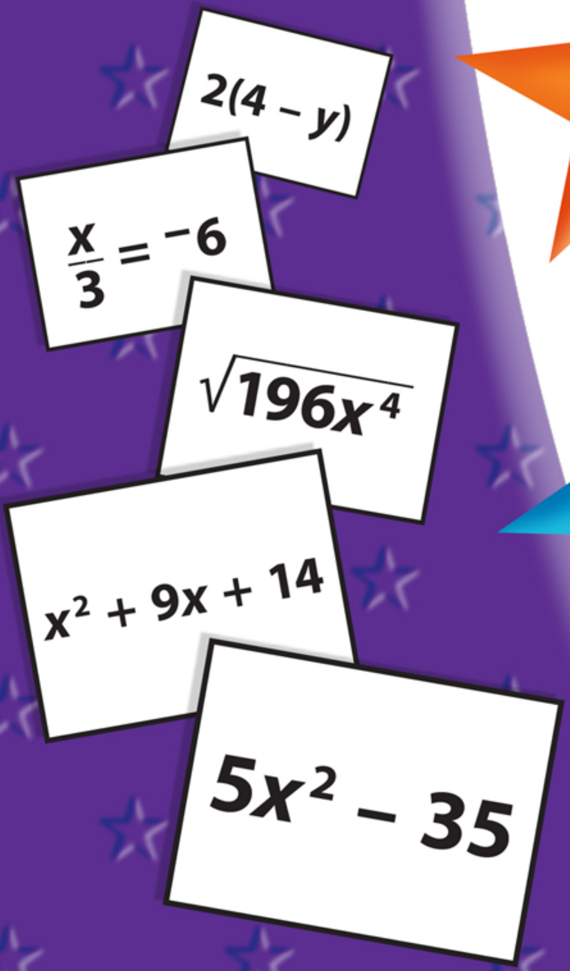
Kelley Wingate
PUBLICATIONS

CD-104316

GRADES
6–9

Algebra

Includes 96 Flash Cards!



- Perfect for Home and School!
- Master the Basic Skills!

A Kelley Wingate Publication

Algebra

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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.

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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.

$n = 0$ 1

$n = 1$ 1 1

$n = 2$ 1 2 1

$n = 3$ 1 3 3 1

$n = 4$ 1 ____ 6 ____ ____

$n = 5$ ____ ____ ____ 10 ____ ____

$n = 6$ ____ ____ ____ ____ ____ ____ ____

$n = 7$ ____ ____ ____ ____ ____ ____ ____ ____

$n = 8$ ____ ____ ____ ____ ____ ____ ____ ____ ____

$n = 9$ ____ ____ ____ ____ ____ ____ ____ ____ ____ ____

$n = 10$ ____ ____ ____ ____ ____ ____ ____ ____ ____ ____ ____

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

1. $(a + b)^3 =$ ____a^3 + ____a^2b + ____ab^2 + ____b^3

2. $(a + b)^6 =$ ____a^6 + ____a^5b + ____a^4b^2 + ____a^3b^3 + ____a^2b^4 + ____ab^5 + ____b^6

3. $(a + b)^4 =$ ____a^4 + ____a^3b + ____a^2b^2 + ____ab^3 + ____b^4

4. $(a + b)^7 =$ ____a^7 + ____a^6b + ____a^5b^2 + ____a^4b^3 + ____a^3b^4 + ____a^2b^5 +
____ab^6 + ____b^7

Name ________________________________ Date ____________________

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. $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \frac{6}{7}$, ________, ________, ________, ________

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, ________, ________, ________, ________, ________

Name ______________________________ Date ____________________

Operations with Real Numbers

Adding Real Numbers

$^{-}7 + 6 = {}^{-}1$

Add.

1. $2.7 + ({}^{-}4.8) =$

2. $1.45 + 2.65 + ({}^{-}9.43) =$

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. $^{-}3\frac{1}{6} + ({}^{-}9\frac{3}{12}) + 6 =$

Name ______________________ Date ______________

Adding Real Numbers

$^{-}6 + 3 = {}^{-}3$

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

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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. $38 - 39 - (^{-}13) =$

Name ______________________________ Date ______________

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. $4.346 - 0.4537 =$

Name ______________________________ Date ____________________

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. $(0)(2)(^-213) =$

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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.

$n = 0$ 1

$n = 1$ 1 1

$n = 2$ 1 2 1

$n = 3$ 1 3 3 1

$n = 4$ 1 4 6 4 1

$n = 5$ 1 5 10 10 5 1

$n = 6$ 1 6 15 20 15 6 1

$n = 7$ 1 7 21 35 35 21 7 1

$n = 8$ 1 8 28 56 70 56 28 8 1

$n = 9$ 1 9 36 84 126 126 84 36 9 1

$n = 10$ 1 10 45 120 210 252 210 120 45 10 1

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

1. $(a + b)^3 = 1a^3 + 3a^2b + 3ab^2 + 1b^3$
2. $(a + b)^6 = 1a^6 + 6a^5b + 15a^4b^2 + 20a^3b^3 + 15a^2b^4 + 6ab^5 + 1b^6$
3. $(a + b)^4 = 1a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + 1b^4$
4. $(a + b)^7 = 1a^7 + 7a^6b + 21a^5b^2 + 35a^4b^3 + 35a^3b^4 + 21a^2b^5 + 7ab^6 + 1b^7$

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Name ______________________ Date ______________

Operations with Real Numbers

Patterns

Carefully study the patterns of numbers to complete each pattern.

1. 130, 120, 110, 100, 90, 80, 70, 60
2. 20, 200, 2,000, 20,000, 200,000, 2,000,000, 20,000,000
3. 3, 6, 7, 14, 15, 30, 31, 62, 63, 126, 127
4. 1, 4, 9, 16, 25, 36, 49, 64, 81, 100
5. 1, 6, 5, 10, 9, 14, 13, 18, 17, 22, 21
6. $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \frac{6}{7}$, $\frac{7}{8}$, $\frac{8}{9}$, $\frac{9}{10}$, $\frac{10}{11}$
7. 17, 15, 25, 23, 33, 31, 41, 39, 49, 47
8. 7, 21, 63, 189, 567, 1,701, 5,103, 15,309
9. 800, 80, 8, 0.8, 0.08, 0.008, 0.0008, 0.00008, 0.000008

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, 21, 34, 55, 89, 144

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Name ______________________ Date ______________

Operations with Real Numbers

Adding Real Numbers

$^{-}7 + 6 = {}^{-}1$

Add.

1. $2.7 + (^{-}4.8) = {}^{-}2.1$
2. $1.45 + 2.65 + (^{-}9.43) = {}^{-}5.33$
3. $^{-}55 + (^{-}8) + (^{-}4) + 54 = {}^{-}13$
4. $3.54 + 4.27 + 7.43 = 15.24$
5. $10 + 7 + (^{-}7) + (^{-}10) = 0$
6. $16 + 21 + (^{-}3) + 7 = 41$
7. $10 + 7 + (^{-}16) + 9 + (^{-}30) = {}^{-}20$
8. $5.8 + 8.4 = 14.2$
9. $2.76 + (^{-}6.56) + (^{-}9.72) = {}^{-}13.52$
10. $8 + (^{-}7) = 1$
11. $2\frac{3}{5} + 4\frac{3}{7} = 7\frac{1}{35}$
12. $^{-}8\frac{3}{5} + 3\frac{3}{7} = {}^{-}5\frac{6}{35}$
13. $3\frac{5}{8} + (^{-}1\frac{2}{3}) + 2 = 3\frac{23}{24}$
14. $^{-}5\frac{3}{4} + (^{-}2\frac{3}{4}) + 8 = {}^{-}\frac{1}{2}$
15. $7.3 + (3.9) = 11.2$
16. $^{-}21 + 12 + (^{-}1) + (^{-}17) = {}^{-}27$
17. $7.867 + (^{-}5.329) = 2.538$
18. $^{-}2\frac{3}{5} + (^{-}5\frac{3}{7}) + 3 = {}^{-}5\frac{1}{35}$
19. $3 + 12 + (^{-}13) + 36 = 38$
20. $^{-}3\frac{1}{6} + (^{-}9\frac{3}{12}) + 6 = {}^{-}6\frac{5}{12}$

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Answer Key

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Operations with Real Numbers

Adding Real Numbers

$^-6 + 3 = ^-3$

Add.

1. $2\frac{3}{5} + (^-3\frac{2}{5}) + ^-6 =$ **$^-6\frac{4}{5}$**
2. $21 + 9 + (^-6) + 7 =$ **31**
3. $12 + (^-9) + 17 =$ **20**
4. $2.54 + ^-5.87 + ^-32.65 =$ **$^-35.98$**
5. $1 + ^-5 + (^-5) + 1 =$ **$^-8$**
6. $21 + 3 + (^-13) + 22 =$ **33**
7. $3 + (^-3) + 4 + (^-5) =$ **$^-1$**
8. $3.3 + (^-3.4) + 5.5 =$ **5.4**
9. $3.6 + (^-2.5) + ^-5.5 =$ **$^-4.4$**
10. $^-0.6 + (^-0.56) + 3 =$ **1.84**
11. $2 + 5 + ^-3 =$ **4**
12. $4.524 + 7.342 =$ **11.866**
13. $^-7\frac{2}{4} + 2\frac{3}{4} =$ **$^-4\frac{3}{4}$**
14. $34 + (^-13) + 18 + 0 + 34 =$ **73**
15. $8.43 + (^-10.98) + (^-3.23) =$ **$^-5.78$**
16. $2.54 + (^-5.21) + (^-6.34) =$ **$^-9.01$**
17. $^-2\frac{1}{3} + (^-5\frac{7}{10}) + (^-7) =$ **$^-15\frac{1}{30}$**
18. $^-1\frac{2}{3} + (^-3\frac{3}{5}) + 4 =$ **$^-1\frac{4}{15}$**
19. $2\frac{1}{2} + 6\frac{1}{2} =$ **9**
20. $4\frac{3}{5} + (^-3\frac{2}{5}) + (^-8) =$ **$^-6\frac{4}{5}$**

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Name ______________________ Date ______________

Operations with Real Numbers

Subtracting Real Numbers

$10 - (^-4) = 10 + 4 = 14$

Subtract.

1. $9 - (^-32) =$ **41**
2. $^-99 - (^-42) =$ **$^-57$**
3. $\frac{3}{5} - \frac{7}{8} =$ **$-\frac{11}{40}$**
4. $0 - 21 =$ **$^-21$**
5. $45 - 301 =$ **$^-256$**
6. $9.432 + 4.348 - 44.938 =$ **$^-31.158$**
7. $^-43 - 6 =$ **$^-49$**
8. $9 - (^-2) - 8 - 7 =$ **$^-4$**
9. $35 - 67 - 85 - 21 - 12 =$ **$^-150$**
10. $12 - 7 - (^-16) - 9 - (^-34) =$ **46**
11. $18 - (^-13) =$ **31**
12. $-\frac{2}{5} - \frac{3}{4} - (-\frac{4}{5}) =$ **$-\frac{7}{20}$**
13. $-\frac{4}{7} - \frac{1}{3} - (-\frac{2}{3}) =$ **$^-1\frac{4}{7}$**
14. $3.434 - 7.294 =$ **$^-3.86$**
15. $8 - 2.8 =$ **5.2**
16. $8 - (^-14) =$ **22**
17. $3.9 - 4.9 =$ **$^-1$**
18. $^-7 - (^-3) =$ **$^-4$**
19. $2.19 - 7.8 - 8.31 =$ **$^-13.92$**
20. $38 - 39 - (^-13) =$ **12**

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Operations with Real Numbers

Subtracting Real Numbers

$4 - (^-5) = 4 + 5 = 9$

Subtract.

1. $^-9 - (^-5) =$ **$^-4$**
2. $321 - (^-34) =$ **355**
3. $\frac{2}{3} - \frac{4}{5} =$ **$-\frac{2}{15}$**
4. $4 - (^-8) =$ **12**
5. $5.34 - 9.9 - 3.65 =$ **$^-8.21$**
6. $^-19 - 8 =$ **$^-27$**
7. $245 - 32 - (^-36) =$ **249**
8. $44 - 35 - 34 - 32 =$ **$^-57$**
9. $8 - (^-5) - 7 - 9 =$ **$^-3$**
10. $43 - 88 - 35 - 21 =$ **$^-101$**
11. $121 - 45 =$ **76**
12. $^-45 - 5 =$ **$^-50$**
13. $-\frac{2}{3} - \frac{1}{3} - (-\frac{1}{3}) =$ **$-\frac{2}{3}$**
14. $-\frac{4}{5} - \frac{1}{2} - \frac{2}{5} =$ **$^-1\frac{7}{10}$**
15. $4 - 12.9 =$ **$^-8.9$**
16. $7 - (^-33) =$ **40**
17. $3.4 - 7.4 =$ **$^-4$**
18. $2.456 - 4.345 - 5.457 =$ **$^-7.346$**
19. $23 - (^-21) =$ **44**
20. $4.346 - 0.4537 =$ **3.8923**

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Operations with Real Numbers

Multiplying Real Numbers

$(^-2)(^-3) = 6$

Multiply.

1. $4 \cdot 9 =$ **36**
2. $^-4 \cdot 12 =$ **$^-48$**
3. $(-\frac{5}{9})(8.8) =$ **$^-4.\overline{8}$**
4. $(^-3)(0) =$ **0**
5. $(^-3)(^-9) =$ **27**
6. $6(23) =$ **138**
7. $(12)(^-3)(4) =$ **$^-144$**
8. $(^-5)(^-5)(^-5) =$ **$^-125$**
9. $(5)(2)(^-1) =$ **$^-10$**
10. $(7)(^-9)(^-12) =$ **756**
11. $(-\frac{2}{3})(^-1.6) =$ **$1.0\overline{6}$**
12. $^-7\ (^-7) =$ **49**
13. $(54.2)(^-3.55) =$ **$^-192.41$**
14. $(2.22)(^-1.11) =$ **$^-2.4642$**
15. $(7.44)(3.2)(4.3) =$ **102.3744**
16. $(2.4)(^-1.4) =$ **$^-3.36$**
17. $(-\frac{3}{5})(\frac{3}{5}) =$ **$-\frac{9}{25}$**
18. $(-\frac{4}{5})(2.2) =$ **$^-1.76$**
19. $^-8 \cdot 12 =$ **$^-96$**
20. $(0)(2)(^-213) =$ **0**

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