

## 1.1 Subsets of Real Numbers


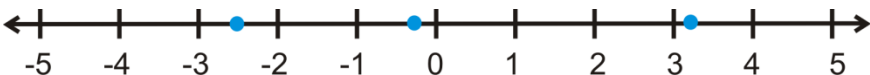
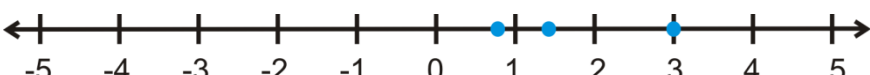
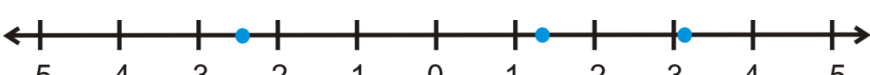
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### Answers

1. Rational Number
2. Irrational Number
3. Rational Number
4. Whole Number
5. Integer
6. Irrational Number
7. Real, Rational, Integer, Whole, and Natural Number
8. Real and Rational Number
9. Real and Irrational Number
10. True
11. True
12. False
13. True
14. True
15. False
16.  $\frac{46}{99}$
17.  $\frac{134}{165}$
18.  $\frac{347}{990}$
19.  $\frac{2483}{999}$
20.  $\frac{12389}{9900}$

## 1.2 Ordering Real Numbers

### Answers

1.  ans-0101-01
2.  ans-0101-02
3.  ans-0101-03
4.  ans-0101-04
5.  $-\frac{9}{2}, -4, -\pi, -\frac{1}{3}, -\frac{1}{4}$
6.  $-\sqrt{\frac{1}{3}}, -\frac{1}{2}, 0, \frac{1}{6}, \frac{4}{5}$
7.  $5, 4\frac{1}{2}, 3\frac{11}{12}, 3.68, \sqrt{10}$
8.  $-\frac{6}{5}, -\sqrt{3}, -2, -\sqrt{5}, -\frac{11}{4}$
9.  $>$
10.  $<$
11.  $>$
12.  $=$
13.  $=$
14.  $<$
15. a)  $e \approx 2.71828\dots$   
 b) Irrational Number  
 c)  $\pi$   
 d)  $e$

### 1.3 Algebraic Properties

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**Answers**

1. commutative
2. distributive
3. inverse
4. associative
5. identity
6. inverse
7. -1
8. -5
  
9. a)  $24 - 54 + 30 = 0$   
b)  $6 \cdot 0 = 0$   
c) both are valid way to simplify an expression.
  
10. 47
11. 26
12.  $\frac{1}{2}$
13. 2
14. 17
15. 30
16. 12
17.  $\frac{1}{5}$
18. 17
19.  $6 + 5 \cdot (2 - 9) \div (3 + 4)$
20.  $(6 + 5) \cdot 2 - (9 \div 3) + 4$

## 1.4 Evaluating Algebraic Expressions and Equations

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### Answers

1. 9
2. 33
3.  $\frac{7}{2}$  or 3.5
4. 9
5. 37
6. -13
7. 0
8. -41
9. 0
10. yes
11. no
12. yes
13. no
14. no
15. yes
16. 2
17. 4
18. -2
19. -10
20. no
21. yes
22. yes
23. no
24. There are at most two solutions to an equation where the largest exponent is 2.
25.  $-4 + 3 = -1$  and  $-4(3) = -12$ . The sum is the opposite sign of the coefficient in front of the  $y$ -term and the product is the same as the constant (last number) in the equation.

## 1.5 Simplifying Algebraic Expressions

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### Answers

1.  $-5(2b-3d)$
2.  $-6(c+2)$
3.  $-4g^2+21$
4.  $5u^2-4u+14$
5. cannot be simplified
6.  $-p^2-4q^2+16p-10$
7.  $7x+13$
8.  $-5n^2+17n+12$
9.  $6(a-3)$
10.  $3(3x^2-5)$
11.  $7(2d+1)$
12.  $3(x-8y+7)$
13.  $b(2b-5)$
14.  $m(m^2-6m+11)$
15.  $4y^2(y^2-3y-2)$

## 1.6 Solving Algebraic Equations for a Variable

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### Answers

1.  $y = 2x - 3$

2.  $c = \frac{9}{4}d + 4$

3.  $f = -\frac{6}{5}g + \frac{14}{5}$

4.  $x = -15y + 3$

5.  $m = -\frac{5}{6}n + 30$

6.  $n = -\frac{6}{5}m + 36$

7.  $w = \frac{P}{2} - l$

8.  $C = \frac{5(F - 32)}{9}$

9.  $y = -\frac{3}{4}$

10.  $y = 46$

11.  $y = -52$

12.  $y = 36$

13.  $30^\circ \text{ C}$

14.  $6 \text{ cm}$

15.  $12 \text{ ft.}$

16.  $h = \frac{SA - 2\pi r^2}{2\pi r}$  or  $\frac{SA}{2\pi r} - r$

17.  $\frac{120\pi}{12\pi} - 6 = 10 - 6 = 4$

18.  $\sqrt[3]{\frac{3}{4}V} = r$

## 1.7 Solving One-Step Equations

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### Answers

1.  $x = 2$

2.  $r = -4$

3.  $s = 6$

4.  $k = 8$

5.  $m = -56$

6.  $n = 9$

7.  $y = -11$

8.  $d = 42$

9.  $p = -18$

10.  $u = \frac{19}{12}$  or  $1\frac{7}{12}$

11.  $a = \frac{45}{13}$  or  $3\frac{6}{13}$

12.  $b = \frac{3}{8}$

13.  $w = 11$

14.  $b = -\frac{3}{20}$

15.  $q = -\frac{20}{11}$

16.  $t = -48$

17.  $x = 3$

18.  $g = -56$

19.  $z = 17$

20.  $k = -45$

## 1.8 Solving Two-Step Equations

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### Answers

1.  $x = -6$

2.  $x = 2$

3.  $x = 14$

4.  $x = -39$

5.  $x = -2$

6.  $x = 75$

7.  $x = 30$

8.  $x = -11$

9.  $x = 28$

10.  $x = 42$

11.  $x = \frac{4}{5}$

12.  $x = 54$

13.  $x = 6$

14.  $x = -6$

15.  $x = -9$

16.  $x = \frac{86}{15}$  or  $5\frac{11}{15}$

17.  $x = \frac{21}{40}$

18.  $x = \frac{35}{27}$  or  $1\frac{8}{27}$

19.  $x = -9$

20. Answers will vary. Chances are, if students do not like to deal with fractions, they will prefer the LCD method.



## 1.9 Solving Multi-Step Equations

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### Answers

1.  $x = 1$

2.  $x = -12$

3.  $x = -21$

4.  $x = 4$

5.  $x = -2$

6.  $x = -4$

7.  $x = 1$

8.  $x = \frac{2}{5}$

9.  $x = 24$

10.  $x = \frac{17}{6}$  or  $2\frac{5}{6}$

11.  $x = -1$

12.  $x = -2$

13.  $x = -4$

14.  $x = 1$

15.  $x = -3$

## 1.10 Solving Basic Inequalities

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### Answers

1.  $x > -11$

2.  $x \geq 7$

3.  $x < -4$

4.  $x \leq 4$

5.  $x > -3$

6.  $x < 11$

7.  $x \geq 14$

8.  $x \leq -6$

9.  $x > -18$

10.  $x > 24$

11.  $x \geq 8$

12.  $x < 12$

13.  $x > -14$

14.  $x > -11$

15.  $x \geq \frac{3}{2}$

16.  $x > 2$

17.  $x \leq -7$

## 1.11 Solving Multi-Step Inequalities

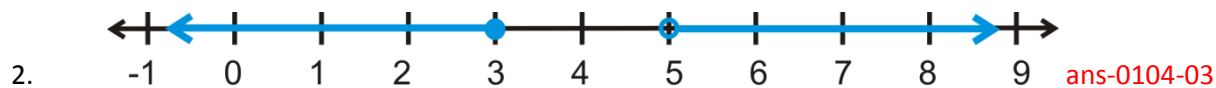
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### Answers

1. yes
2. no
3. no
4.  $x \geq 13$
5.  $x > -4$
6.  $x > \frac{2}{3}$
7.  $x \leq -5$
8.  $x \geq \frac{7}{2}$
9.  $x \leq 4$
10.  $x < -7$
11.  $x < -4$
12.  $x \leq -\frac{10}{7}$
13.  $-\frac{10}{7} \leq x$
14. Even though the  $x$ 's are on different sides these inequalities are the same. These two problems show us why we need to flip the inequality sign when dividing or multiplying by a negative.
15. The  $x$  terms end up canceling out and we are left with  $-7 > 9$  which is an untrue statement. This means there is no solution to this inequality.

## 1.12 Compound Inequalities

### Answers



4.  $x \leq -12$  or  $x > -9$

5.  $-2 < x < 9$

6.  $-2 \leq x \leq 1$

7.  $-2 < x \leq 11$

8.  $-5 < x \leq -1$

9.  $x > -3$  or  $x \leq -12$

10.  $0 < x < 20$

11.  $x > \frac{13}{2}$  or  $x \leq -3$

12.  $x \geq 48$  or  $x < 14$

13.  $3 \leq x < 11$

14.  $-10 < x < 14$

15. Answers will vary. Students should come up with an “or” inequality where the solutions are the same number, but going in opposite directions, such as  $2x - 1 > 3$  or  $x + 5 \leq 9$ . Another possibility would be an “or” inequality where the solutions overlap and continue, such as  $2x - 1 > 3$  or  $x + 1 \leq 9$ .

## 1.13 Solving Absolute Value Equations

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### Answers

1. no
2. no
3. yes
4.  $x = 5, -11$
5.  $x = \frac{9}{2}, -\frac{9}{2}$
6.  $x = -6, -9$
7.  $x = 21, 9$
8.  $x = 6, -54$
9.  $x = 5, -\frac{11}{7}$
10.  $x = 15, -\frac{65}{3}$
11.  $x = 8, -\frac{1}{2}$
12.  $x = -5, \frac{55}{3}$
13.  $x = \frac{3}{2}$
14. There is only one solution for this absolute value equation because zero does not have a negative.
15. An absolute value equation would have no solution if it is set equal to a negative number. Answers may vary.

## 1.14 Solving Absolute Value Inequalities

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### Answers

1. no
2. yes
3. yes
4.  $x > 6$  or  $x < -18$
5.  $-7 \leq x \leq 25$
6.  $x \geq 5$  or  $x \leq 2$
7.  $-\frac{11}{4} < x < 4$
8.  $x > 6$  or  $x < -\frac{42}{5}$
9.  $4 \leq x \leq 5$
10.  $x > 28$  or  $x < -\frac{20}{3}$
11.  $-4 \leq x \leq \frac{40}{7}$
12.  $x \geq 9$  or  $x \leq -\frac{65}{3}$
13.  $x > 2a$  or  $x < 0$
14.  $-2a \leq x \leq 0$
15.  $0 \leq x \leq 2a$

**1.15 Unit Conversion**

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**Answers**

1. 5280 ft.
2. 4 c
3. 100,000 cm
4. 8 pt.
5. 139,392 cm
6. 0.25 gal
7. 189 in.
8. 60 pt.
9. 5200 lbs.
10. 475 cm
11. 10.5 c
12. 18 oz. bittersweet, 6 oz. semi-sweet

## 1.16 Using Algebraic Models

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### Answers

1. 5.38 hrs
2. 162.5 mi
3. 39, 40
4. 21, 23
5. 24 weeks, but in the last week, you will only have to pay \$5.
6. width = 20 ft, length = 40 ft
7. 150 bars
8. 118 dozen
9. 160 ft
10. 44, 46, 48