

§1-1**INTEGERS****Definition**

The set of **integers**, Z , consists of the whole numbers and their negative counterparts.

$$Z = \{ \dots, -3, -2, -1, 0, 1, 2, 3, \dots \}$$

Definition

The absolute value of a number is the distance between the number and zero on a number line.

It is defined by the formula: $|x| = \begin{cases} x, & \text{if } x \geq 0 \\ -x, & \text{if } x < 0 \end{cases}$

Example 1

Evaluate each absolute value below.

a. $|5| = 5$

b. $|-5| = 5$

c. $|0| = 0$

Property**Multiplying Integers**

To multiply two integers, first multiply their absolute values. If the integers have the same sign then the result is positive, otherwise the result is negative.

Example 2

Multiply the integers below.

a. $3 \cdot 2 = 6$

b. $3 \cdot (-2) = -6$

c. $(-3) \cdot 2 = -6$

d. $(-3) \cdot (-2) = 6$

Property**Dividing Integers**

To divide two integers, first divide their absolute values. If the integers have the same sign then the result is positive, otherwise the result is negative.

Example 3

Divide the integers below.

a. $10 \div 2 = 5$

b. $10 \div (-2) = -5$

c. $(-10) \div 2 = -5$

d. $(-10) \div (-2) = 5$

Property**Adding Integers**

To add two integers which have the same sign, add their absolute values and give the result the same sign as the integers.

To add two integers with opposite signs, subtract the smaller absolute value from the larger and give the result the sign of the integer with the larger absolute value.

Example 4

Add the integers below.

a. $3 + 5 = 8$

b. $3 + (-5) = -2$

c. $(-3) + 5 = 2$

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

Property**Subtracting Integers**

To subtract two integers change the subtraction symbol to addition while reversing the sign of the second integer. Then use the rules for addition.

Example 5

Subtract the integers below.

a. $3 - 5 = 3 + (-5) = -2$

b. $3 - (-5) = 3 + 5 = 8$

c. $(-3) - 5 = (-3) + (-5) = -8$

d. $(-3) - (-5) = (-3) + 5 = 2$

Evaluate each absolute value.

1. $|7|$ 2. $|-3|$ 3. $|0|$ 4. $|-75|$
5. $|-16|$ 6. $|15|$ 7. $|-7|$ 8. $|1|$

Multiply the integers.

9. $7 \cdot 12$ 10. $(-9) \cdot 3$ 11. $3 \cdot (-16)$ 12. $(-10) \cdot (-5)$
13. $(-5) \cdot 4$ 14. $(-6) \cdot (-11)$ 15. $11 \cdot 8$ 16. $3 \cdot (-8)$
17. $6 \cdot (-7)$ 18. $(-12) \cdot 9$ 19. $(-2) \cdot (-13)$ 20. $6 \cdot 9$

Divide the integers.

21. $(-20) \div (-4)$ 22. $12 \div 3$ 23. $36 \div (-9)$ 24. $(-9) \div 3$
25. $(-80) \div 20$ 26. $(-15) \div (-3)$ 27. $64 \div 4$ 28. $13 \div (-1)$
29. $42 \div (-7)$ 30. $108 \div 12$ 31. $(-72) \div 8$ 32. $(-121) \div (-11)$

Add the integers.

33. $(-3) + 5$ 34. $13 + (-6)$ 35. $(-15) + (-8)$ 36. $5 + 7$
37. $(-2) + (-5)$ 38. $9 + 12$ 39. $(-11) + 4$ 40. $4 + (-8)$
41. $1 + (-7)$ 42. $(-16) + (-3)$ 43. $18 + 6$ 44. $(-3) + 6$

Subtract the integers.

45. $(-3) - 5$ 46. $13 - (-6)$ 47. $(-15) - (-8)$ 48. $5 - 7$
49. $(-2) - (-5)$ 50. $9 - 12$ 51. $(-11) - 4$ 52. $4 - (-8)$
53. $1 - (-7)$ 54. $(-16) - (-3)$ 55. $18 - 6$ 56. $(-3) - 6$

Evaluate.

57. $(11 - 19)(3 - 8)$ 58. $(3 - 7)(8 - 5)$ 59. $5(-3) - 11$
60. $31 - (-1)(-2)$ 61. $(12 - 15)(-3)$ 62. $(4)(17 - 19)$
63. $14 - 7 - 22$ 64. $8 - 9 - 11$ 65. $6 - (-12 + 5)$
66. $8 - (11 - 17)$ 67. $18 + (12 \div 3)$ 68. $7 - (80 \div 16)$
69. $(-4)(5) \div (-2)$ 70. $(-15)(2) \div (6)$ 71. $(20 - 4) \div (17 - 21)$
72. $|15 + (-12)|$ 73. $|(-7) \cdot 4|$ 74. $|7 - 31|$
75. $|(-10) - 12|$ 76. $|(-9) + (-7)|$ 77. $|(-24) \div (-4)|$

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|----------------|----------------|-----------------|----------------|----------------|
| 1. 7 | 2. 3 | 3. 0 | 4. 75 | 5. 16 |
| 6. 15 | 7. 7 | 8. 1 | 9. 84 | 10. -27 |
| 11. -48 | 12. 50 | 13. -20 | 14. 66 | 15. 88 |
| 16. -24 | 17. -42 | 18. -108 | 19. 26 | 20. 54 |
| 21. 5 | 22. 4 | 23. -4 | 24. -3 | 25. -4 |
| 26. 5 | 27. 16 | 28. -13 | 29. -6 | 30. 9 |
| 31. -9 | 32. 11 | 33. 2 | 34. 7 | 35. -23 |
| 36. 12 | 37. -7 | 38. 21 | 39. -7 | 40. -4 |
| 41. -6 | 42. -19 | 43. 24 | 44. 3 | 45. -8 |
| 46. 19 | 47. -7 | 48. -2 | 49. 3 | 50. -3 |
| 51. -15 | 52. 12 | 53. 8 | 54. -13 | 55. 12 |
| 56. -9 | 57. 40 | 58. -12 | 59. -26 | 60. 29 |
| 61. 9 | 62. -8 | 63. -15 | 64. -12 | 65. 13 |
| 66. 14 | 67. 22 | 68. 2 | 69. 10 | 70. -5 |
| 71. -4 | 72. 3 | 73. 28 | 74. 24 | 75. 22 |
| 76. 16 | 77. 6 | | | |