ACTIVITY 1.1

Identify the set of numbers represented by the following symbols.

1. N
2. W
3. Q
4. Z

For each number, identify each set to which it belongs. Use the symbols N, W, Z, Q, and R to represent the sets of numbers.

5. -7
6. $\frac{4}{9}$
7. $\sqrt{15}$
8. 0
9. 0.45

Tell which property is illustrated by this problem.

10. $(2 + 3) + 3 = 2 + (3 + 3)$
11. Identify the most specific subset of real numbers to which all numbers in each given set belongs.
    a. $\{2, 0, 10\}$
    b. $\{-3, 7, 0.5\}$
    c. $\{0.2, \sqrt{3}, 5, -2\}$

ACTIVITY 1.2

12. Eyeglass prescriptions are written with + values indicating farsightedness and − values indicating nearsightedness. List the eyeglass prescriptions in order from least to greatest:

    Marley: +2 Brady: −1 Holly: 0
    Courtney: −3 Mariah: +3

13. Write the opposite of 4.
14. Evaluate $|-45|$.
15. Write two inequalities showing the relationship between the integers 23, and −23.
16. Graph the inequality $r \geq -8$ on a number line.
17. Can the sum of a negative integer and a positive integer be positive? Explain using a model.
18. Evaluate each expression. Use a number line if necessary.
    a. $-5 + -4$
    b. $-3 + 6$
    c. $2 + -4$
    d. $10 + 0$
19. Evaluate each expression. Use a number line if necessary.
    a. $-1 - (-9)$
    b. $-7 - 3$
    c. $4 - (-4)$
    d. $10 - 3$
    e. $9 + (-5) - 2$

ACTIVITY 1.3

20. Evaluate: $\frac{4 \times (-2) \times (-5)}{-4 \times 5}$

21. Find the mean of the following temperatures:
$-5°$ F, $-10°$ F, $-20°$ F, and $-9°$ F.

22. The average low temperature in May at Telescope Peak is -6 F°. If the record low temperature recorded on Telescope Peak in Death Valley is three times the average low temperature for May what is the record low?

23. Dolphins dive at 3 feet per second. How far can a dolphin dive in one minute?

24. Evaluate each expression.

a. $-8 \times 8 =$

b. $-9 \times (-5) =$

c. $4 \times (-3) =$

d. $24 \div (-3) =$

e. $-36 \div 12 =$

ACTIVITY 1.4

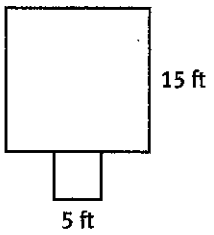
25. The area of a square is 288 m^2. A second square is half its area. What is the side length of the second square?

26. Dan bought 180 square feet of carpet to carpet a square room. When he finished, he had 11 square feet leftover. What is the area of the room he carpeted? What is the side length of the room?

27. What are two whole numbers that you can substitute for n to make this statement true?

$$6 < \sqrt{n} < 7$$

28. Diane is putting the same carpet in her bedroom and walk-in closet. She says that the cost of carpeting the square floor of the closet will be $\frac{1}{3}$ the cost of carpeting the square floor of her bedroom. Do you agree or disagree? Use the diagram to help explain your answer.



29. Evaluate this expression: $(3 \text{ m})^2$

30. If the side of a cube is 10 ft., what is the volume of the cube?

31. If the volume of a cube is 729 cm^3, what is the length of one side?

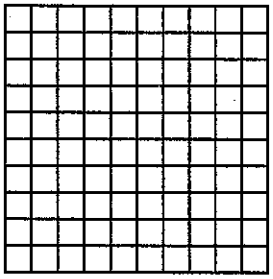
32. Evaluate this expression: $\left(\frac{1}{8}\right)^2$

33. Evaluate this expression: 9^0

ACTIVITY 1.5

34. Domestic cats typically weigh between 5.5 and 16 pounds. The largest car ever weighed about 46.952 pounds! How many times heavier is this than the average weight of the typical cat? Round your answer to the nearest hundredth.

35. Draw a grid like the one below. Then use it to represent $0.7 \cdot 0.9$. Finally check your work with an algorithm.



36. Compute.

a. $105.95 + 6.6 + (-42.088)$

b. $55.09 - 37.175$

c. 3.7×12.502

d. $9.47 \div 2.6$ (Round to the nearest hundredth.)

37. How can you use estimation to determine whether the problem has the correct answer? $2.34 \cdot 6.9 = 161.46$. If there is an error, what is it?

38. The tallest dog in the world is a Great Dane named Gibson. The dog is about $3\frac{1}{2}$ ft tall. The average size of a Great Dane is about $2\frac{2}{3}$ ft tall. How much taller than the average is Gibson? Show your work.

39. Evaluate each expression.

a. $5\frac{2}{9} + 2\frac{1}{5} + \frac{2}{3}$

b. $18\frac{4}{11} - 17\frac{11}{12}$

c. $3\frac{5}{6} \times (-4\frac{1}{3})$

d. $7\frac{1}{4} \div 1\frac{7}{8}$

40. You decide to make cookies for a picnic, but must make $2\frac{1}{2}$ times the recipe in order to have enough for everyone. The recipe calls for $\frac{3}{4}$ c sugar. Is it reasonable to use front-end estimation in this situation to estimate the amount of sugar needed? Explain why or why not.

41. A person who held the record for having the longest hands had hands that measure about $12\frac{11}{16}$ in. long. Measure your hand to the nearest $\frac{1}{16}$ of an inch. Measure from the wrist to the end of the middle finger. Then, answer the questions below and show your work.

a. What is the difference in length between your hand and that world record holder's hand?

b. If your hand were $2\frac{1}{2}$ times longer, would you beat that world record? Explain.

c. How many times longer is that world record holder's hand than yours?

d. If you and a friend added your hand lengths together, would you beat that world record? If so, by how much? If not, how many more inches would be needed?

ACTIVITY 1.6

42. Cutting grass for neighbors, Casey made a total of $160. If her profit was 60%, how much money did Casey spend in costs such as gas, yard bags, and so on.

43. After a 30% discount, Kay's sneakers cost $36.

a. What was the original price?

b. If she had waited another week, the store would have sold them for $28. What percent of decrease would this be from the sale price of $36?

44. There was a 9% markup over last year's price on jet skiing. It now costs $125 per hour.

a. What was last year's price?

b. If next year the price goes up again to $140, what would be the percent of increase from $125?

45. The population of a school is 400 students. Next year it is expected to be about 120% of what it is now. What will be next year's student population?

46. A survey at Lake Middle School shows that only 0.8% of the student population walks to school each day. If 1200 students attend the school, about how many walk?

47. Kirk makes $4.25 an hour working at a clothing store, and earns an additional 7% commission on his daily sales total.

a. If he sells a total of $375 in clothing, how much money will he make in commission?

b. If he works 8 hours that day, what is his total earnings per hour?

48. Mia takes out a loan for $2000. She must pay simple interest at 6.1%. How much money will she owe in interest after 4 years?

49. You put $700 in a bank earning 7.5% compound interest, and the interest is compounded annually. How much money will you have in your account after 3 years?

ACTIVITY 1.7

50. Tell which of the following numbers has been correctly written using scientific notation?

a. 0.9×10^{6}

b. 11×10^{-5}

c. $2.5 \times 10^{0.9}$

d. 3.4×10^{-7}

51. Copy and complete this table.

Standard Form	Scientific Notation	Name
	5.35×10^{5}	
		76 thousand
	4.1×10^{7}	
1,800,000,000		
		8 million
3,400		

52. Which amount is the greatest? Explain your thinking.

a. 9×10^{5}

b. 8×10^{6}

c. 6×10^{5}

d. 6×10^{6}

53. The population of a city started at 3×10^{3} and grew 2.1×10^{4} times larger. What is the population of the city now?

54. Only 27 out of 35,000 species of spiders have been known to have caused human fatalities. When this ratio is written as a decimal by dividing 35,000 by 27, the calculator shows: 7.714285714E-4. Explain what this means.

55. Copy and complete this table.

Standard Form	Scientific Notation
	8×10^{-4}
0.0029	
6	
	4.6×10^{-9}

56. Ty's computer downloads a picture at a speed of 0.009 seconds. Emma's computer can do it in 1×10^{-2} seconds, and Scott's computer takes 89 thousandths of a second. Whose computer is the fastest? Justify your answer.

57. The mass of Pluto is 13,000,000,000,000,000,000,000 kg and the mass of Earth is 5,973,700,000,000,000,000,000,000 kg.

a. Write each mass using scientific notation.

b. Write and solve an expression showing how many times larger the mass of Earth is than the mass of Pluto. Round your answer to the nearest tenth.

Reflection

An important aspect of growing as a learner is to take the time to reflect on your learning. It is important to think about where you started, what you have accomplished, what helped you learn, and how you will apply your new knowledge in the future. Use notebook paper to record your thinking on the following topics and to identify evidence of your learning.

Essential Questions

1. Review the mathematical concepts and your work in this unit before you write thoughtful responses to the questions below. Support your responses with specific examples from concepts and activities in the unit.
   - Why is it important to understand properties and operations involving integers and negative rational numbers?
   - How can number lines and diagrams be used to interpret solutions of real-world problems?

Academic Vocabulary

2. Look at the following academic vocabulary words:
   - exponential form
   - principal
   - scientific notation
   - set of real numbers
   - set notation

Choose three words and explain your understanding of each word and why each is important in your study of math.

Self-Evaluation

3. Look through the activities and Embedded Assessments in this unit. Use a table similar to the one below to list three major concepts in this unit and to rate your understanding of each.

Unit Concepts	Is Your Understanding Strong (S) or Weak (W)?
Concept 1	
Concept 2	
Concept 3	

   a. What will you do to address each weakness?

   b. What strategies or class activities were particularly helpful in learning the concepts you identified as strengths? Give examples to explain.

4. How do the concepts you learned in this unit relate to other math concepts and to the use of mathematics in the real world?

1. What is the value of the expression $8 + (-7) - 5$?

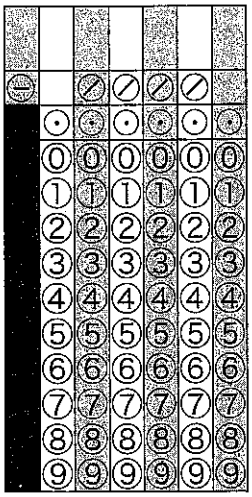
A. 20 **C.** -4

B. 4 **D.** -6

1. Ⓐ Ⓑ Ⓒ Ⓓ

2. Jerry went scuba diving in North Carolina where he dove a depth of –35 feet. Last week he went diving in caves off the coast of Florida at 3 times the depth of his dive in North Carolina. What was the depth of his cave dive?

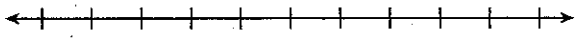
2.



Read
Solve
Explain

3. A youth group clears trash from an area of 7 square miles in a state park. The area that the group clears is a square. About how long is each side of the area?

Part A: Use the number line to find the approximate length of the side of the square.



Part B: Give the answer to the nearest tenth of mile. Explain how to check whether your answer is correct.

Answer and Explain

Read
Solve
Explain

4. This chart shows the statistics for a team quarterback during a recent season as reported by the National Football League.

NATIONAL FOOTBALL LEAGUE				
	Passing Statistics			
Team	Attempted	Completed	Decimal	Fraction
Tampa Bay Buccaneers	343	227		
Arizona Cardinals	394	232		
Miami Dolphins	446	299		
Indianapolis Colts	548	364		

Part A: Complete the chart by finding the decimal equivalent (to at least four places) of the ratio of the number of passes completed to the number of passes attempted. Then express that ratio as a percent (to the **nearest whole percent**).

Part B: Tell whether the decimals you listed in Part A are terminating or non-terminating. Then describe the difference between terminating and non-terminating decimals.

Answer and Explain

Part C: Which form of the ratio gives more information about the passing success of each quarterback? Explain your answer with an example.

Answer and Explain