

Learning to Work with Integers ... Set 2

To subtract two integers: add the opposite of the one to be subtracted:

example: 3 subtract -4 , or $(3) - (-4)$: The opposite of -4 is 4 , so we add 4 (rather than subtract -4).

We change the problem from $(3) - (-4)$ to $(3) + (4)$, which we know how to do:

$$(3) + (4) = 3 + 4 = 7$$

example: $(-4) - (3)$: Add the opposite of 3 , namely -3 : $(-4) - (3) = (-4) + (-3) = -7$

example: $(4) - (3) = (4) + (-3) = 1$

example: $-5 - 8 = (-5) - (8) = (-5) + (-8) = -13$

Problems 34-43: Calculate:

34. $(12) - (3) =$

35. $-12 - 3 =$ (Hint: this means $-12 + (-3)$)

36. $-12 - (-3) =$

37. $3 - 12 =$

38. $-3 - 12 =$

39. $(-7) - (-7) =$

40. $0 - 3 =$

41. $0 + 4 =$

42. $-12 + 3 =$

43. $(-3) + (-12) =$

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Answers

34. 9

35. -15

36. -9

37. -9

38. -15

39. 0

40. -3

41. 4

42. -9

43. -15

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<u>To multiply two integers:</u>		
1st integer ×	2nd integer =	Answer
+	+	+
-	+	-
+	-	-
-	-	+

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Both positive: multiply as two natural numbers.

example: $(3) \times (4) = 3 \times 4 = 12$

Both negative: multiply as if positive; and make the answer positive. and remember, two negatives make a positive. When multiplying two negative numbers, you always get a positive answer.

example: $(-3)(-4)$ so $3 \times 4 = 12$; make it positive, and the answer is 12.

One positive, one negative: When multiplying a negative number and a positive number, the answer is always negative.

example: $(3)(-4)$ so $3 \times 4 = 12$; make the answer negative; answer -12 .

Problems 44-55: Multiply:

44. $3 \times (-4) =$

45. $(3) \cdot (-4) =$

46. $(3)(-4) =$

47. $3(-4) =$

48. $(-3)(-4) =$

49. $-3(-4) =$

50. $(-4) \cdot 0 =$

51. $0^2 =$

52. $(-3)^2 =$

53. $(4)^2 =$

54. $(-3) \cdot 4 =$

55. $3 \cdot 4 =$

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Answers

44. -12

45. -12

46. -12

47. -12

48. 12

49. 12

50. 0

51. 0

52. 9

53. 16

54. -12

55. 12

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Reciprocals are used for dividing. Every integer except zero has a reciprocal. The reciprocal is the number that multiplies the integer to give 1.

example: $6 \cdot \frac{1}{6} = 1$, so the reciprocal of 6 is $\frac{1}{6}$.

(And the reciprocal of $\frac{1}{6}$ is 6.)

example: $(-4)\left(-\frac{1}{4}\right) = 1$, so the reciprocal of -4 is $-\frac{1}{4}$.

Problems 56-59: Find the reciprocal:

56. -5 | 57. 1 | 58. 10 | 59. -1

60. What number is its own reciprocal? (Can you find “more than one”?)

61. Using the reciprocal definition, explain why there is no reciprocal of zero.

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Answers

56. $-\frac{1}{5}$

57. 1

58. $\frac{1}{10}$

59. -1

60. 1; also -1

61. no number times $0 = 1$

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To divide two integers: multiply by the reciprocal of the one to be divided by:

example: 20 divided by $-5 = 20 \div (-5)$.

The reciprocal of -5 is $-\frac{1}{5}$ so we multiply by

$$-\frac{1}{5}: 20 \div (-5) = 20 \times \left(-\frac{1}{5}\right) =$$

$$\frac{20}{1} \times \left(-\frac{1}{5}\right) = -\frac{20 \cdot 1}{1 \cdot 5} = -\frac{20}{5} = -4$$

example: $\frac{-5}{20} = -5 \div 20 = -5 \cdot \frac{1}{20} = -\frac{1}{4}$

example: $\frac{-3}{-6} = -3 \div (-6) = -3 \cdot \left(-\frac{1}{6}\right) = \frac{3}{6} = \frac{1}{2}$

(Note negative times negative is positive.)

example: $\frac{0}{3} = 0 \div 3 = 0 \cdot \frac{1}{3} = 0$

Problems 62-67: Calculate:

$$62. (-14) \div (-2) = \quad \left| \quad 65. \frac{-15}{3} =$$

$$63. 2 \div 3 = \quad \left| \quad 66. \frac{-5}{0} = (\text{careful})^*$$

$$64. 3 \div 2 = \quad \left| \quad 67. \frac{0}{7} =$$

* Problem 61 says $\frac{1}{0}$ has no value (you cannot divide by zero).

68. From the rule for division, why is it impossible to divide by zero?

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Answers

62. 7

63. $\frac{2}{3}$

64. $\frac{3}{2}$

65. -5

66. no value (not defined)

67. 0

68. zero has no reciprocal

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To “sum” it all up:

Positive+positive = larger positive

Negative+negative = more negative

Positive+negative = in between both

Positive \times positive = positive

Negative \times negative = positive

Positive \times negative = negative

To subtract add the opposite.

To divide, multiply by the reciprocal.

69. Given the statement “Two negatives make a positive.” Provide an example of a situation where the statement would be true and another when it would be false.

70. Write “18 divided by 30” in three ways: using \div , $\overline{)$, and using a fraction bar $\frac{\quad}{\quad}$.

Problems 71- 80: Calculate:

$$71. 4 - 10 + 3 - 2 = \quad | \quad 76. -2[(-6)(8) + 9] =$$

$$72. 4 - (10 + 3 - 2) = \quad | \quad 77. 5 + (3 - 7) =$$

$$73. 4 + 3 - (10 - 2) = \quad | \quad 78. 5 - (3 - 7) =$$

$$74. 6(8 - 3) = \quad | \quad 79. 5 - 3 + 7 =$$

$$75. (-6)(8) + 9 = \quad | \quad 80. -1 + 2 - 3 + 4 =$$

81. What is the meaning of “sum”, “product”, “quotient”, and “difference”?

Answers

69. true if \times , false if $+$.

70. $18 \div 30$, $30 \overline{)18}$, $18/30$

71. -5

72. -7

73. -1

74. 30

75. -39

76. 78

77. 1

78. 9

79. 9

80. 2

81. $+$, \times , \div , $-$