Includes 96 Flash Cards!

\[ 2(4 - y) \]
\[ \frac{x}{3} = -6 \]
\[ \sqrt{196x^4} \]
\[ x^2 + 9x + 14 \]
\[ 5x^2 - 35 \]

Perfect for Home and School!
Master the Basic Skills!

A Kelley Wingate Publication
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Operations with Real Numbers

Integers are . . . −5, −4, −3, −2, −1, 0, 1, 2, 3, 4, 5 . . .
There is a set of three dots before and after the list of integers. This means that the numbers continue, and there is no largest or smallest integer.

Looking at a number line, the integers to the right of zero are positive integers and the integers to the left of zero are negative integers. Zero is neither a positive integer nor a negative integer.

Natural numbers are all positive integers.
  1, 2, 3, 4, 5 . . .

Whole numbers are comprised of zero and all of the positive integers.
  0, 1, 2, 3, 4, 5 . . .

Variables are letters of the alphabet that represent a number in mathematics. For example, in the problem 5x = 15, x is the variable.

The quotient of two integers is a rational number. A rational number can be written as \( \frac{t}{x} \), in the case that \( t \) and \( x \) are integers and \( x \) is not equal to zero (\( x \neq 0 \)). When a rational number is written this way, it is called a fraction.

It is important to note that every integer is a rational number. A decimal number, such as 12.6, is also considered a rational number. All rational numbers can be written as repeating or terminating decimals.

An irrational number is a number whose decimal expansion does not terminate and never repeats. For example \( \pi = 3.141592604 \ldots \)

Real numbers are made up of rational numbers and irrational numbers.
Operations with Real Numbers

Patterns

The French mathematician Blaise Pascal developed a triangular pattern to describe the coefficients for the expansion of \((a + b)^n\), for consecutive values of \(n\) in rows. This pattern is referred to as Pascal’s triangle.

In the triangular formation below, note that \((a + b)^0 = 1\) and \((a + b)^1 = a + b\).

Part A. Fill in the blanks in Pascal’s triangle to extend the pattern.

\[
\begin{array}{ccccccccc}
\hline
n = 0 & & & & & & & & 1 \\
\hline
n = 1 & 1 & 1 & & & & & & \\
\hline
n = 2 & 1 & 2 & 1 & & & & & \\
\hline
n = 3 & 1 & 3 & 3 & 1 & & & & \\
\hline
n = 4 & 1 & & & & 6 & & & \\
\hline
n = 5 & & & & & & & 10 & & \\
\hline
n = 6 & & & & & & & & & \\
\hline
n = 7 & & & & & & & & & \\
\hline
n = 8 & & & & & & & & & \\
\hline
n = 9 & & & & & & & & & \\
\hline
n = 10 & & & & & & & & & \\
\hline
\end{array}
\]

Part B. Use Pascal’s triangle to find the coefficients of the expansion \((a + b)\).

1. \((a + b)^3 = \quad a^3 + \quad a^2b + \quad ab^2 + \quad b^3\)

2. \((a + b)^6 = \quad a^6 + \quad a^5b + \quad a^4b^2 + \quad a^3b^3 + \quad a^2b^4 + \quad ab^5 + \quad b^6\)

3. \((a + b)^4 = \quad a^4 + \quad a^3b + \quad a^2b^2 + \quad ab^3 + \quad b^4\)

4. \((a + b)^7 = \quad a^7 + \quad a^6b + \quad a^5b^2 + \quad a^4b^3 + \quad a^3b^4 + \quad a^2b^5 + \quad ab^6 + \quad b^7\)
Operations with Real Numbers

Patterns

Carefully study the patterns of numbers to complete each pattern.

1. 130, 120, 110, 100, __________, __________, __________, __________

2. 20, 200, 2,000, 20,000, __________, __________, __________

3. 3, 6, 7, 14, 15, 30, 31, __________, __________, __________, __________

4. 1, 4, 9, 16, 25, __________, __________, __________, __________, __________

5. 1, 6, 10, 9, 14, 13, __________, __________, __________, __________

6. \( \frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \frac{6}{7} \) __________, __________, __________

7. 17, 15, 25, 23, 33, 31, __________, __________, __________, __________

8. 7, 21, 63, 189, __________, __________, __________

9. 800, 80, 8, 0.8, 0.08, __________, __________, __________, __________

Challenge! The following is a special pattern called the Fibonacci sequence. See if you can discover and complete this interesting pattern.

1, 1, 2, 3, 5, 8, 13, __________, __________, __________, __________, __________
Operations with Real Numbers

Adding Real Numbers

Add.

1. \(-7 + 6 = -1\)

2. \(2.7 + (-4.8) = \)

3. \(-55 + (-8) + (-4) + 54 = \)

4. \(3.54 + 4.27 + 7.43 = \)

5. \(10 + 7 + (-7) + (-10) = \)

6. \(16 + 21 + (-3) + 7 = \)

7. \(10 + 7 + (-16) + 9 + (-30) = \)

8. \(5.8 + 8.4 = \)

9. \(2.76 + (-6.56) + (-9.72) = \)

10. \(8 + (-7) = \)

11. \(2\frac{3}{5} + 4\frac{3}{7} = \)

12. \(-8\frac{3}{5} + 3\frac{3}{7} = \)

13. \(3\frac{5}{8} + (-1\frac{2}{3}) + 2 = \)

14. \(-5\frac{3}{4} + (-2\frac{3}{4}) + 8 = \)

15. \(7.3 + (3.9) = \)

16. \(-21 + 12 + (-1) + (-17) = \)

17. \(7.867 + (-5.329) = \)

18. \(-2\frac{3}{5} + (-5\frac{3}{7}) + 3 = \)

19. \(3 + 12 + (-13) + 36 = \)

20. \(-3\frac{1}{6} + (-9\frac{3}{12}) + 6 = \)
Operations with Real Numbers

Adding Real Numbers

Add.

1. \(2 \frac{3}{5} + (-3 \frac{2}{5}) + (-6) = \)
2. \(21 + 9 + (-6) + 7 = \)
3. \(12 + (-9) + 17 = \)
4. \(2.54 + (-5.87) + (-32.65) = \)
5. \(1 + (-5) + (-5) + 1 = \)
6. \(21 + 3 + (-13) + 22 = \)
7. \(3 + (-3) + 4 + (-5) = \)
8. \(3.3 + (-3.4) + 5.5 = \)
9. \(3.6 + (-2.5) + (-5.5) = \)
10. \(-0.6 + (-0.56) + 3 = \)
11. \(2 + 5 + (-3) = \)
12. \(4.524 + 7.342 = \)
13. \(-7 \frac{2}{4} + 2 \frac{3}{4} = \)
14. \(34 + (-13) + 18 + 0 + 34 = \)
15. \(8.43 + (-10.98) + (-3.23) = \)
16. \(2.54 + (-5.21) + (-6.34) = \)
17. \(-2 \frac{1}{3} + (-5 \frac{7}{10}) + (-7) = \)
18. \(-1 \frac{2}{3} + (-3 \frac{3}{5}) + 4 = \)
19. \(2 \frac{1}{2} + 6 \frac{1}{2} = \)
20. \(4 \frac{3}{5} + (-3 \frac{2}{5}) + (-8) = \)
Operations with Real Numbers

Subtracting Real Numbers

\[ 10 - (-4) = 10 + 4 = 14 \]

Subtract.

1. \( 9 - (-32) = \)

2. \( -99 - (-42) = \)

3. \( \frac{3}{5} - \frac{7}{8} = \)

4. \( 0 - 21 = \)

5. \( 45 - 301 = \)

6. \( 9.432 + 4.348 - 44.938 = \)

7. \( -43 - 6 = \)

8. \( 9 - (-2) - 8 - 7 = \)

9. \( 35 - 67 - 85 - 21 - 12 = \)

10. \( 12 - 7 - (-16) - 9 - (-34) = \)

11. \( 18 - (-13) = \)

12. \( \frac{-2}{5} - \frac{3}{4} - (-\frac{4}{5}) = \)

13. \( -\frac{4}{7} - \frac{1}{3} - (\frac{2}{3}) = \)

14. \( 3.434 - 7.294 = \)

15. \( 8 - 2.8 = \)

16. \( 8 - (-14) = \)

17. \( 3.9 - 4.9 = \)

18. \( -7 - (-3) = \)

19. \( 2.19 - 7.8 - 8.31 = \)

20. \( 38 - 39 - (-13) = \)
Operations with Real Numbers

Subtracting Real Numbers

\[ 4 - (-5) = 4 + 5 = 9 \]

Subtract.

1. \(-9 - (-5) = \)

2. \(321 - (-34) = \)

3. \(\frac{2}{3} - \frac{4}{5} = \)

4. \(4 - (-8) = \)

5. \(5.34 - 9.9 - 3.65 = \)

6. \(-19 - 8 = \)

7. \(245 - 32 - (-36) = \)

8. \(44 - 35 - 34 - 32 = \)

9. \(8 - (-5) - 7 - 9 = \)

10. \(43 - 88 - 35 - 21 = \)

11. \(121 - 45 = \)

12. \(-45 - 5 = \)

13. \(-\frac{2}{3} - \frac{1}{3} - (-\frac{1}{3}) = \)

14. \(-\frac{4}{5} - \frac{1}{2} - \frac{2}{5} = \)

15. \(4 - 12.9 = \)

16. \(7 - (-33) = \)

17. \(3.4 - 7.4 = \)

18. \(2.456 - 4.345 - 5.457 = \)

19. \(23 - (-21) = \)

20. \(4.346 - 0.4537 = \)
Operations with Real Numbers

Multiplying Real Numbers

\((-2)(-3) = 6\)

Multiply.
1. \(4 \cdot 9 = \)
2. \(-4 \cdot 12 = \)

3. \((-\frac{5}{9})(8.8) = \)
4. \((-3)(0) = \)

5. \((-3)(-9) = \)
6. \(6(23) = \)

7. \((12)(-3)(4) = \)
8. \((-5)(-5)(-5) = \)

9. \((5)(2)(-1) = \)
10. \((7)(-9)(-12) = \)

11. \((-\frac{2}{3})(-1.6) = \)
12. \(-7(-7) = \)

13. \((54.2)(-3.55) = \)
14. \((2.22)(-1.11) = \)

15. \((7.44)(3.2)(4.3) = \)
16. \((2.4)(-1.4) = \)

17. \((-\frac{3}{5})(\frac{3}{5}) = \)
18. \((-\frac{4}{5})(2.2) = \)

19. \(-8 \cdot 12 = \)
20. \((0)(2)(-213) = \)
Answer Key

Name ______________________ Date __________________

Operations with Real Numbers

Patterns

Carefully study the patterns of numbers to complete each pattern.

1. 130, 120, 110, 100, __________
2. 20, 200, 2,000, 20,000, __________
3. 3, 6, 7, 14, 15, 30, 31, __________
4. 1, 4, 9, 16, 25, __________
5. 1, 6, 5, 10, 9, 14, 13, __________
6. 1 2 3 4 5 6 7 8 9 10 __________
7. 17, 15, 25, 23, 33, 31, __________
8. 7, 21, 63, 189, __________
9. 800, 80, 8, 0.8, 0.08 __________

Challenge! The following is a special pattern called the Fibonacci sequence.

Add:
1. 2.7 + (−4.8) = __________
2. 5.5 + (−8) + (−4) + 54 = __________
3. 10 + 7 + (−7) + (−10) = __________
4. 10 + 7 + (−16) + 9 + (−30) = __________
5. 6.5 + (−6.56) + (−9.72) = __________
6. 2 + 3 + 4 + 3 = __________
7. 3 + 5 + 8 + (−1) + 2 = __________
8. 7.3 + (−3.9) = __________
9. 7.867 + (−5.329) = __________
10. 3 + 12 + (−13) + 36 = __________
### Operations with Real Numbers

#### Adding Real Numbers

<table>
<thead>
<tr>
<th>Expression</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \frac{3}{5} + \left[ \frac{3}{2} \right] \times \frac{4}{5} )</td>
<td>(-6 \frac{4}{5} )</td>
</tr>
<tr>
<td>12 + (-9)</td>
<td>20</td>
</tr>
<tr>
<td>1 + (-5) + (-5) + 1</td>
<td>-8</td>
</tr>
<tr>
<td>3 \times (-3) + 4 \times (-5)</td>
<td>-1</td>
</tr>
<tr>
<td>3.6 \times \left(2.5\right) + 5.5</td>
<td>-4.4</td>
</tr>
<tr>
<td>10 \times \left(0.56\right) + 3</td>
<td>1.84</td>
</tr>
<tr>
<td>2 \times 5 \times -3</td>
<td>-4</td>
</tr>
<tr>
<td>(-\frac{7}{4} + \frac{3}{2})</td>
<td>-4 \frac{3}{4}</td>
</tr>
<tr>
<td>13.84 + \left(10.98\right) + \left(3.23\right)</td>
<td>5.78</td>
</tr>
<tr>
<td>(-\frac{1}{3} + \frac{2}{5})</td>
<td>10.57</td>
</tr>
<tr>
<td>(-\frac{1}{3} + \frac{2}{5})</td>
<td>-4 \frac{3}{5}</td>
</tr>
<tr>
<td>2 \times \frac{3}{2} + \frac{1}{2}</td>
<td>9</td>
</tr>
</tbody>
</table>

#### Subtracting Real Numbers

<table>
<thead>
<tr>
<th>Expression</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 \times \left(-32\right)</td>
<td>41</td>
</tr>
<tr>
<td>3 \times \frac{7}{8} - \frac{11}{40}</td>
<td>29</td>
</tr>
<tr>
<td>45 - 301</td>
<td>-256</td>
</tr>
<tr>
<td>(-43) - 6</td>
<td>-49</td>
</tr>
<tr>
<td>35 - 67 - 85 - 21 - 12</td>
<td>-150</td>
</tr>
<tr>
<td>18 - (-13)</td>
<td>31</td>
</tr>
<tr>
<td>(-\frac{4}{7} - \frac{1}{3})</td>
<td>-1 \frac{5}{7}</td>
</tr>
<tr>
<td>18 - \left(-14\right)</td>
<td>22</td>
</tr>
<tr>
<td>3.9 - 4.9</td>
<td>-1</td>
</tr>
<tr>
<td>2.19 - 7.8 - 8.33</td>
<td>-13.92</td>
</tr>
</tbody>
</table>

#### Subtracting Real Numbers

<table>
<thead>
<tr>
<th>Expression</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 - (-6)</td>
<td>16</td>
</tr>
<tr>
<td>10 \times 4</td>
<td>40</td>
</tr>
</tbody>
</table>

#### Multiplying Real Numbers

<table>
<thead>
<tr>
<th>Expression</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 \times 9</td>
<td>36</td>
</tr>
<tr>
<td>(-\frac{1}{8}) \times (8.8)</td>
<td>-0.48</td>
</tr>
<tr>
<td>(-3) \times (-9)</td>
<td>27</td>
</tr>
<tr>
<td>\left(12\right) \times \left(\frac{3}{4}\right)</td>
<td>-144</td>
</tr>
<tr>
<td>\left(5\right) \times \left(\frac{1}{2}\right)</td>
<td>-10</td>
</tr>
<tr>
<td>\left(-\frac{3}{4}\right) \times \left(-1.6\right)</td>
<td>1.96</td>
</tr>
<tr>
<td>\left(54.2\right) \times \left(-3.55\right)</td>
<td>-192.41</td>
</tr>
<tr>
<td>\left(7.44\right) \times \left(3.2\right)</td>
<td>102.3744</td>
</tr>
<tr>
<td>\left(-\frac{3}{5}\right) \times \left(-\frac{2}{5}\right)</td>
<td>1.76</td>
</tr>
<tr>
<td>\left(-\frac{3}{5}\right) \times \left(-\frac{2}{5}\right)</td>
<td>0</td>
</tr>
</tbody>
</table>