the graph below, find the coordinates of each of the marked points.
   The coordinates of the point labelled A are (_____, _____).
   The coordinates of the point labelled B are (_____, _____).
   The coordinates of the point labelled C are (_____, _____).




2. In the graph below, find the coordinates of each of the marked points.
   The coordinates of the point labelled A are (_____, _____).
   The coordinates of the point labelled B are (_____, _____).
   The coordinates of the point labelled C are (_____, _____).

The coordinates of the point labelled D are (_____, _____).
The coordinates of the point labelled E are (_____, _____).
The coordinates of the point labelled F are (_____, _____).




3. In the graph above, the $x$ and $y$ values are shown on the axes.
   The point with coordinates $(-4, 5)$ is _____.
   The point with coordinates $(5, 4)$ is _____.
   The point with coordinates $(-3, -5)$ is _____.

The point with coordinates $(4, 5)$ is _____.
The point with coordinates $(2, 5)$ is _____.
The point with coordinates $(-3, 5)$ is _____.

4. Determine whether the given points are on the graph of $y = 2x + 3$.

   (a) $(6, 15)$
   (b) $(5, 13)$
   (c) $(-1, 0)$
   (d) $(-1, -4)$

5. Graph the equation by plotting points.

   (a) $y = x$
   (b) $y = -4x$
   (c) $y = 2x - 1$
   (d) $3x - 3y = 12$
   (e) $3x + 2y = -10$

# Chapter 26

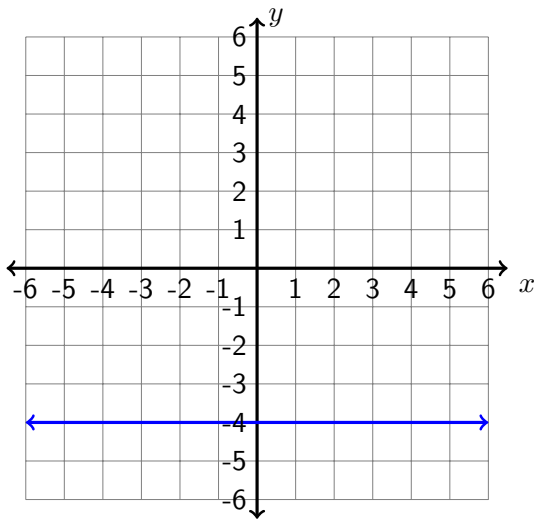
# Homework Graphing Linear Equations

1. Find the slope, the $x$- and $y$-intercepts of the equation $y = x + 5$.
   The slope is _____.
   The $x$-intercept is (_____, _____).
   The $y$-intercept is (_____, _____).

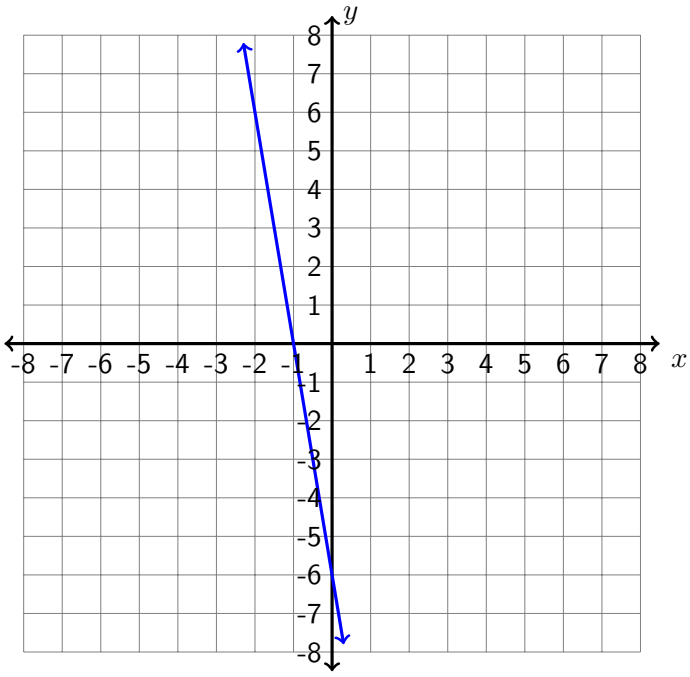
2. Find the slope, $x$- and $y$-intercepts of the equation $-4x + 3y = 24$.
   The slope is _____.
   The $x$-intercept is (_____, _____).
   The $y$-intercept is (_____, _____).

3. Graph the equation $2x - 8y = -16$. Then answer the following questions:
   The slope is _____.
   The $x$-intercept is (_____, _____).
   The $y$-intercept is (_____, _____).

4. Use the graph given below to find the slope and the equation of the line.




5. Find an equation $y = mx + b$ for the line whose graph is sketched below.
   The number $m$ equals _____.
   The number $b$ equals _____.



6. Find the equation for the vertical line passing through the point $(-12, -8)$.

7. Find the equation for the horizontal line passing through the point $(15, 9)$.

8. A line through $(10, 0)$ with a slope of 0 has a $y$-intercept at _____.

9. Could the table represent a linear function?

(a)

| $x =$ | 2 | 4 | 8 | 16 | 32 |
|---|---|---|---|---|---|
| $y =$ | 6 | 8 | 12 | 20 | 36 |

(b)

| $x =$ | -4 | -2 | 0 | 2 | 4 |
|---|---|---|---|---|---|
| $y =$ | 21 | 13 | 5 | -3 | -11 |

(c)

| $x =$ | 7 | 12 | 17 | 22 | 27 |
|---|---|---|---|---|---|
| $y =$ | 30 | 45 | 60 | 75 | 90 |

(d)

| $x =$ | -2 | 0 | 4 | 10 | 18 |
|---|---|---|---|---|---|
| $y =$ | 7 | 6 | 4 | 1 | -3 |

(e)

| $x =$ | 2 | 4 | 8 | 16 | 32 |
|---|---|---|---|---|---|
| $y =$ | 6 | 12 | 18 | 24 | 30 |

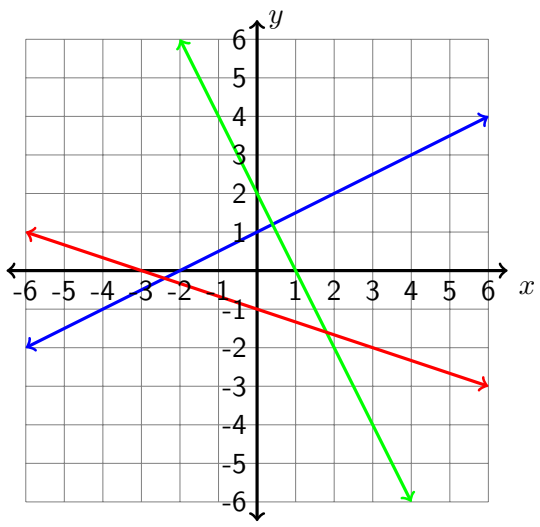
10. Find the slope of the line passing through the points $(2, 2)$ and $(4, 5)$. Then find the equation of the line in slope-intercept form.

11. Find the slope of the line passing through the points $(0, 4)$ and $(2, 8)$. Then find the equation of the line in slope-intercept form.

12. Find the slope of the line passing through the points $(2, 0)$ and $(4, 0)$. Then find the equation of the line in slope-intercept form.

13. Find the slope of the line passing through the points $(0, 0)$ and $(2, 5)$. Then find the equation of the line in slope-intercept form.

14. Use the graph below to find the slope of each line.
Slope of line 1 (blue) = _____.
Slope of line 2 (red) = _____.
Slope of line 3 (green) = _____.




15. A line can be defined *in general form* by the equation

$$Ax + By = C$$

where $A$, $B$ and $C$ are constants. You may assume that both $A$ and $B$ are non-zero. The slope of the line is _____, its $x$-intercept is _____, and its $y$-intercept is _____. Of course your answers will depend on $A$, $B$ and $C$.

# Chapter 27

# Homework Solving a System of Linear Equations Algebraically

1. Solve the system of linear equations:

   (a) $\begin{cases} -3x + 2y &= -5 \\ -2x + 4y &= -6 \end{cases}$

   (b) $\begin{cases} -2x + 5y &= 31 \\ -9x + 8y &= 38 \end{cases}$

   (c) $\begin{cases} 4x - 5y &= 13 \\ -3x - 7y &= -42 \end{cases}$

   (d) $\begin{cases} 7x + 3y &= -8 \\ -6x + 2y &= -4 \end{cases}$

2. Use the substitution method to solve the system: $\begin{cases} -x + y &= -2 \\ 4x - 3y &= 9 \end{cases}$

3. Find two numbers whose sum is -4 and whose difference is -2.

# Chapter 28

# Homework Solving a System of Linear Equations Graphically

1. Solve the system of linear equations graphically:

   (a) $\begin{cases} 2x - y &= 14 \\ -5x + 8y &= -57 \end{cases}$

   (b) $\begin{cases} -8x + 5y &= 2 \\ 9x + 8y &= 25 \end{cases}$

   (c) $\begin{cases} -x + y &= -3 \\ 4x - 3y &= 11 \end{cases}$

2. Give a geometric description of the system of equations:

   (a) $\begin{cases} -7x + 5y &= 8 \\ 4x + 3y &= -5 \end{cases}$

   (b) $\begin{cases} -6x - 4y &= 10 \\ 12x + 8y &= -20 \end{cases}$

   (c) $\begin{cases} -6x - 4y &= 10 \\ 12x + 8y &= -21 \end{cases}$