NAME ______________________________ DATE ______________

Module 1 Getting Ready for Algebra
Lesson 1 Defining Sets and Real Numbers

independent practice

Identify all the sets of numbers to which each of the following belong.

1. -7 ______________
2. 0 ______________
3. $3\frac{2}{5}$ ______________
4. $\frac{\pi}{3}$ ______________

If possible, give an example of a number that is . . .

5. an integer but not a natural number. ______________
6. both a natural number and an irrational number. ______________
7. both an irrational number and a real number. ______________
8. both an integer and an irrational number. ______________
9. an integer but not a rational number. ______________
10. a rational number but not a whole number. ______________

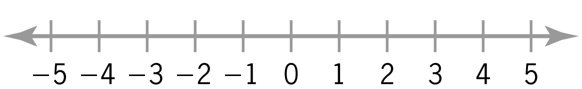
Draw a Venn diagram to show the relationship between the following sets of numbers:

11. Irrational numbers and natural numbers

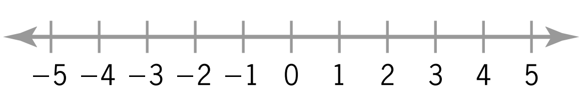
12. Rational numbers and whole numbers

Graph the numbers on the number line provided.

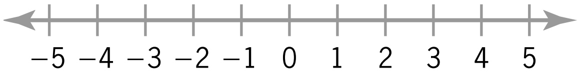
13. $0, 2.5, -3, -\frac{2}{3}, -\frac{3}{2}$, and $-\pi$



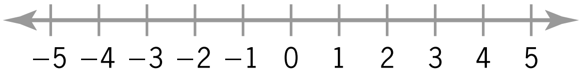
14. $\frac{1}{2}, 1, -0.3, \sqrt{7}$, and -1.5



15. $-\frac{3}{4}$, 1, $-\frac{5}{3}$, and $2\frac{1}{4}$



16. −2, 1.75, $-\frac{4}{5}$, 3.1, and π



Determine whether each statement is *true* or *false*. If a statement is false, provide an example showing it is false.

17. The quotient of two non-zero integers is also an integer. ______________________

18. The product of two rational numbers is also a rational number. ______________________

19. The sum of two rational numbers is also a rational number. ______________________

20. The sum of two irrational numbers is also an irrational number. ______________________

To describe each of the following examples, identify the most reasonable set of numbers from which to choose.

21. Fahrenheit temperatures:

____

22. The number of siblings someone has:

____

23. Number of children in a family:

____

24. Celsius temperatures:

____

25. Number of yards gained on a football play:

____

26. U.S. highway speed limits in mph:

____

27. Average number of yards gained per carry:

____

28. Height of a plant in millimeters:

____

29. A family's checking account balance:

____

30. Length of your foot in centimeters:

____

Journal

1. In 25 words or less, explain how the set of whole numbers and the set of integers are similar and how they are different.
2. Give an example of a situation in which you would rather use decimal numbers for computation. Give an example of a situation in which you would rather use fractions for computation.
3. Explain what is meant by saying the set of rational numbers and the set of irrational numbers are *disjoint* sets.
4. Explain what you would say to your parent to show that the set of integers is a subset of the set of rational numbers.
5. Your parent says that natural numbers best describe weight, but a grocer says that rational numbers are best to describe weight. Explain why both answers can be correct.

Calculator Problems

The set of real numbers contains the set of rational numbers and the set of irrational numbers. A square root can be either rational or irrational.

A square root is **rational** if its radicand is a perfect square. For example:

$\sqrt{9}$ is rational because 9 is a perfect square. $\sqrt{9} = \sqrt{3 \cdot 3} = \sqrt{3^2} = 3$.

$\sqrt{\frac{9}{16}}$ is rational because $\frac{9}{16}$ is a perfect square. $\sqrt{\frac{9}{16}} = \sqrt{\frac{3 \cdot 3}{4 \cdot 4}} = \sqrt{\frac{3^2}{4^2}} = \frac{3}{4}$.

A square root is **irrational** if its radicand is not a perfect square. For example:

$\sqrt{7}$ is irrational because 7 is not a perfect square (there is no rational number that can be squared to get 7).

$\sqrt{\frac{11}{16}}$ is irrational because $\frac{11}{16}$ is not a perfect square $\left(\text{there is no rational number that can be squared to get } \frac{11}{16}\right)$.

Use a calculator to find whole number or decimal representations for square roots. For example:

Rational square roots:

$\sqrt{9} = 3$ (exact)

$\sqrt{\frac{9}{16}} = \frac{3}{4} = 0.75$ (exact)

$\sqrt{\frac{16}{81}} = \frac{4}{9} \approx 0.4444$ (an approximation for a repeating decimal, rounded to the nearest ten thousandth)

$\sqrt{\frac{16}{121}} = \frac{4}{11} \approx 0.3636$ (an approximation for a repeating decimal, rounded to the nearest ten thousandth)

Irrational square roots:

$\sqrt{7} \approx 2.6458$ (an approximation for a nonrepeating, nonterminating decimal, rounded to the nearest ten thousandth)

$\sqrt{\frac{11}{16}} \approx 0.8292$ (an approximation for a nonrepeating, nonterminating decimal, rounded to the nearest ten thousandth)

Use a calculator to find a decimal representation for each of the following rational numbers. Round to the nearest ten thousandth if rounding is necessary.

1. $\sqrt{100}$ ________ **2.** $\sqrt{\frac{1}{16}}$ ________ **3.** $\sqrt{\frac{49}{121}}$ ________ **4.** $\sqrt{169}$ ________ **5.** $\sqrt{\frac{7}{7}}$ ________

Use a calculator to find a decimal representation for each of the following irrational numbers. Round to the nearest ten thousandth if rounding is necessary.

1. $\sqrt{8}$ ________ **2.** $\sqrt{\frac{9}{11}}$ ________ **3.** $\sqrt{\frac{22}{21}}$ ________ **4.** $\sqrt{51}$ ________ **5.** $\sqrt{23.29}$ ________

Cumulative Review

Simplify.

1. $23.3 + 5.79$ ________

2. $17.41 - 2.93$ ________

3. $10.1 - 3.28$ ________

4. $2.5 \cdot 0.36$ ________

5. $1.2 \div 0.03$ ________

6. $3\frac{4}{5} - 2\frac{1}{5}$ ________

7. $2\frac{1}{8} + 3\frac{3}{4}$ ________

8. $3\frac{1}{5} - 1\frac{3}{5}$ ________

9. $1\frac{3}{4} \div 3\frac{1}{2}$ ________

10. $1\frac{3}{4} \cdot 1\frac{1}{3}$ ________