Sets of Numbers in the Real Number System

Reals
A real number is either a rational number or an irrational number.
$$4, -7, 0, \frac{2}{3}, \sqrt{11}$$

Rationals
A rational number is any number that can be put in the form $\frac{p}{q}$ where p and q are integers and $q \neq 0$.
$$3, \frac{12}{6}, -\frac{5}{2}, 4\frac{1}{7}, \frac{8}{13}$$

Irrationals
An irrational number is a nonrepeating, nonterminating decimal.
$$\sqrt{2}, \pi, -\sqrt[3]{7}, 0.121231234\ldots, \sqrt{13}$$

Non-Integer Fractions
A non-integer fraction is a fraction whose numerator is _not_ a multiple of the denominator.
$$\frac{1}{2}, -\frac{5}{4}, 8\frac{3}{7}$$

Integers
The integers consist of the natural numbers, 0, and the opposites of the natural numbers.
$$\ldots -2, -1, 0, 1, 2, 3, \ldots$$

$$\ldots -5, -4, -3, -2, -1$$

Whole Numbers
The whole numbers consist of the natural numbers and 0.
$$0, 1, 2, 3, 4, \ldots$$

$$0$$

Natural Numbers
The natural numbers are also referred to as the counting numbers.
$$1, 2, 3, 4, \ldots$$

Real Number System Worksheet
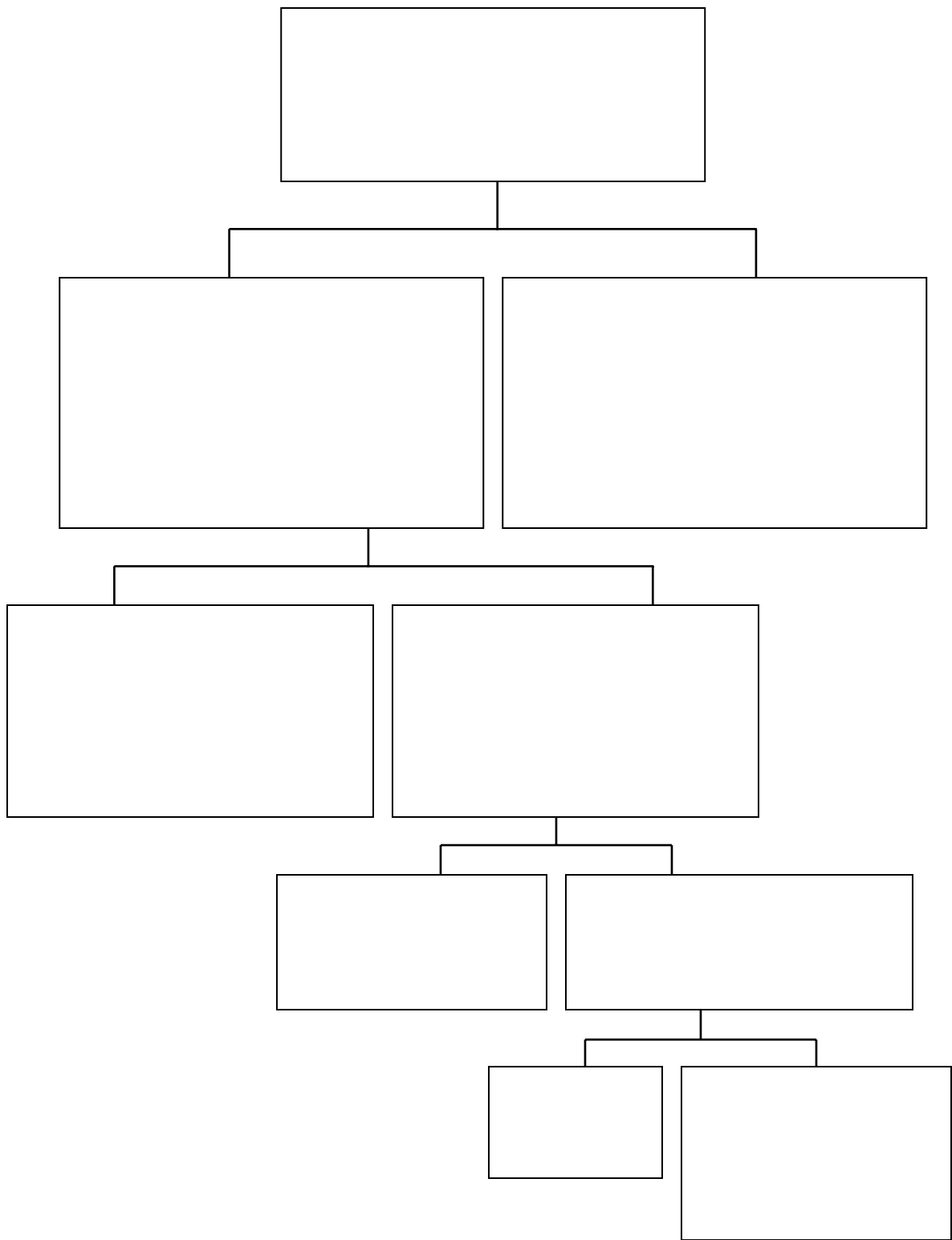
The Number System

Identify the sets to which each of the following numbers belongs by marking an "X" in the appropriate boxes.

	Number	Natural Numbers	Whole Numbers	Integers	Rational Numbers	Irrational Numbers	Real Numbers
1.	$-\sqrt{17}$						
2.	-2						
3.	$-\dfrac{9}{37}$						
4.	0						
5.	-6.06						
6.	$4.5\overline{6}$						
7.	$3.050050005...$						
8.	18						
9.	$\dfrac{-43}{0}$						
10.	π						
11.	$\overline{.634}$						
12.	$\sqrt{225}$						
13.	$.634$						
14.	$\sqrt{\dfrac{4}{49}}$						
15.	$-\sqrt{64}$						

	Number	Natural Numbers	Whole Numbers	Integers	Rational Numbers	Irrational Numbers	Real Numbers
16.	$\sqrt{13}$						
17.	−5						
18.	$\dfrac{2}{3}$						
19.	−0.083						
20.	27						
21.	$2.6\overline{47}$						
22.	$3.0\overline{505}$						
23.	−198						
24.	$-\dfrac{1}{2}$						
25.	10						

ANSWERS

1. IN, R   **3.** RN, R   **5.** RN, R   **7.** IN, R   **9.** None   **11.** RN, R   **13.** RN, R   **15.** I, RN, R
17. I, RN, R   **19.** RN, R   **21.** RN, R   **23.** I, RN, R   **25.** N, W, I, RN, R

The Real Number Line Worksheet

Graph the number on the real number line.

1. $3\frac{1}{2}$

<++++++++++++++++++++>
-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6

2. $-2\frac{1}{2}$

<++++++++++++++++++++>
-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6

3. - 4.5

<++++++++++++++++++++>
-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6

4. 0.5

<++++++++++++++++++++>
-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6

5. $\sqrt{17}$

<++++++++++++++++++++>
-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6

6. $-\sqrt{10}$

<++++++++++++++++++++>
-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6

7. $-\sqrt{24}$

<++++++++++++++++++++>
-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6

8. $\sqrt{15}$

<++++++++++++++++++++>
-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6
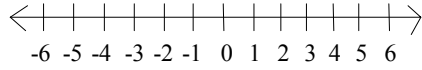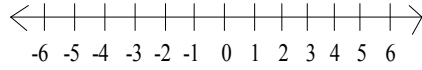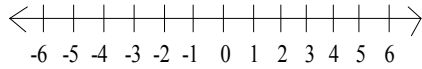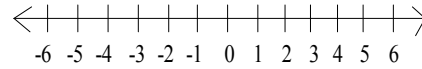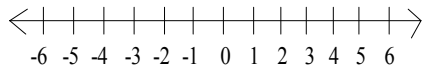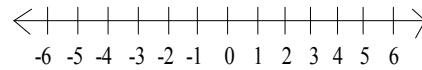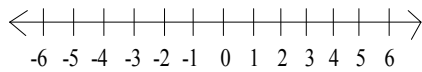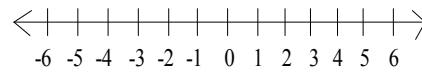
Graph.

9. the real numbers greater than 4

<++++++++++++++++++++>
-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6
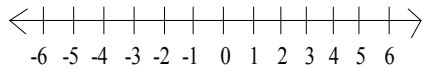
10. the real numbers greater than 1

<++++++++++++++++++++>
-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6
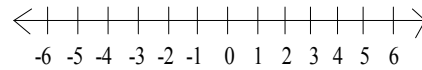
11. the real numbers less than 0

<++++++++++++++++++++>
-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6
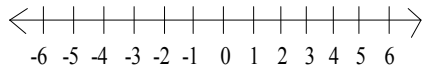
12. the real numbers greater than -2

<++++++++++++++++++++>
-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6
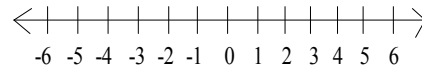
13. the real numbers less than -3

<++++++++++++++++++++>
-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6
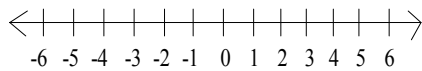
14. the real numbers less than 5

<++++++++++++++++++++>
-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6
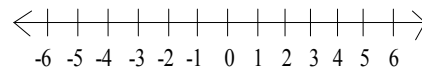
15. the real numbers less than -4

<++++++++++++++++++++>
-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6
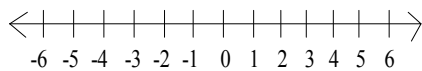
16. the real numbers less than -2

<++++++++++++++++++++>
-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6
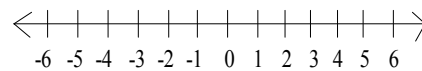
17. the real numbers between 2 and 6

<++++++++++++++++++++>
-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6
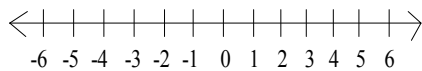
18. the real numbers between -3 and 1

<++++++++++++++++++++>
-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6
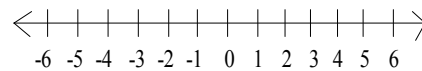
19. the real numbers between -5 and -1

<++++++++++++++++++++>
-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6
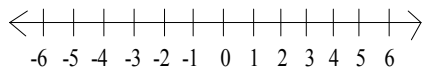
20. the real numbers between -3 and 0

<++++++++++++++++++++>
-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6
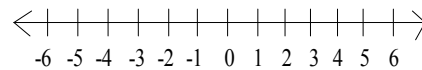
Solve.

21. For the inequality $x \geq 6$, which numbers listed below make the inequality true?

  a. -2.6   b. 0   c. 6   d. $\sqrt{83}$

22. For the inequality $x < 3$, which numbers listed below make the inequality true?
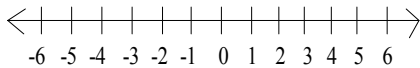
  a. $-\sqrt{21}$ b. 0   c. 3   d. 3.02

23. For the inequality $x \leq -5$, which numbers listed below make the inequality true?

  a. 6   b. -5   c. 0   d. $-\sqrt{5}$

24. For the inequality $x \geq -2$, which numbers listed below make the inequality true?

  a. -5   b. -2   c. -1.6   d. $\sqrt{3}$

What values of the variable x make the inequality true?

  25. $x > 4$ **26.** $x < -3$ **27.** $x \leq -6$ **28.** $x \geq 2$

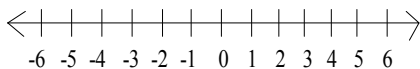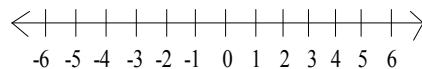**Graph the inequality on the real number line.**

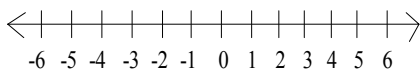**29.** $x > -3$

  -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6

30. $x < 5$

  -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6

31. $x \geq 0$

  -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6

32. $x \leq -4$

  -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6

33. $x < -1$

  -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6

34. $x \geq 3$

  -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6

35. $x \leq 1$

  -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6

36. $x > -2$

  -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6

1.

-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6

3.

-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6

5.

-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6

7.

-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6

9.

-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6

11.

-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6

13.

-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6

15.

-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6

17.

-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6

19.

-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6
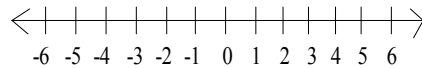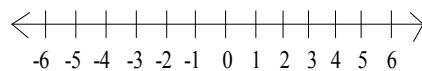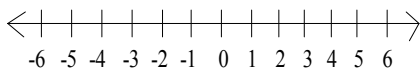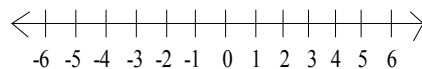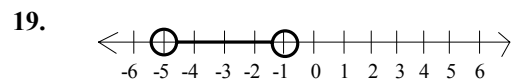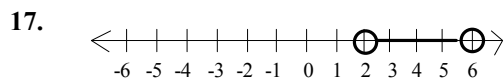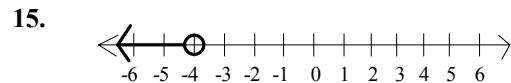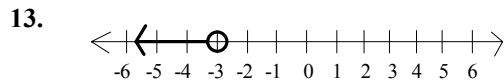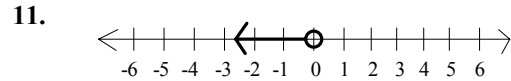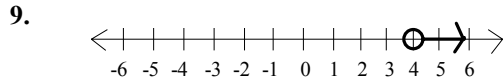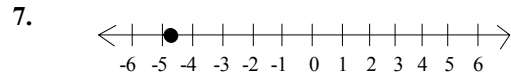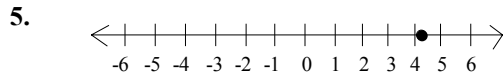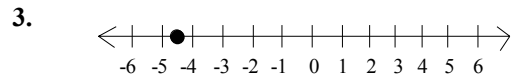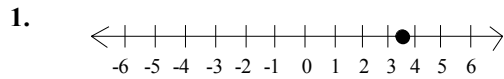
21. c, d   **23.** b   **25.** All real numbers greater than 4 make the inequality true.

27. All real numbers less than or equal to -6 make the inequality true.

29.

-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6

31.

-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6

33.

-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6

35.

-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6