## Problem Set 1.1: Set of Real Numbers

*Fill in the blanks.*

1. A ____set____ is a collection of objects.
2. If every members of one set *B* is also a member of a second set *A*, then *B* is called a ____subset____ of *A*.
3. If *A* and *B* are two sets, the set that contains all members that are in sets *A* and *B* or both is called the ____union____ of *A* and *B*
4. If *A* and *B* are two sets, the set that contains all members that are in both sets is called the ____intersection____of *A* and *B*.
5. A real number is any number that can be expressed as a ____rational or irrational numbers____.
6. A ____variable____is a letter that is used to represent a number.
7. The smallest prime number is ____2____.
8. All integers that are exactly divisible by 2 are called ____even____ integers.
9. Natural numbers greater than 1 that are not prime are called ____composite____ numbers.
10. Fractions such as $\frac{2}{3}, \frac{8}{2}$, and $\frac{-7}{9}$ are called ____rational____ numbers.
11. Irrational numbers are ____decimals____ that don't terminate and don't repeat.
12. The symbol ____≤____ is read as "is less than or equal to."
13. On a number line, the ____negative____ numbers are to the left of 0.
14. The only integer that is neither positive nor negative is ____zero____.
15. The Associative Property of Addition states that $(x + y) + z =$ ____x + (y + z)____.
16. The Commutative Property of Multiplication states that $xy =$ ____yx____.
17. Use the Distributive Property to complete the statement: $5(m + 2) =$ ____5m + 10____.
18. The statement $(m + n)\, p = p\, (m + n)$ illustrates the ____Associative____ Property of ____Addition____.
19. The graph of an ____interval____ is a portion of a number line.
20. The graph of an open interval has ____no____ endpoints.
21. The graph of a closed interval has ____two____ endpoints.
22. The graph of a ____close____ interval has one endpoint.
23. Except for 0, the absolute value of every number is ____positive____.
24. The ____distance____ between two distinct points on a number line is always positive.

***Let***

**N** = the set of natural numbers
**W** = the set of whole numbers
**Z** = the set of integers
**Q** = the set of rational numbers
**R** = the set of real numbers

***Determine whether each statement is true or false. Read the symbol ⊂ as "is a subset of."***

**true** 25. N ⊂ W
**true** 26. Q ⊂ R
**true** 27. Q ⊂ N
**true** 28. Z ⊂ Q
**true** 29. W ⊂ Z
**true** 30. R ⊂ Z

***Let A = {a, b, c, d, e}, B = {d, e, f, g}, and C = {a, c, e, f}. Find each set.***

31. A ∪ B = **{a, b, c, d, e, f, g}**
32. A ∩ B = **{d, e}**
33. A ∩ C = **{a, c, e}**
34. B ∪ C = **{a, c, d, e, f, g}**

***Determine whether the decimal form of each fraction terminates or repeats.***

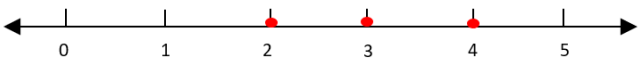
35. $\frac{9}{16}$ **= 0.5625 terminating decimal**
36. $\frac{3}{8}$ **= 0.375 terminating decimal**
37. $\frac{3}{11}$ **= 0.2727… repeating decimal**
38. $\frac{5}{12}$ **= 0.41666... repeating decimal**

***Consider the following set:*** ***{-5, -4,*** $\frac{-2}{3}$ ***, 0, 1, √2, 2.75, 6, 7}***

39. Which numbers are natural numbers? **{1, 6, 7}**
40. Which numbers are whole numbers? **{0, 1, 6, 7}**
41. Which numbers are integers? **{-5, -4, 0, 1, 6, 7}**
42. Which numbers are rational numbers? **{-5, -4, -2/3, 0, 1, 2.75, 6, 7}**
43. Which numbers are irrational numbers? **{√2}**
44. Which numbers are prime numbers? **{7}**
45. Which numbers are composite numbers? **{6}**
46. Which numbers are even integers? **{-4, 0, 6}**
47. Which numbers are odd integers? **{-5, 1, 7}**
48. Which numbers are negative numbers? **{-5, -4, -2/3}**

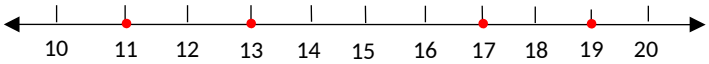
***Graph each subset of the real numbers on a number line.***

49. The natural numbers between 1 and 5

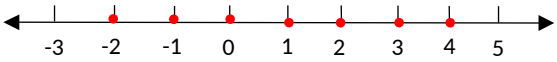


50. The composite numbers less than 10


51. The prime numbers between 10 and 20

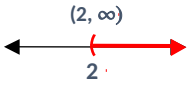



52. The integers from –2 to 4

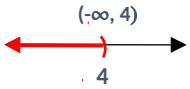



***Write each inequality in interval notation and graph the interval.***

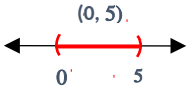
53. x > 2




54. x < 4




55. 0 < x < 5

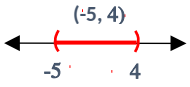



***Write each pair of inequalities as the intersection of two intervals and graph the result.***

56. x > - 5 and x < 4

-5 < x < 4

(-5, ∞) ∩ (-∞, 4)




57. x ≥ - 3 and x < 6

-3 ≤ x < 6

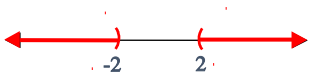
[-3, ∞) ∩ (-∞, 6)


***Write each inequality as the union of two intervals and graph the result.***

58. *x* < -2 or x > 2

2 < x < -2

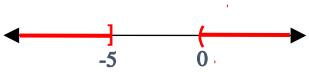
(2, ∞) ∪ (-∞, -2)




59. $x \leq -5$ or $x > 0$

$0 < x \leq -5$

$(0, \infty) \cup (-\infty, -5]$




***Write each expression without using absolute value symbols.***

60. $|13| = 13$

61. $|-17| = 17$

62. $-|63| = -(63) = -63$

63. $-|-8| = -(8) = -8$

***Find the distance between each pair of points on the number line.***

64. -5 and 12

$d = |12 - 5| = |7| = 7$

65. -8 and -3

$d = |-3 - (-8)| = |-3 + 8| = |5| = 5$