Unit 1.1 Real Numbers

Students Learning Targets (SWBAT):

- Represent real numbers
- Order and Interval Notations
- Use basic properties of algebra
- Use properties of integer exponents to simplify expressions
- Write scientific notation

Notes:

Assignment 1.1:

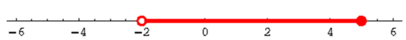
Find the decimal form for the rational number. State whether it repeats or terminates.

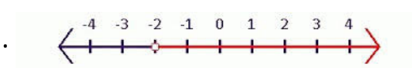
1. -37/8
2. 15/99
3. -13/6
4. 5/37

<u>Describe and graph</u> **the interval of real numbers.**

5. $x \leq 2$
6. $-2 \leq x < 5$
7. $(-\infty, 7)$
8. $[-3,3]$
9. x is negative.

Use an inequality to describe the interval of real numbers.

10. $[-1,1)$
11. $(-\infty, 4]$
12. 

13. 

14. x is between -1 and 2

Use interval notation to describe the interval of real number.

15. $x > -3$
16. $-7 < x \leq -2$
17. x *is greater than* -3 and less than or equal to 4.
18. x *is positive*.

Convert to inequality and interval notation. State whether the interval is bounded or unbounded.

19. $(-3,4]$
20. $(-3,-1)$
21. $(-\infty, 5)$
22. $[-6, \infty)$

Use both inequality and interval notation to describe the set of numbers.

23. Bill is at least 29 years old.
24. No item at Sarah's Variety Store costs more than $2.00.

25. Salary raises at the State University of California at Chico will average between 2% and 6.5%.

Use the distributive property to write the factored form or the expanded form of the given expression.

26. $a(x^2 + b)$

27. $(y - z^3)c$

28. $ax^2 + dx^2$

29. $a^3z + a^3w$

Identify which algebraic property or properties are illustrated by the equation.

30. $(3x)y = 3(xy)$

31. $a^2b + (-a^2b) = 0$

32. $a^2b = ba^2$

33. $(x + 3)^2 + 0 = (x + 3)^2$

34. $a(x + y) = ax + ay$

35. $(x + 2)\frac{1}{x+2} = 1$

36. $a \cdot (x + y) = x + y$

37. $2(x - y) = 2x - 2y$

Simplify the expression.

38. $\frac{x^4y^3}{x^2y^5}$

39. $\frac{(3x^2)^2y^4}{3y^2}$

40. $(\frac{4}{x^2})^2$

41. $(\frac{2}{xy})^{-3}$

42. $\frac{(x^{-3}y^2)^{-4}}{(y^6x^{-4})^{-2}}$

43. $(\frac{4a^3b}{a^2b^3})(\frac{3b^2}{2a^2b^4})$

The following data gives the revenues in thousands of dollars for public elementary and secondary schools for the 2003-04 school year.

Source	Amount (in $1000)
Federal	36,930,339
State	221,802,107
Local and Intermediate	193,175,805
Total	**45,908,251**

Write the amount of revenue in dollars obtained from the source in scientific notation.

44. Federal

45. State

46. Local and Intermediate

47. Total

Unit 1.2 Linear Equations and Inequalities

Students Learning Targets (SWBAT):

- Solve linear equations and linear inequalities.
- Solve for a variable in a linear equation

Notes:

Assignment 1.2

Determine if it is a solution for the given value of x.

1. $2x^2 + 5x = 3; x = -3$
2. $\sqrt{1 - x^2} + 2 = 3; x = -2$
3. $(x - 2)^{1/3} = 2; x = 10$

Solve the equation.

4. $3t - 4 = 8$
5. $2x - 3 = 4x - 5$
6. $4 - 2x = 3x - 6$
7. $4 - 3y = 2(y + 4)$
8. $4(y - 2) = 5y$
9. $\frac{1}{2}x + \frac{1}{3} = 1$
10. $\frac{1}{3}x + \frac{1}{4} = 1$
11. $2(3 - 4z) - 5(2z + 3) = z - 17$

Solve the equation. Support your answer with a calculator.

12. $\frac{2x-3}{4} + 5 = 3x$
13. $2x - 4 = \frac{4x-5}{3}$

Solve the inequality.

14. $x - 4 < 2$
15. $2x - 1 \leq 4x + 3$
16. $3x - 1 \geq 6x + 8$
17. $2 \leq x + 6 < 9$

18. $-1 \leq 3x - 2 < 7$

19. $2(5 - 3x) + 3(2x - 1) \leq 2x + 1$

20. $\frac{5x+7}{4} \leq -3$

21. $\frac{2y-3}{2} + \frac{3y-1}{5} < y - 1$

22. $\frac{1}{2}(x + 3) + 2(x - 4) < \frac{1}{3}(x - 3)$

23. Explain how the second equation was obtained from the first.

$$x - 3 = 2x + 3, \quad x - \frac{1}{2} = x - 2$$

24. The formula for the perimeter *P* is a rectangle is $P = 2(L + W)$. Solve this equation for *W*.

25. The formula for the are A of a trapezoid is $A = \frac{1}{2}h(b_1 + b_2)$. Solve the equation for b_1.

26. The formula for Celsius temperature in terms of Fahrenheit temperature is $C = \frac{5}{9}(F - 32)$. Solve the equation for *F*.

Unit 1.3 Solving Equations Graphically, Numerically, and Algebraically

Students Learning Targets (SWBAT):

- Solve equations graphically
- solve quadratic equations
- approximate solutions of equations graphically
- solve equations by finding intersections

Notes:

Assignment 1.3

Solve the equation graphically by finding x-intercepts. Confirm by suing factoring to solve the equation.

1. $x^2 - x - 20 = 0$
2. $x^2 - 8x = -15$

Solve the equation by extracting square roots.

3. $4x^2 = 25$
5. $(2x - 3)^2 = 169$
4. $2(x - 5)^2 = 17$

Solve the equation using the quadratic formula.

6. $x^2 + 8x - 2 = 0$
7. $2x^2 - 3x + 1 = 0$
8. $3x + 4 = x^2$
9. $x^2 - 2x + 6 = 2x^2 - 6x - 26$

Solve the equation graphically by finding x-intercepts.

10. $4x^2 + 20x = -23$
11. $x^3 + x^2 + 2x - 3 = 0$
12. $x^2 + 4 = 4x$

Solve the equation graphically by finding intersections.

13. $|x - 8| = 2$
14. $|x + 1| = 2x - 3$
15. $|2x - 3| = x^2$
16. $|x^2 - 3x| = 12 - 3(x - 2)$

17. $x + 2 - 2\sqrt{x + 3} = 0$

18. $\sqrt{x + 7} = -x^2 + 5$

19. $|x^2 + 4x - 1| = 7$

Graph the inequality.

20. $2x + 5y \leq 7$

21. $x^2 + y^2 < 9$

22. $y < x^2 + 1$

Solve the system of inequalities.

23. $\begin{cases} y \geq x^2 - 2 \\ y \leq 2x + 3 \end{cases}$

24. $\begin{cases} y \geq x^2 \\ x^2 + y^2 \leq 4 \end{cases}$

25. $\begin{cases} x^2 + y^2 \leq 9 \\ y \geq |x| \end{cases}$

26. The equation $\frac{x^2}{\mathbf{9}} + \frac{y^2}{\mathbf{4}} \leq 1$ defines y as two implicit functions of x. Solve for y to find the two functions and draw the graph of the equations.

Unit 1.4 Radicals and Rational Expressions

Students Learning Targets (SWBAT):

- Simplify radical expressions
- Rationalize the denominator
- Manipulate rational exponents

Notes:

Assignment 1.4:

Find the indicated real roots.

1. Square roots of 81
2. Fourth roots of 81
3. Cube roots of 64
4. Fifth roots of 243
5. square roots of 16/9
6. Cube roots of -27/8

Evaluate the expression without using a calculator.

7. $\sqrt{144}$
8. $\sqrt{-16}$
9. $\sqrt[3]{-216}$
10. $\sqrt{\frac{64}{25}}$
11. $\sqrt[3]{-\frac{64}{27}}$

Simplify by removing factors from the radicand.

12. $\sqrt{288}$
13. $\sqrt[3]{500}$
14. $\sqrt[3]{-250}$
15. $\sqrt[4]{192}$
16. $\sqrt{2x^3y^4}$
17. $\sqrt[3]{-27x^3y^6}$
18. $\sqrt[4]{3x^8y^6}$
19. $\sqrt[5]{96x^{10}}$

Rationalize the denominator.

20. $\frac{1}{\sqrt{5}}$
21. $\frac{4}{\sqrt[3]{2}}$

22. $\frac{1}{\sqrt[5]{x^2}}$

23. $\sqrt[3]{\frac{x^2}{y}}$

Convert to exponential form.

24. $\sqrt[3]{(a+2b)^2}$

25. $\sqrt[5]{x^2y^3}$

Convert to radical form.

26. $a^{\frac{3}{4}}b^{\frac{1}{4}}$

27. $x^{\frac{2}{3}}y^{\frac{1}{3}}$

28. $x^{-\frac{5}{3}}$

Simplify the exponential expression.

29. $\frac{a^{\frac{3}{5}}a^{\frac{1}{3}}}{a^{\frac{3}{2}}}$

30. $(x^2y^4)^{\frac{1}{2}}$

31. $\left(\frac{-8x^6}{y^{-3}}\right)^{\frac{2}{3}}$

32. $\frac{(p^2q^4)^{\frac{1}{2}}}{(27q^3p^6)^{\frac{1}{3}}}$

Simplify the radical expression.

33. $\sqrt{9x^{-6}y^4}$

34. $\sqrt{16y^8z^{-2}}$

35. $\sqrt[3]{\frac{4x^2}{y^2}} \cdot \sqrt[3]{\frac{2x^2}{y}}$

36. $\sqrt[5]{9ab^6} \cdot \sqrt[5]{27a^2b^{-1}}$

37. $2\sqrt{175} - 4\sqrt{28}$

38. $\sqrt{x^3} - \sqrt{4xy^2}$

39. $\sqrt{18x^2y} + \sqrt{2y^3}$

Unit 1.5 Inverse Functions

Students Learning Targets (SWBAT):

- **Find inverse functions**
- **Determine if a function has an inverse using it's graph**

Notes:

Assignment 1.5:

Find the equation for the inverse relation.

1. $y = 4x - 1$
2. $y = 5x + \frac{1}{3}$
3. $y = -\frac{2}{3}x + 2$
4. $y = -\frac{3}{5}x + \frac{7}{5}$
5. $f(x) = x^7$
6. $f(x) = 4x^4, x \geq 0$
7. $f(x) = -\frac{2}{5}x^3$
8. $f(x) = \frac{2x^3 - 6}{9}$

Graph the function *f*. Then use the graph to determine whether the inverse of *f* is a function.

9. $f(x) = -x - 5$
10. $f(x) = \frac{1}{4}x^2 -$
11. $f(x) = \frac{1}{3}x^3$
12. $f(x) = |x| + 4$
13. $f(x) = 4x^4 - 5x^2 - 6$
14. The maximum hull speed *v* (in knots) of a boat with a displacement hull can be approximated by $v = 1.35\sqrt{l}$ where *l* is the length (in feet) of the boat's waterline. Find the inverse of the model. Then find the waterline length needed to achieve a maximum speed of 7.5 knots.
15. The body surface area A (in square meters) of a person with a mass of 60 kilograms can be approximated by the model $A = 0.2195h^{0.3964}$ where *h* is the person's height (in centimeters). Find the inverse of the model. Then estimate the height of a 60 kilogram person who has a body surface area of 1.6 square meters.