

Honors Algebra 2



Extra Practice Problems

Contents

1	Equations and Inequalities	2
1.1	Answer Key	3
2	Compound Inequalities	4
2.1	Answer Key	5
3	Absolute Value Equations and Inequalities	6
3.1	Absolute Value Equations	6
3.2	Absolute Value Inequaltiies	6
3.3	Answer Key	7
4	Factoring Techniques	8
4.1	Answer Key	9
5	The Quadratic Formula	10
5.1	Answer Key	11
6	Complex Numbers	12
6.1	Answer Key	13
7	Graphs of Quadratic Expressions	14
7.1	Answer Key	15
8	Intro to Functions	16
8.1	Answer Key	17
9	Operations with Functions	18
9.1	Answer Key	19
10	Compositions of Functions	20
11	Function Transformations	22
11.1	Answer Key	23

Chapter 1

Equations and Inequalities

Equations

Solve each equation. For decimal equations, round your answers to 2 decimal places.

1. $-7x + 5 = -10x + 11$

2. $\frac{2}{3}x - 10 = \frac{5}{8}$

3. $-0.2x - 3(x + 1.4) = -5.2x + 1$

4. $1.3 + 2.1(6.3x + 12) = -19.7$

5. $\frac{1}{4}x + \frac{3}{7} = -2\left(x + \frac{3}{8}\right)$

6. $\frac{1}{3}\left(\frac{2}{5}x - \frac{4}{7}\right) = 3x - 8$

Solve each for the variable indicated.

7. $F = ma$; for a

8. $PV = nRT$; for n

9. $m = \frac{y_2 - y_1}{x_2 - x_1}$; for y_2

10. $m = \frac{y_2 - y_1}{x_2 - x_1}$; for y_1

11. $v = v_0 + gt$; for t

12. $S = 180(n - 2)$; for n

Inequalities

Solve each inequality. Graph your answers on a number line.

1. $2(x + 2) \leq 4x - 2(x - 1)$

2. $-3.2x - 5(x - 1.5) > 7.7 + 1.8x$

1.1 Answer Key

Equations

1. $x = 2$

4. $x \approx -3.49$

7. $a = \frac{F}{m}$

10. $y_1 = y_2 - m(x_2 - x_1)$

2. $x = \frac{255}{16}$

5. $x = -\frac{11}{21}$

8. $n = \frac{PV}{RT}$

11. $t = \frac{v - v_0}{g}$

3. $x = 2.6$

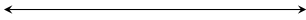
6. $x = \frac{820}{301}$

9. $y_2 = m(x_2 - x_1) + y_1$

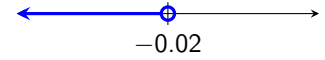
12. $n = \frac{S}{180} + 2$

Inequalities

1. \emptyset



2. $x < -0.02$



Chapter 2

Compound Inequalities

Solve each. Graph your answers on a number line.

1. $-3 < x - 8 \leq 12$

2. $7 \leq 2x - 5 < 18$

3. $x + 8 < 10$ or $5x - 9 \geq 26$

4. $x - 1.5 > 8$ or $-x + 2 > 9$

5. $4 \leq x + 7 < 9$

6. $-2 < 6x + 10 \leq 5$

7. $3x > 9$ or $-5x > 25$

8. $8x + 12 \leq 20$ or $x + 12 > 9$

9. $-8 \leq 3x + 7 < 40$

10. $-5x + 9 \geq 12$ or $2x + 6 > 5$

11. $3x - 1 < x + 5$ or $-x \geq 5 + 7x$

2.1 Answer Key

1. $5 < x \leq 20$

4. $x < -7$ or $x > \frac{19}{2}$

7. $x < -5$ or $x > 3$

8. \mathbb{R}

10. $x \leq -\frac{3}{5}$ or $x > -\frac{1}{2}$

2. $6 \leq x < \frac{23}{2}$

5. $-3 \leq x < 2$

9. $-5 \leq x < 11$



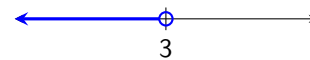
11.

3. $x < 2$ or $x \geq 7$

6. $-2 < x \leq -\frac{5}{6}$



12. $x < 3$



Chapter 3

Absolute Value Equations and Inequalities

3.1 Absolute Value Equations

Solve each of the following.

1. $|2x| = 10$

2. $|3x - 7| = 8$

3. $|5x + 1| = -4$

4. $|x + 7| = 9$

5. $|8x + 16| = -24$

6. $|-x - 4| = -3$

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

3.2 Absolute Value Inequalities

Solve each. Graph your answers on a number line.

1. $|x - 9| < 10$

2. $|-x + 1| \geq 7$

3. $|x + 8| < -1$

4. $|6x - 18| < 42$

5. $|-2x + 1| \geq 9$

6. $|5x + 2| < 3x$

7. $|3x + 2| > 1$

8. $|2x - 1| \leq 7$

9. $|2x - 8| \leq 3x$

10. $3|\frac{1}{3}x + 9| > 27$

11. $|0.1x + 5.4| < 4.7$

12. $|2x - 5| \leq 12$

13. $|3x + 1| > -2x + 2$

14. $-5|x + 7| < -15$

3.3 Answer Key

Absolute Value Equations

1. $x = \pm 5$

4. $x = 2$ or $x = -16$

7. $x = 10$

2. $x = -\frac{1}{3}$ or $x = 5$

5. \emptyset

3. \emptyset

6. \emptyset

Absolute Value Inequalities

1. $-1 < x < 19$



2. $x \leq -6$ or $x \geq 8$



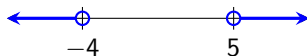
3. \emptyset



4. $-4 < x < 10$



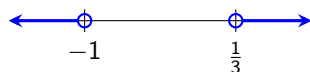
5. $x \leq -4$ or $x \geq 5$



6. \emptyset



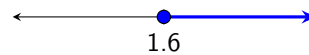
7. $x < -1$ or $x > \frac{1}{3}$



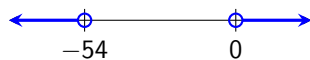
8. $-3 \leq x \leq 4$



9. $x \geq 1.6$



10. $x < -54$ or $x > 0$



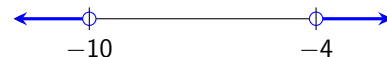
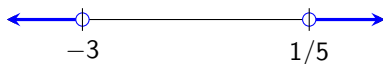
11. $-101 < x < -7$



12. $-3.5 \leq x \leq 8.5$



13. $x < -3$ or $x > \frac{1}{5}$



14. $x < -10$ or $x > -4$

Chapter 4

Factoring Techniques

Factor each completely.

1. $x^2 + 2x - 15$

2. $a^2 - 15a + 56$

3. $8x^2 + 10x + 3$

4. $w^2 + w - 12$

5. $5b^2 - 9b - 2$

6. $12x^2 + 40x - 7$

7. $4x^2 - 4x - 24$

8. $18t^2 - 9t - 5$

9. $6a^2 + 23a + 21$

10. $x^2 - 12x + 36$

11. $9x^2 - 1$

12. $4x^2 + 4x + 1$

13. $x^3 - x^2 - 2x$

14. $6x^2 - 32x + 10$

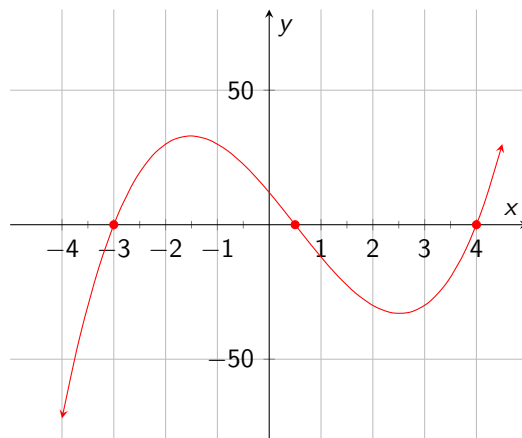
15. $2x^3 - 9x^2 - 51x - 40$

16. $2x^3 + 3x^2 - 3x - 2$

17. $4x^3 + 3x^2 - 42x + 40$

18. $6x^3 - 27x^2 - 168x$

19. The graph of a factorable expression is shown below. If the expression is in lowest terms (i.e. there is no number in front of all of the parentheses when it is factored) and contains integer coefficients, write the factored form of the expression.



4.1 Answer Key

1. $(x + 5)(x - 3)$
2. $(a - 8)(a - 7)$
3. $(4x + 3)(2x + 1)$
4. $(w + 4)(w - 3)$
5. $(b - 2)(5b + 1)$
6. $(2x + 7)(6x - 1)$
7. $4(x - 3)(x + 2)$
8. $(3t + 1)(6t - 5)$
9. $(3a + 7)(2a + 3)$
10. $(x - 6)^2$
11. $(3x - 1)(3x + 1)$
12. $(2x + 1)^2$
13. $x(x - 2)(x + 1)$
14. $2(3x - 1)(x - 5)$
15. $(2x + 5)(x + 1)(x - 8)$
16. $(x + 2)(2x + 1)(x - 1)$
17. $(x + 4)(4x - 5)(x - 2)$
18. $3x(2x + 7)(x - 8)$
19. $(x + 3)(2x - 1)(x - 4)$

Chapter 5

The Quadratic Formula

Solve each. Exact answers only.

1. $x^2 - 6x = -2$

2. $4x^2 + 7x - 1 = 0$

3. $8x^2 + 4x = 3$

4. $5x^2 + 6x - 2 = 3x^2 + 10$

5. $7x^2 - 5 = 6x + 11$

6. $8x^2 + 2x + 1 = 7x^2 - 8x - 9$

7. $8x^2 - 2x - 7 = 3x + 1$

8. $x^4 + 7x^2 - 5 = x^4 + 3x$

9. $-8x^2 = 3x - 14$

5.1 Answer Key

1. $x = 3 \pm \sqrt{7}$

2. $x = \frac{-7 \pm \sqrt{65}}{8}$

3. $x = \frac{-1 \pm \sqrt{7}}{4}$

4. $x = \frac{-3 \pm \sqrt{33}}{2}$

5. $x = -\frac{8}{7}, x = 2$

6. $x = -5 \pm \sqrt{15}$

7. $x = \frac{5 \pm \sqrt{281}}{16}$

8. $x = \frac{3 \pm \sqrt{149}}{14}$

9. $x = \frac{-3 \pm \sqrt{457}}{16}$

Chapter 6

Complex Numbers

Simplify each.

1. $(4 - 7i) + (-2 + 6i)$

2. $(2 - 4i) - (2 - 3i)$

3. $6 - (8 + 4i)$

4. $3(-2 + 7i)$

5. $(2 + 3i)(-2 - 5i)$

6. $(4 + 6i)(4 - 6i)$

7. $\frac{3+i}{2-i}$

8. $3(7 - 4i) + 2i(1 + 6i)$

9. $(-2 - 6i)^2$

10. $\frac{2+3i}{4-5i}$

11. $(2 + 3i)(-5 + i)$

12. $(-7 - 5i)^2$

13. $\frac{3+2i}{8+9i}$

14. $\frac{-1+5i}{-9-2i}$

Solve each. Exact answers only.

15. $3x^2 - 7x + 6 = 0$

16. $5x^2 - 3x + 2 = 0$

17. $3x^2 + 7x - 4 = 5x^2 + 2x + 5$

6.1 Answer Key

1. $2 - i$
2. $-i$
3. $-2 - 4i$
4. $-6 + 21i$
5. $11 - 16i$
6. 52
7. $1 + i$
8. $9 - 10i$
9. $-32 + 24i$
10. $-\frac{7}{41} + \frac{22}{41}i$
11. $-13 - 13i$
12. $24 + 70i$
13. $\frac{42}{145} - \frac{11}{145}i$
14. $\frac{-1}{85} - \frac{47}{85}i$
15. $x = \frac{7 \pm i\sqrt{23}}{6}$
16. $x = \frac{3 \pm i\sqrt{31}}{10}$
17. $x = \frac{5 \pm i\sqrt{47}}{4}$

Chapter 7

Graphs of Quadratic Expressions

Identify the vertex and axis of symmetry for each.

1. $y = 5x^2 - 15x + 7$

2. $y = x^2 + 8x - 1$

3. $y = \frac{1}{4}(x + 3)^2 + 1$

Write each of the following in general, $y = ax^2 + bx + c$, form.

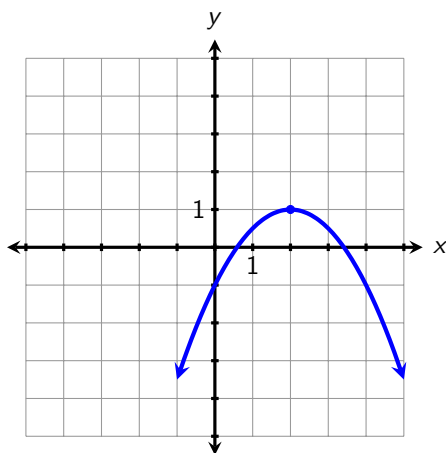
4. $y = (x - 7)^2 + 4$

5. $y = -3(x + 2)^2 - 5$

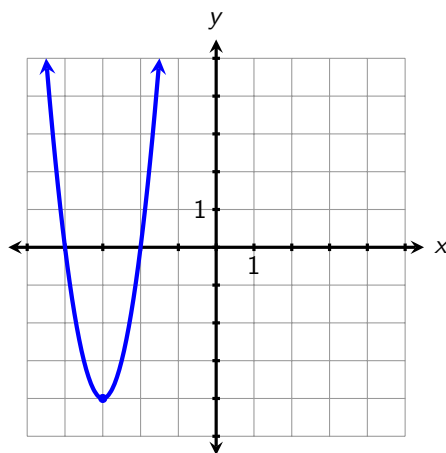
6. $y = \frac{1}{4}(x - 7)^2 + 1$

Write each of the following in $y = a(x - h)^2 + k$ and $y = ax^2 + bx + c$ form.

7.



8.



7.1 Answer Key

1. Vertex: $(\frac{3}{2}, -\frac{17}{4})$; Axis of Symmetry: $x = \frac{3}{2}$
2. Vertex: $(-4, -17)$; Axis of Symmetry: $x = -4$
3. Vertex: $(-3, 1)$; Axis of Symmetry: $x = -3$
4. $y = x^2 - 14x + 53$
5. $y = -3x^2 - 12x - 17$
6. $y = \frac{1}{4}x^2 - \frac{7}{2}x + \frac{53}{4}$
7. $y = -\frac{1}{2}(x - 2)^2 + 1 = -\frac{1}{2}x^2 + 2x - 1$
8. $y = 4(x + 3)^2 - 4 = 4x^2 + 24x + 32$

Chapter 8

Intro to Functions

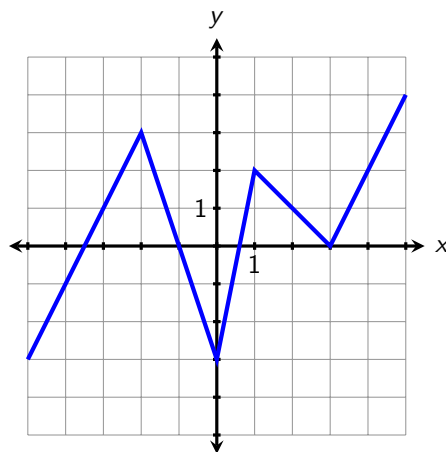
Evaluate each of the following given $f(x) = \frac{x}{5} + 8$.

1. $f(9)$

2. $f(-1)$

3. $f(8)$

Given the graph of $f(x)$ below, find each of the following.



4. $f(-5)$

5. $f(-4)$

6. $f(-1)$

7. $f(-2)$

8. $f(3)$

9. $f(4)$

10. $f(2)$

11. $f(0)$

8.1 Answer Key

1. $\frac{49}{5}$
2. $\frac{39}{5}$
3. $\frac{48}{5}$
4. -3
5. -1
6. 0
7. 3
8. 0
9. 2
10. 1
11. -3

Chapter 9

Operations with Functions

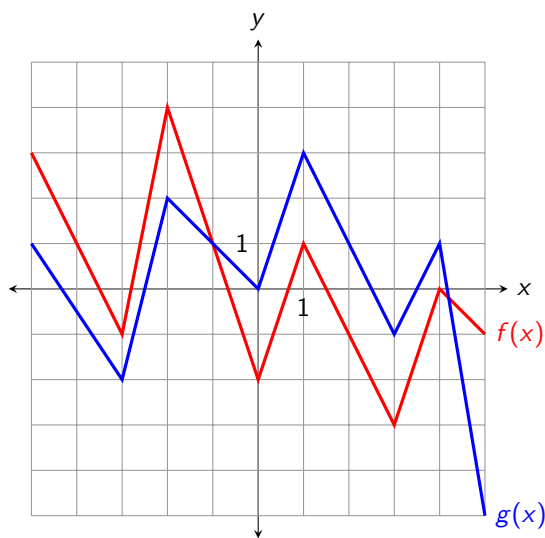
Given $f(x) = x^2 + 2x - 3$ and $g(x) = 5x + 2$, simplify or evaluate each.

- | | | | |
|----------------------------------|----------------------------------|-----------------|--------------|
| 1. $(f + g)(x)$ | 2. $(f - g)(x)$ | 3. $(g - f)(x)$ | 4. $(fg)(x)$ |
| 5. $\left(\frac{f}{g}\right)(x)$ | 6. $\left(\frac{g}{f}\right)(x)$ | 7. $(g + f)(7)$ | 8. $(fg)(0)$ |

Given $f(x) = x^2 + 5$ and $g(x) = -3x - 2$, find or evaluate each.

- | | | | |
|-----------------|---------------|------------------|-----------------------------------|
| 9. $(f + g)(x)$ | 10. $(fg)(x)$ | 11. $(f - g)(4)$ | 12. $\left(\frac{f}{g}\right)(7)$ |
|-----------------|---------------|------------------|-----------------------------------|

Given the graph of $f(x)$ and $g(x)$, find each.



- | | | | | | |
|-------------------|------------------|---------------|-------------------|-----------------------------------|------------------------------------|
| 13. $(f + g)(-2)$ | 14. $(f - g)(1)$ | 15. $(fg)(3)$ | 16. $(g - f)(-5)$ | 17. $\left(\frac{f}{g}\right)(4)$ | 18. $\left(\frac{g}{f}\right)(-5)$ |
|-------------------|------------------|---------------|-------------------|-----------------------------------|------------------------------------|

9.1 Answer Key

1. $x^2 + 7x - 1$
2. $x^2 - 3x - 5$
3. $-x^2 + 3x + 5$
4. $5x^3 + 12x^2 - 11x - 6$
5. $\frac{x^2+2x+3}{5x+2}$
6. $\frac{5x+2}{x^2+2x+3}$
7. 97
8. -6
9. $x^2 - 3x + 3$
10. $-3x^3 - 2x^2 - 15x - 10$
11. 35
12. $-\frac{54}{23}$
13. 6
14. -2
15. 3
16. -2
17. 0
18. $\frac{1}{3}$

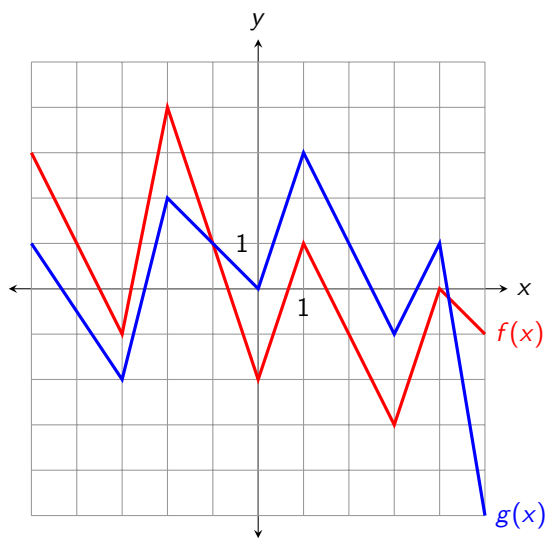
Chapter 10

Compositions of Functions

Given $f(x) = x^2 + 5$ and $g(x) = -3x - 2$, find or evaluate each.

- | | | | |
|---------------------|----------------------|---------------------|---------------|
| 1. $(f \circ g)(x)$ | 2. $(g \circ f)(x)$ | 3. $(f \circ f)(x)$ | 4. $g(g(x))$ |
| 5. $(f \circ g)(1)$ | 6. $(g \circ f)(-2)$ | 7. $(f \circ f)(0)$ | 8. $g(g(-8))$ |

Given the graph of $f(x)$ and $g(x)$, find each.



- | | | | |
|---------------------|-----------------------|----------------------|-----------------|
| 9. $(f \circ g)(0)$ | 10. $(g \circ f)(-5)$ | 11. $(f \circ f)(1)$ | 12. $(g(g(5)))$ |
|---------------------|-----------------------|----------------------|-----------------|

Answer Key

1. $9x^2 + 12x + 9$
2. $-3x^2 - 17$
3. $x^4 + 10x^2 + 30$
4. $9x + 4$
5. 30
6. -29
7. 30
8. -68
9. -2
10. -1
11. 1
12. 1

Chapter 11

Function Transformations

For the function $f(x) = \sqrt{x}$, write the resulting function $g(x)$ after the final ordered sequence of transformations.

- | | |
|--|--|
| 1. (1) Shift up 3 units
(2) Shift right 2 units | 2. (1) Shift left 3 units
(2) Reflect across x -axis |
| 3. (1) Vertical compression by factor of 3
(2) Reflect across y -axis | 4. (1) Vertical stretch by factor of 4
(2) Shift down 7 units |

11.1 Answer Key

1. $g(x) = \sqrt{x-2} + 3$

2. $g(x) = -\sqrt{x+3}$

3. $g(x) = \frac{1}{3}\sqrt{-x}$

4. $g(x) = 4\sqrt{x} - 7$