Equations and Inequalities

Real Numbers

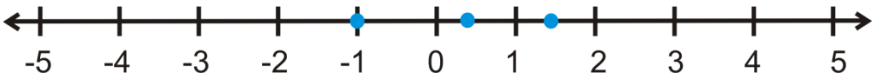
Review Queue Answers

1. Answers will vary.
2. Parenthesis, Exponents, Multiplication/Division, Addition/Subtraction
3. a) $\frac{5}{6}$ b) $\frac{1}{3}$ c) $\frac{6}{7}$

Subsets of Real Numbers: Problem Set Answers

1. Natural 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

Ordering Real Numbers: Problem Set Answers

1. 

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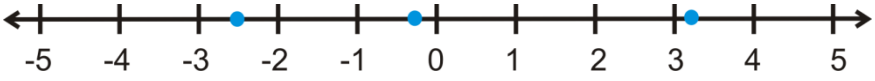
2. 

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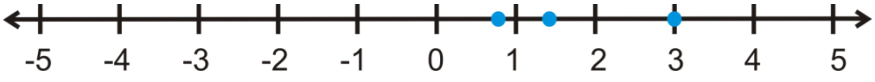
3. 

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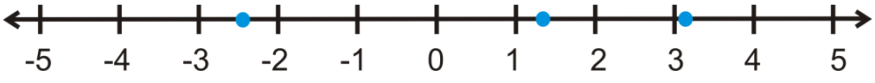
4. 

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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) $e \approx 2.71828...$ b) Irrational Number c) π d) e

Algebraic Properties

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. $(6+5)\cdot 2-(9\div 3)+4$

Simplifying Algebraic Expressions and Equations

Review Queue Answers

1. 25
2. -6
3. $22x-28$
4. $-3x + 2$

Evaluating Algebraic Expressions and Equations

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.

Simplifying Algebraic Expressions

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. $4y^2(y^2-3y-2)$

Solving Algebraic Equations for a Variable

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° C 14. 6 cm 15. 12 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. $\sqrt[3]{\frac{3}{4}V}=r$

Solving Linear Equations

Review Queue Answers

1. a) 33 b) 34 c) 39

2. $y = -\frac{9}{7}x + 9$

3. $x = -\frac{7}{9}y + 7$

Solving One-Step Linear Equations

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

Solving Two-Step Equations

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.

Solving Multi-Step Equations

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

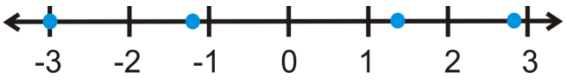
Solving Linear Inequalities

Review Queue Answers

1. x = 5 2. x = -12

3. No; $9(-2)-7 \neq -2+12$

$-18-7 \neq 10$

4. 

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Solving Basic Inequalities

1. x > -11 2. x ≥ 7 3. x < -4

4. x ≤ 4 5. x > -3 6. x < 11

7. x ≥ 14 8. x ≤ -6 9. x > -18

10. x > 24 11. x ≥ 8 12. x < 12

13. x > -14 14. x > -11 15. $x \geq \frac{3}{2}$

16. x > 2 17. x ≤ -7

Multi-Step Inequalities

1. yes 2. no 3. no

4. x ≥ 13 5. x > -4 6. $x > \frac{2}{3}$

7. x ≤ -5 8. $x \geq \frac{7}{2}$ 9. x ≤ 4

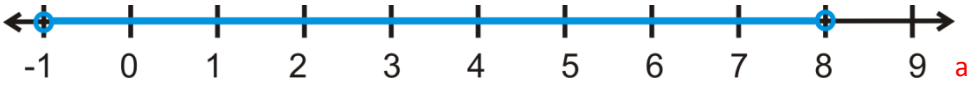
10. x < -7 11. x < -4 12. $x \leq -\frac{10}{7}$

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.

Compound Inequalities

1. 

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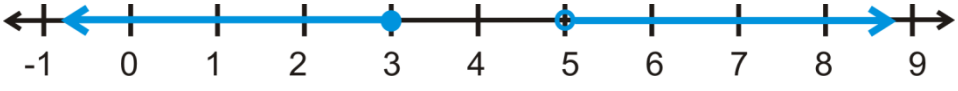
2. 

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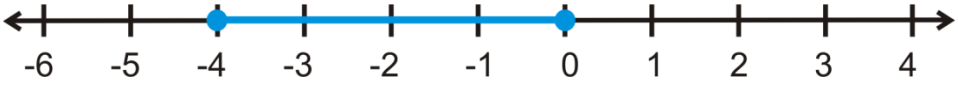
3. 

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

5. -2 < x < 9

6. -2 ≤ x ≤ 1

7. -2 < x ≤ 11

8. -5 < x ≤ -1

9. x > -3 or x ≤ -12

10. 0 < x < 20

11. $x > \frac{13}{2}$ or x ≤ -3

12. x ≥ 48 or x < 14

13. 3 ≤ 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 $x + 5 \le 9$. Another possibility would be an "or" inequality where the solutions overlap and continue, such as $2x - 1 > 3$ or $x + 1 \le 9$.

Solving Absolute Value Equations and Inequalities

Review Queue Answers

1. x = 7

2. 3 < x < 7

3. x ≤ -16

4. x = 5

Solving Absolute Value Equations

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. $x = \frac{3}{2}$; there is only one solution for this absolute value equation because zero does not have a negative.

14. An absolute value equation would have no solution if it is set equal to a negative number. An example would be $|2x+3|=-11$ or anything where the right hand side is a negative number. Answers may vary.

Absolute Value Inequalities

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

Interpreting Word Problems

Review Queue Answers

1. x = 8
2. 3 feet in a yard, 5280 feet in a mile.
3. plus, sum, together, increase
4. minus, difference, take away, decrease

Unit Conversion

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

Using Algebraic Models

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