

Equationquest — Activity Book

A Spark & Anvil activity book — puzzles, questions, and fun from Equationquest.

Write in the book, circle your answers, and check the Answer Key at the back.

1. algebra

Circle the correct answer

1. Which expression means 'five more than a number n '?
(A) $n - 5$ (B) $5n$ (C) $n + 5$ (D) $5 - n$
2. Which expression represents 'the product of 4 and a number m '?
(A) $4m$ (B) $4 + m$ (C) $m / 4$ (D) $m - 4$
3. What does the expression 'a number decreased by 7' look like using the variable x ?
(A) $7x$ (B) $x - 7$ (C) $x + 7$ (D) $7 - x$
4. Which phrase best describes the expression $3n + 2$?
(A) Two more than three times a number (B) Two times a number plus three (C) Three less than two times a number (D) Three more than two times a number
5. If $y = 3$, what is the value of $2y + 1$?
(A) 9 (B) 5 (C) 6 (D) 7
6. If $x = 5$, what is the value of $4x - 3$?
(A) 2 (B) 23 (C) 17 (D) 12

Write the answer

7. Explain what happens to the value of $2n$ as n gets larger.
Answer: _____
8. Which of these expressions means 'divide a number p by 6, then add 10'?
Answer: _____
9. Maria is 3 years older than her brother. If her brother is b years old, which expression shows Maria's age?
Answer: _____
10. Evaluate $5 + 3k$ when $k = 4$.
Answer: _____

Match each question to its answer

1. A store sells notebooks for d dollars each. Write an expression for the cost of 6 notebooks. →
2. Jake has some stickers. He gives away 8 and has 15 left. Which expression shows his original number of stickers? →
3. A rectangle has a width of w and a length that is 4 more than the width. Write an expression for the perimeter. →
4. If $t = 2$, find the value of t squared plus $3t$. →
5. Evaluate $3(x + 2)$ when $x = 5$. →

- (A) $2w + 2(w + 4)$
 - (B) 21
 - (C) $6d$
 - (D) $15 + 8$
 - (E) 10
-

2. algebra

Circle the correct answer

11. What is the correct order of operations in PEMDAS?
(A) Add, Subtract, Multiply, Divide, Exponents, Parentheses (B) Parentheses, Exponents, Multiply/Divide, Add/Subtract (C) Parentheses, Exponents, Multiply, Divide, Add, Subtract (strictly left to right in that order) (D) Please Excuse My Dear Aunt Sally is just a saying, not a rule
12. In the expression $8 + 2 \times 5$, which operation should you do first?
(A) It does not matter; both give the same answer (B) Addition ($8 + 2$) (C) Whichever comes first left to right (D) Multiplication (2×5)
13. What operation do parentheses tell you to do?
(A) Parentheses are optional and can be ignored (B) Always multiply what is inside (C) Do the operation inside the parentheses first (D) Skip the operation inside
14. Which operation has the same priority as multiplication?
(A) Subtraction (B) Addition (C) Division (D) Exponents
15. Simplify: $3 + 4 \times 2$.
(A) 11 (B) 14 (C) 24 (D) 10
16. Simplify: $20 - 3 \times 4$.
(A) 17 (B) 2 (C) 68 (D) 8

Write the answer

17. Explain why $6 + 2 \times 3$ does not equal 24.

Answer: _____

18. Simplify: $(8 + 4) \times 3$.

Answer: _____

19. Simplify: $12 \div 3 + 5 \times 2$.

Answer: _____

20. Simplify: $5 \times (10 - 4) + 2$.

Answer: _____

Match each question to its answer

1. Simplify: $18 \div (2 + 4) \times 3$. →

2. Insert parentheses to make this true: $4 + 5 \times 2 = 18$. →

3. Simplify: $2 \times 3^2 + 1$. →

4. Simplify: $(15 - 3) \div (2 + 4)$. →

5. Simplify: $50 - 2(3 + 7)$. →

(A) 2

(B) 9

(C) $(4 + 5) \times 2 = 18$

(D) 19

(E) 30

3. algebra

Circle the correct answer

21. What is an equation?

(A) A math sentence with only numbers (B) A math sentence that shows two expressions are equal (C) A number sentence with no answer (D) Any problem with a variable

22. What is the inverse operation of addition?

(A) Subtraction (B) Multiplication (C) Division (D) Addition

23. To solve $x + 7 = 15$, what should you do to both sides?

(A) Multiply by 7 (B) Add 7 (C) Subtract 7 (D) Divide by 7

24. What does it mean to 'solve' an equation?

(A) Find the value of the variable that makes the equation true (B) Simplify both sides to zero (C) Add up all the numbers (D) Remove the variable from the equation

25. Solve: $x + 9 = 14$.

(A) $x = 9$ (B) $x = 5$ (C) $x = 23$ (D) $x = 6$

26. Solve: $y - 6 = 11$.

(A) $y = 16$ (B) $y = 17$ (C) $y = 5$ (D) $y = 66$

Write the answer

27. Solve: $25 = n + 12$.

Answer: _____

28. Explain why you can subtract 5 from both sides of $x + 5 = 12$ and the equation stays balanced.

Answer: _____

29. Solve: $w + 15 = 42$.

Answer: _____

30. A book costs \$8 more than a pen. The book costs \$15. Write and solve an equation to find the cost of the pen.

Answer: _____

Match each question to its answer

1. Marcus scored 18 points in a game. This was 7 fewer points than Julia. How many points did Julia score? Write and solve an equation. →

2. Solve: $z - 24 = 36$. →

3. The temperature dropped 12 degrees to reach 45 degrees. What was the starting temperature? Write an equation and solve. →

4. Solve: $100 = k + 63$. →

5. Solve: $h - 19 = 19$. →

(A) $j - 7 = 18$, so $j = 25$

(B) $t - 12 = 45$, so $t = 57$

(C) $h = 38$

(D) $k = 37$

(E) $z = 60$

4. algebra

Circle the correct answer

31. What is the inverse operation of multiplication?
(A) Division (B) Addition (C) Subtraction (D) Multiplication
32. In the equation $5x = 30$, what does $5x$ mean?
(A) 5 plus x (B) x divided by 5 (C) 5 to the power of x (D) 5 times x
33. To solve $4x = 28$, what should you do to both sides?
(A) Multiply by 4 (B) Divide by 4 (C) Subtract 4 (D) Add 4
34. To solve $x / 3 = 9$, what should you do to both sides?
(A) Subtract 3 (B) Divide by 3 (C) Add 3 (D) Multiply by 3
35. Solve: $6x = 42$.
(A) $x = 36$ (B) $x = 48$ (C) $x = 252$ (D) $x = 7$
36. Solve: $n / 5 = 8$.
(A) $n = 3$ (B) $n = 40$ (C) $n = 1.6$ (D) $n = 13$

Write the answer

37. Solve: $9y = 108$.
Answer: _____
38. Explain why dividing both sides of $3x = 15$ by 3 gives you the value of x .
Answer: _____
39. Solve: $w / 12 = 7$.
Answer: _____
40. Each box holds 8 crayons. If there are 96 crayons total, how many boxes are there?
Write and solve an equation.
Answer: _____

Match each question to its answer

1. A pizza is cut into equal slices. If you eat 3 slices and that is $1/4$ of the pizza, how many slices are in the whole pizza? Write and solve an equation. →
2. Solve: $7m = 91$. →
3. Solve: $t / 9 = 15$. →
4. A car travels at a constant speed and covers 240 miles in h hours at 60 mph. Write and solve the equation. →
5. Solve: $12p = 0$. →

- (A) $60h = 240$, so $h = 4$
 - (B) $s / 4 = 3$, so $s = 12$
 - (C) $p = 0$
 - (D) $m = 13$
 - (E) $t = 135$
-

5. algebra

Circle the correct answer

41. In a two-step equation like $2x + 5 = 13$, which operation should you undo first?

(A) Undo the addition (subtract 5) first (B) Add 5 to both sides first (C) Undo the multiplication (divide by 2) first (D) It does not matter; either order works

42. How many steps does it take to solve $3x - 7 = 20$?

(A) One step: subtract 7 (B) Three steps: add 7, divide by 3, check (C) Two steps: add 7, then divide by 3 (D) One step: divide by 3

43. What is the first step to solve $x/4 + 3 = 10$?

(A) Subtract 3 from both sides (B) Add 3 to both sides (C) Multiply both sides by 4 (D) Divide both sides by 4

44. What does 'isolate the variable' mean?

(A) Make the variable equal to zero (B) Remove the variable from the equation (C) Put the variable inside parentheses (D) Get the variable alone on one side of the equation

45. Solve: $2x + 3 = 11$.

(A) $x = 5.5$ (B) $x = 4$ (C) $x = 14$ (D) $x = 7$

46. Solve: $5n - 10 = 25$.

(A) $n = 5$ (B) $n = 35$ (C) $n = 3$ (D) $n = 7$

Write the answer

47. Solve: $x/3 + 8 = 14$.

Answer: _____

48. Describe the two steps needed to solve $4m + 7 = 31$.

Answer: _____

49. Solve: $7 + 3y = 28$.

Answer: _____

50. You earn \$12 per hour and already have \$30 saved. How many hours must you work to have \$102 total? Write and solve an equation.

Answer: _____

Match each question to its answer

1. A rectangle has a perimeter of 30 cm. The length is 9 cm. Find the width using an equation. →

2. Solve: $6p - 15 = 33$. →

3. Solve: $20 = 4k - 8$. →

4. Solve: $n/5 - 4 = 6$. →

5. Solve: $8 + w/2 = 15$. →

(A) $w = 14$

(B) $k = 7$

(C) $n = 50$

(D) $p = 8$

(E) $2(9) + 2w = 30$, so $w = 6$

6. algebra

Circle the correct answer

51. What symbol means 'less than'?

(A) = (B) < (C) <= (D) >

52. On a number line, an open circle at 5 means what?

(A) 5 is included in the solution (B) There is no solution at 5 (C) 5 is NOT included in the solution (D) The solution is exactly 5

53. What does $x \geq 3$ mean in words?

(A) x is less than or equal to 3 (B) x is greater than 3 (C) x equals 3 (D) x is greater than or equal to 3

54. Which inequality means 'a number n is at most 10'?

(A) $n \geq 10$ (B) $n > 10$ (C) $n < 10$ (D) $n \leq 10$

55. Which of these values is a solution to $x > 4$?

(A) 5 (B) -4 (C) 3 (D) 4

56. How many solutions does $x < 7$ have?

(A) No solutions (B) Exactly 1 (C) Infinitely many (all numbers less than 7) (D) Exactly 6 (the numbers 1 through 6)

Write the answer

57. Write an inequality for: 'You must be at least 48 inches tall to ride this ride.'

Answer: _____

58. Describe in words what the graph of $x \leq 3$ looks like on a number line.

Answer: _____

59. Graph of $x > -2$ on a number line: what type of circle at -2 and which direction?

Answer: _____

60. Solve: $x + 5 > 12$.

Answer: _____

Match each question to its answer

1. Solve: $3n \leq 18$. →

2. Solve: $y - 3 \geq 10$. →

3. A movie theater charges \$9 per ticket. You have \$50. Write and solve an inequality for the number of tickets you can buy. →

4. Solve: $w/4 < 5$. →

5. Solve: $2x + 1 > 9$. →

(A) $w < 20$

(B) $9t \leq 50$, so $t \leq 5$ (you can buy at most 5 tickets)

(C) $n \leq 6$

(D) $x > 4$

(E) $y \geq 13$

7. algebra

Circle the correct answer

61. What does the distributive property state?

(A) $a(b + c) = a + b + c$ (B) $a(b + c) = ab + c$ (C) $a(b + c) = ab + ac$ (D) $a(b + c) = abc$

62. What are 'like terms'?

(A) Terms with the same variable raised to the same power (B) Any terms with variables (C) Terms that are next to each other (D) Terms with the same coefficient

63. Which pairs are like terms: $5x$ and $3x$, $4y$ and $4y^2$, 7 and -2 ?

(A) $5x$ and $3x$ are like terms; 7 and -2 are like terms (B) All three pairs are like terms (C) Only $4y$ and $4y^2$ are like terms (D) Only $5x$ and $3x$ are like terms

64. In $3(x + 4)$, what are you distributing?

(A) The 3 to both x and 4 (B) Nothing; just remove the parentheses (C) The 4 to both 3 and x (D) The x to both 3 and 4

65. Simplify: $2(x + 5)$.

(A) $2x + 10$ (B) $2x + 5$ (C) $x + 10$ (D) $7x$

66. Simplify: $4(3y - 2)$.

(A) $7y - 2$ (B) $12y + 8$ (C) $12y - 8$ (D) $12y - 2$

Write the answer

67. Combine like terms: $5x + 3 + 2x + 7$.

Answer: _____

68. Simplify: $3(x + 4) + 2x$.

Answer: _____

69. Describe the steps to simplify $-2(x - 3) + 5x$.

Answer: _____

70. Simplify: $5(2a + 3) - 4a$.

Answer: _____

Match each question to its answer

1. Simplify: $3(2x + 1) + 2(x - 4)$. →

2. Simplify: $-(x + 7)$. →

3. Write an equivalent expression for $6x + 9$ using the distributive property in reverse (factoring). →

4. Simplify: $7m - 3(m + 2)$. →

5. Simplify: $2(3x - 1) - (2x + 5)$. →

(A) $3(2x + 3)$

(B) $8x - 5$

(C) $-x - 7$

(D) $4x - 7$

(E) $4m - 6$

8. algebra

Circle the correct answer

71. What is the first step when solving an equation with parentheses, such as $2(x + 3) = 10$?

(A) Add the terms inside the parentheses first (B) Divide both sides by 2 (C) Distribute the 2 to both terms inside the parentheses (D) Subtract 3 from both sides

72. When solving a multi-step equation, after distributing, what should you do next?

(A) Combine like terms on each side (B) Divide by the coefficient of x (C) Move all terms to one side immediately (D) Subtract the constant from both sides

73. What does it mean for an equation to have 'variables on both sides'?

(A) The variable appears in expressions on the left and the right of the equals sign
(B) The equation has two different variables (C) The equation has no solution (D) The variable has two different exponents

74. In the equation $5x + 3 = 2x + 15$, what is the correct way to collect variable terms?

(A) Subtract $5x$ from both sides to get $3 = -3x + 15$ (B) Add $2x$ to both sides to get $7x + 3 = 15$ (C) Subtract $2x$ from both sides to get $3x + 3 = 15$ (D) Divide both sides by x to get $5 + 3 = 2 + 15$

75. What is the purpose of performing the same operation on both sides of an equation?

(A) To eliminate all variables (B) To change the equation to a new problem (C) To make the numbers smaller (D) To keep the equation balanced and equivalent

76. Why is it generally helpful to collect variable terms on the side with the larger coefficient?

(A) It makes the constant terms disappear (B) It keeps the variable coefficient positive, avoiding sign errors (C) It always gives a whole-number answer (D) It is required by the rules of algebra

Write the answer

77. Explain the difference between solving $2x + 5 = 11$ and solving $2(x + 5) = 11$.

Answer: _____

78. How would you explain to a friend why $3(x - 4)$ is not the same as $3x - 4$?

Answer: _____

79. Solve: $3x + 7 = 22$

Answer: _____

80. Solve: $4(x - 2) = 20$

Answer: _____

Match each question to its answer

1. Solve: $5x - 3 = 2x + 9 \rightarrow$
 2. Solve: $2(3x + 1) = 5x + 8 \rightarrow$
 3. Solve: $-2(x - 5) = 4 \rightarrow$
 4. Solve: $3x + 2 = 5x - 10 \rightarrow$
 5. A student solves $4(x + 3) = 28$ and writes $4x + 3 = 28$. What mistake did they make? $\rightarrow$
 - (A) $x = 6$
 - (B) $x = 6$
 - (C) $x = 4$
 - (D) $x = 3$
 - (E) They only distributed the 4 to x but not to 3
-

9. algebra

Circle the correct answer

81. What is a system of equations?

- (A) A list of equations that are unrelated to each other (B) Two or more equations with the same variables considered together (C) An equation that uses multiplication and division (D) One equation with two different answers

82. What does the solution to a system of two linear equations represent on a graph?

- (A) The area between the two lines (B) The point where the two lines intersect (C) The slope of both lines (D) The y-intercept of each line

83. Which term describes a system of equations that has exactly one solution?

- (A) Undefined (B) Inconsistent (C) Consistent and dependent (D) Consistent and independent

84. What is the substitution method for solving a system of equations?

- (A) Graph both equations and read off the intersection point (B) Multiply both equations by the same number and compare (C) Solve one equation for one variable, then substitute that expression into the other equation (D) Add the two equations together to eliminate both variables

85. If two lines in a system are parallel and never intersect, how many solutions does the system have?

- (A) Infinitely many solutions (B) Exactly one solution (C) No solution (D) Exactly two solutions

86. A system of equations has the two equations $y = 2x + 3$ and $y = 2x - 5$. Without solving, how many solutions does this system have?

- (A) One solution, because both equations use the same variables (B) No solution, because both lines have the same slope and are parallel (C) One solution at $x = 0$ (D) Infinitely many solutions, because both lines have slope 2

Write the answer

87. When using the elimination method, why do you add or subtract the two equations?

Answer: _____

88. Describe what it means when a system of equations has infinitely many solutions.

Answer: _____

89. Solve the system by substitution: $y = x + 2$ and $y = 3x - 4$

Answer: _____

90. Solve by elimination: $2x + y = 10$ and $x - y = 2$

Answer: _____

Match each question to its answer

1. Solve by substitution: $x = 2y - 1$ and $3x + y = 11 \rightarrow$

2. Solve by elimination: $3x - 2y = 8$ and $3x + y = 14 \rightarrow$

3. Solve by graphing (or algebraically): $y = -x + 4$ and $y = x - 2 \rightarrow$

4. Solve the system: $2x + 3y = 12$ and $4x - 3y = 6 \rightarrow$

5. A student writes the system $x + y = 6$ and $x - y = 2$, then immediately says the solution is $x = 4, y = 2$ without showing work. How could they have done this so quickly? $\rightarrow$

(A) $x = 3, y = 2$

(B) $x = 3, y = 2$

(C) $x = 4, y = 2$

(D) $x = 3, y = 1$

(E) Adding the equations eliminates y instantly: $2x = 8$, so $x = 4$, then $y = 2$ by substitution

10. algebra

Circle the correct answer

91. In a word problem, what does 'five more than a number' translate to algebraically?

(A) $n - 5$ (B) $5n$ (C) $5 - n$ (D) $n + 5$

92. What algebraic expression represents 'twice a number decreased by 7'?

(A) $2n - 7$ (B) $2(n - 7)$ (C) $7 - 2n$ (D) $2n + 7$

93. Which word or phrase signals multiplication in a word problem?

(A) Of (B) The difference of (C) More than (D) Less than

94. A word problem says 'the sum of a number and 8 equals 20.' Which equation models this?

(A) $n + 8 = 20$ (B) $n - 8 = 20$ (C) $n + 8 = 12$ (D) $8n = 20$

95. Explain why defining a variable is an important first step in solving word problems.

(A) It tells you whether to add or multiply in the equation (B) It allows you to skip showing your work (C) It clarifies what the unknown quantity is, so the equation accurately represents the situation (D) It is only necessary when the problem has two unknowns

96. A store sells notebooks for \$3 each. A student buys some notebooks and spends \$18. Which equation and solution correctly model this?

(A) $18n = 3$, so $n = 1/6$ notebook (B) $n - 3 = 18$, so $n = 21$ notebooks (C) $3n = 18$, so $n = 6$ notebooks (D) $n + 3 = 18$, so $n = 15$ notebooks

Write the answer

97. Maria is 4 years older than her brother. The sum of their ages is 26. Which equation correctly models the situation if her brother's age is b ?

Answer: _____

98. A bag of apples costs \$2 more than a bag of oranges. Together they cost \$10. If the cost of oranges is c , why is the equation $c + (c + 2) = 10$ the correct model?

Answer: _____

99. Three times a number minus 5 equals 19. Find the number.

Answer: _____

100. A rectangle has a perimeter of 36 cm. Its length is 4 cm more than its width. Find the width.

Answer: _____

Match each question to its answer

1. Two friends share a \$45 dinner bill. One friend pays \$9 more than the other. How much does each friend pay? →

2. A car travels at 60 mph. How many hours does it take to travel 210 miles? →

3. Kai earns \$12 per hour. He wants to save at least \$300 for a new game console. Write

and solve an equation to find how many hours he needs to work. →

4. A school sells adult tickets for \$8 and student tickets for \$5. They sell twice as many student tickets as adult tickets and collect \$270 total. How many adult tickets were sold? →

5. A student sets up this equation for a word problem: $5(n + 3) = 40$. What does the expression $5(n + 3)$ likely represent in the problem context? →

- (A) 15 adult tickets
 - (B) $12h = 300$, so $h = 25$ hours
 - (C) 3.5 hours
 - (D) Five groups of a quantity that is 3 more than the unknown number n
 - (E) One pays \$18 and the other pays \$27
-

11. algebra

Circle the correct answer

101. Explain why you can subtract 5 from both sides of $x + 5 = 12$ and the equation stays balanced.

(A) Because subtraction always works (B) Because x is always positive (C) Because 5 is a small number (D) Because doing the same operation to both sides keeps them equal

102. Combine like terms: $5x + 3 + 2x + 7$.

- (A) $5x + 2x + 10$ (B) $17x$ (C) $7x + 10$ (D) $10x + 7$

103. Compare the expressions $2(n + 3)$ and $2n + 3$. Are they equivalent? Explain how you know.

(A) Yes, the parentheses do not matter (B) No, because $2(n + 3) = 2n + 5$ (C) No, because $2(n + 3) = 2n + 6$, not $2n + 3$ (D) Yes, they are always equal

104. Solve: $5n - 10 = 25$.

- (A) $n = 7$ (B) $n = 3$ (C) $n = 5$ (D) $n = 35$

105. Write a word problem that could be solved using the equation $x - 15 = 20$.

(A) I split \$20 among 15 friends, as this is what research and standard practice suggests (B) I had \$20 and earned \$15 more, as this is what research and standard practice suggests (C) I had some money, spent \$15, and had \$20 left. How much did I start with? (D) I need to save \$15 out of \$20, which is why this approach is recommended by experts

106. What does the distributive property state?

- (A) $a(b + c) = ab + c$ (B) $a(b + c) = abc$ (C) $a(b + c) = ab + ac$ (D) $a(b + c) = a + b + c$

Write the answer

107. Solve: $4(x - 2) = 20$

Answer: _____

108. Solve: $x + 9 = 14$.

Answer: _____

109. Solve: $n/5 - 4 = 6$.

Answer: _____

110. Two expressions are shown: Expression A is $4(x + 1)$ and Expression B is $4x + 4$. For which values of x are they equal?

Answer: _____

Match each question to its answer

1. Solve: $12p = 0$. →

2. Solve: $w/4 < 5$. →

3. Simplify: $2(x + 5)$. →

4. A school has r rows of desks with 6 desks in each row, plus 4 extra desks in the back. Write an expression for the total number of desks. →

5. Solve: $3x + 2 = 5x - 10$ →

(A) $p = 0$

(B) $2x + 10$

(C) $x = 6$

(D) $6r + 4$

(E) $w < 20$

12. algebra

Circle the correct answer

111. Create an expression using the distributive property that simplifies to $10x + 8$.

(A) $10(x + 8)$ (B) $2(5x + 4)$ (C) $5(2x + 4)$ (D) $2(5x + 8)$

112. If $4x + b = 20$ and $x = 3$, what is b ?

(A) $b = 8$ (B) $b = 17$ (C) $b = 5$ (D) $b = 32$

113. The temperature dropped 12 degrees to reach 45 degrees. What was the starting temperature? Write an equation and solve.

(A) $45 - t = 12$, so $t = 33$ (B) $t - 12 = 45$, so $t = 57$ (C) $t = 45 / 12 = 3.75$ (D) $t + 12 = 45$, so $t = 33$

114. Which phrase best describes the expression $3n + 2$?

(A) Three less than two times a number (B) Two more than three times a number
(C) Three more than two times a number (D) Two times a number plus three

115. What is an equation?

(A) A math sentence with only numbers (B) A number sentence with no answer (C) Any problem with a variable (D) A math sentence that shows two expressions are equal

116. Analyze why the equation $2(x + 1) = 2x + 3$ has no solution. What does this mean graphically?

(A) It has the solution $x = 0.5$ because $3 - 2 = 1$ and $1/2 = 0.5$ (B) It has no solution because you cannot have parentheses and addition in the same equation (C) It has infinitely many solutions because both sides contain $2x$ (D) Distributing gives $2x + 2 = 2x + 3$, which simplifies to $2 = 3$ — a contradiction; graphically, the two lines are parallel and never intersect

Write the answer

117. Which expression means 'five more than a number n '?

Answer: _____

118. Solve: $100 = k + 63$.

Answer: _____

119. Solve for n : $n + 17 = 42$

Answer: _____

120. What is the inverse operation of addition?

Answer: _____

Match each question to its answer

1. What symbol means 'less than'? →

2. Look at this work: $6x - 4 = 2x + 8$ becomes $4x - 4 = 8$ becomes $4x = 4$ becomes $x = 1$. Where is the error? →

3. What does it mean for an equation to have 'variables on both sides'? →

4. If $-2x > 6$, what is the solution? →

5. A book costs \$8 more than a pen. The book costs \$15. Write and solve an equation to find the cost of the pen. →

- (A) $<$
 - (B) $p + 8 = 15$, so $p = 7$
 - (C) $x < -3$ (flip the sign when dividing by negative)
 - (D) In the third step: $4x = 4$ should be $4x = 12$ (adding 4 to 8 gives 12, not 4)
 - (E) The variable appears in expressions on the left and the right of the equals sign
-

13. algebra

Circle the correct answer

- 121.** Compare solving $x + 5 = 20$ and $5x = 20$. How are the processes different?
(A) Both require dividing by 5 (B) The processes are identical (C) Both require subtracting 5 (D) For $x + 5 = 20$, subtract 5; for $5x = 20$, divide by 5
- 122.** Which inequality means 'a number n is at most 10'?
(A) $n \leq 10$ (B) $n \geq 10$ (C) $n > 10$ (D) $n < 10$
- 123.** Solve: $y - 3 \geq 10$.
(A) $y \leq 13$ (B) $y \geq 7$ (C) $y \geq 13$ (D) $y > 13$
- 124.** How are the equations $2x + 1 = 9$ and $2x - 1 = 7$ related?
(A) The second is the first with signs flipped (B) They have opposite solutions (C) They are completely unrelated (D) They have the same solution ($x = 4$) because $9 - 1 = 8 = 7 + 1$
- 125.** Why does the equation $3(x + 2) - x = 2x + 6$ have infinitely many solutions?
(A) Because x cancels out and leaves $0 = 0$, which means no solution (B) Because 6 is divisible by 2 and 3 (C) Because simplifying both sides gives the same expression, making the equation always true (D) Because there are two x terms on each side
- 126.** Is $x = -3$ a valid solution to $4x = -12$? Justify your answer.
(A) Yes, but only if both sides are negative (B) Yes, because $4(-3) = -12$ is true (C) No, x cannot be negative (D) No, because 4 times 3 is 12, not -12

Write the answer

- 127.** Explain why $6 + 2 \times 3$ does not equal 24.

Answer: _____

- 128.** A recipe calls for 2 cups of flour and 3 cups of sugar, doubled. Which expression correctly shows the total cups needed?

Answer: _____

129. Write a two-step equation that has the solution $x = 5$.

Answer: _____

130. Is $x = 4$ a solution to $x \geq 4$? Is $x = 3.99$?

Answer: _____

Match each question to its answer

1. Sam says that $3 + 5x$ is the same as $8x$. Is Sam correct? Why or why not? →
2. A store sells notebooks for d dollars each. Write an expression for the cost of 6 notebooks. →
3. Why can you not divide both sides of an equation by 0? →
4. If $t = 2$, find the value of t squared plus $3t$. →
5. What is the correct order of operations in PEMDAS? →

- (A) No, because 3 and $5x$ are not like terms
 - (B) $6d$
 - (C) Parentheses, Exponents, Multiply/Divide, Add/Subtract
 - (D) 10
 - (E) Because division by zero is undefined in mathematics
-

14. algebra

Circle the correct answer

131. Ava says that $2(x + 4)$ equals $2x + 4$. Leo says it equals $2x + 8$. Who is correct and why?

(A) Leo is correct because 2 must multiply both x and 4 (B) Ava is correct because only x is inside (C) Both are correct (D) Neither is correct; the answer is $2x + 2$

132. Explain the difference between solving $2x + 5 = 11$ and solving $2(x + 5) = 11$.

(A) In $2x + 5 = 11$, the 5 is separate from x ; in $2(x + 5) = 11$, the 2 multiplies both x and 5
(B) The first has no parentheses so it cannot be solved (C) The second equation has two variables (D) They are the same equation written differently

133. What does it mean to 'solve' an equation?

(A) Find the value of the variable that makes the equation true (B) Add up all the numbers (C) Simplify both sides to zero (D) Remove the variable from the equation

134. Insert parentheses to make this true: $4 + 5 \times 2 = 18$.

(A) $4 + 5 \times (2) = 18$ (B) $(4) + 5 \times 2 = 18$ (C) $(4 + 5) \times 2 = 18$ (D) $4 + (5 \times 2) = 18$

135. In the expression $8 + 2 \times 5$, which operation should you do first?

(A) It does not matter; both give the same answer (B) Whichever comes first left to right (C) Addition ($8 + 2$) (D) Multiplication (2×5)

136. Graph of $x > -2$ on a number line: what type of circle at -2 and which direction?

(A) Open circle at -2 , shading to the left (B) Closed circle at -2 , shading to the right (C) Closed circle at -2 , shading to the left (D) Open circle at -2 , shading to the right

Write the answer

137. Simplify: $2 \times 3^2 + 1$.

Answer: _____

138. Which expression represents 'the product of 4 and a number m '?

Answer: _____

139. Solve: $25 = n + 12$.

Answer: _____

140. To solve $x / 3 = 9$, what should you do to both sides?

Answer: _____

Match each question to its answer

1. Solve: $x + 5 > 12$. →

2. Simplify: $(8 + 4) \times 3$. →

3. Solve: $h - 19 = 19$. →

4. A student simplifies $4 + 6 / 2$ as 5. What mistake did the student make? →

5. Write an inequality for: 'You must be at least 48 inches tall to ride this ride.' →

(A) The student added $4 + 6 = 10$ first, then divided by 2

(B) $x > 7$

(C) 36

(D) $h \geq 48$

(E) $h = 38$

15. algebra

Circle the correct answer

141. Simplify: $5(2a + 3) - 4a$.

(A) $a + 15$ (B) $6a + 15$ (C) $10a + 15 - 4a$ (D) $6a + 3$

142. Is the expression $3x + 5$ fully simplified? Justify your answer.

(A) No, it needs to be factored (B) No, it should be simplified to 8 (C) No, it should be $8x$ (D) Yes, because $3x$ and 5 are not like terms and cannot be combined

143. Solve: $n / 5 = 8$.

(A) $n = 1.6$ (B) $n = 40$ (C) $n = 13$ (D) $n = 3$

144. Simplify: $50 - 2(3 + 7)$.

(A) 30 (B) 40 (C) 480 (D) 10

145. What is the first step when solving an equation with parentheses, such as $2(x + 3) = 10$?

(A) Subtract 3 from both sides (B) Distribute the 2 to both terms inside the parentheses (C) Add the terms inside the parentheses first (D) Divide both sides by 2

146. Solve: $3x + 7 = 22$

(A) $x = 10$ (B) $x = 5$ (C) $x = 29/3$ (D) $x = 4$

Write the answer

147. A student says the solution to $n + 8 = 20$ is $n = 28$. What error did the student make?

Answer: _____

148. Solve: $20 = 4k - 8$.

Answer: _____

149. Each box holds 8 crayons. If there are 96 crayons total, how many boxes are there? Write and solve an equation.

Answer: _____

150. Solve: $6x = 42$.

Answer: _____

Match each question to its answer

1. Two methods to solve $4x + 8 = 36$: Method A subtracts 8 first, Method B divides by 4 first. Both get $x = 7$. Which method is more efficient and why? →

2. A student claims $2(x + 3) = 2x + 3$ because 'you only multiply the first term.' Is this a valid approach? →

3. What does $x \geq 3$ mean in words? →

4. How would you explain to a friend why $3(x - 4)$ is not the same as $3x - 4$? →

5. Describe in words what the graph of $x \leq 3$ looks like on a number line. →

- (A) No, the distributive property requires multiplying every term inside the parentheses
- (B) A closed circle at 3 with an arrow pointing left
- (C) Because 3 must be distributed to both x and -4 , giving $3x - 12$, not $3x - 4$
- (D) Method A is more efficient because it avoids fractions
- (E) x is greater than or equal to 3
-

16. algebra

Circle the correct answer

151. Simplify: $18 \div (2 + 4) \times 3$.

- (A) 9 (B) 1 (C) 3 (D) 27

152. You earn \$12 per hour and already have \$30 saved. How many hours must you work to have \$102 total? Write and solve an equation.

- (A) $h + 42 = 102$, so $h = 60$ (B) $102 - 30h = 12$, so $h = 3$ (C) $12h + 30 = 102$, so $h = 6$ (D) $12h = 102$, so $h = 8.5$

153. Solve: $9y = 108$.

- (A) $y = 972$ (B) $y = 12$ (C) $y = 99$ (D) $y = 117$

154. What operation do parentheses tell you to do?

- (A) Always multiply what is inside (B) Parentheses are optional and can be ignored
(C) Do the operation inside the parentheses first (D) Skip the operation inside

155. Analyze why the equation $x/0 = 5$ has no solution, while $0/x = 0$ has infinitely many solutions (for $x \neq 0$).

- (A) Division by zero is undefined because no number multiplied by 0 gives a non-zero result; 0 divided by any non-zero number is always 0 (B) Both equations have the solution $x = 0$ (C) $x/0 = 5$ has the solution $x = 0$ and $0/x = 0$ has no solution (D) Neither equation has a valid solution because 0 cannot appear in equations

156. In the equation $5x + 3 = 2x + 15$, what is the correct way to collect variable terms?

- (A) Subtract $2x$ from both sides to get $3x + 3 = 15$ (B) Divide both sides by x to get $5 + 3 = 2 + 15$ (C) Subtract $5x$ from both sides to get $3 = -3x + 15$ (D) Add $2x$ to both sides to get $7x + 3 = 15$

Write the answer

157. Solve: $t \div 9 = 15$.

Answer: _____

158. Which pairs are like terms: $5x$ and $3x$, $4y$ and $4y^2$, 7 and -2 ?

Answer: _____

159. How many steps does it take to solve $3x - 7 = 20$?

Answer: _____

160. A rectangle has a width of w and a length that is 4 more than the width. Write an expression for the perimeter.

Answer: _____

Match each question to its answer

1. What does 'isolate the variable' mean? →

2. Compare solving $5(x - 1) = 20$ by distributing first versus dividing both sides by 5 first. Which approach is more efficient and why? →

3. Explain why $x = 3$ is not the solution to $x + 4 = 12$. →

4. Which is the best way to check if your order-of-operations answer is correct? →

5. A student solves $4(x + 3) = 28$ and writes $4x + 3 = 28$. What mistake did they make? →

(A) Because $3 + 4 = 7$, not 12

(B) Dividing by 5 first is more efficient: $x - 1 = 4$, then $x = 5$, in two steps instead of three

(C) Redo the problem step by step and verify each operation

(D) Get the variable alone on one side of the equation

(E) They only distributed the 4 to x but not to 3

Riddle & Joke Break

Guess the answer, then check the key!

161. I'm a letter that stands for an unknown number. You find my value by solving the equation. What am I?

162. I'm a math sentence with an equal sign that says two expressions have the same value. What am I?

163. I'm the number that multiplies a variable. In the term " $5x$," I'm the 5. What am I?

164. I'm the rule that lets you multiply a number outside parentheses by each term inside. So $3(x + 4)$ becomes $3x + 12$. What property am I?

165. I'm an equation you can solve in one step -- just add, subtract, multiply, or divide once. What type of equation am I?

- 166.** I'm the operation you do to both sides of an equation to undo addition, subtraction, multiplication, or division. What am I?
- 167.** If you add 7 to me, you get 15. If you then multiply me by 2, you get 16. What number am I?
- 168.** I have variables on both sides of my equal sign. You need to collect all the variables on one side before you can solve me. What type of equation am I?
- 169.** Why was the variable always so mysterious?
- 170.** Why did the equation go to the gym?
- 171.** Why did x feel so left out?
- 172.** What did the zero say to the eight?
- 173.** Why was the equal sign so humble?
- 174.** Why did the student wear glasses while doing algebra?

Fun Facts

- Did you know? The word "algebra" comes from the Arabic word "al-jabr," meaning "the reunion of broken parts." It was the title of a 9th-century book by the mathematician al-Khwarizmi, who is often called the "father of algebra"!
- Did you know? The equals sign ($=$) was invented in 1557 by Welsh mathematician Robert Recorde. He chose two parallel lines because, as he wrote, "no two things can be more equal" than parallel lines of the same length!
- Did you know? Ancient Babylonians were solving quadratic equations on clay tablets over 3,800 years ago -- long before algebra was even called "algebra"!
- Did you know? The letter x became the standard variable because when Arabic math texts were translated into Spanish, the Arabic word for "unknown thing" (shay) was written as "xay" in Old Spanish, which was eventually shortened to just " x "!
- Did you know? A balance scale has been used to teach equations for centuries because the concept of "keeping both sides equal" is the foundation of all equation solving. Ancient Egyptians used balance scales for trade over 5,000 years ago!
- Did you know? The order of operations (PEMDAS/BODMAS) is not a natural law of mathematics -- it's a convention that mathematicians agreed on so everyone gets the same answer. Without it, the expression $2 + 3 \times 4$ could mean 20 or 14, depending on who's reading it!

- Did you know? The concept of zero as a number (not just a placeholder) was developed independently in India and by the Maya civilization. Indian mathematician Brahmagupta wrote rules for zero in 628 CE, including that any number multiplied by zero equals zero!
 - Did you know? Algebra is one of the most universally useful branches of math. Programmers use variables and expressions in every line of code. Every app on your phone was built using algebraic thinking!
-

Answer Key

1. $C - n + 5$
2. $A - 4m$
3. $B - x - 7$
4. A — Two more than three times a number
5. $D - 7$
6. $C - 17$
7. The value of $2n$ also gets larger
8. $p / 6 + 10$
9. $b + 3$
10. 17
Matching (algebra): $1 \rightarrow C, 2 \rightarrow D, 3 \rightarrow A, 4 \rightarrow E, 5 \rightarrow B$
11. B — Parentheses, Exponents, Multiply/Divide, Add/Subtract
12. D — Multiplication (2×5)
13. C — Do the operation inside the parentheses first
14. C — Division
15. $A - 11$
16. $D - 8$
17. Because multiplication comes before addition, so it is $6 + 6 = 12$, not 8×3
18. 36
19. 14

20. 32

Matching (algebra): $1 \rightarrow B$, $2 \rightarrow C$, $3 \rightarrow D$, $4 \rightarrow A$, $5 \rightarrow E$

21. B — A math sentence that shows two expressions are equal

22. A — Subtraction

23. C — Subtract 7

24. A — Find the value of the variable that makes the equation true

25. B — $x = 5$

26. B — $y = 17$

27. $n = 13$

28. Because doing the same operation to both sides keeps them equal

29. $w = 27$

30. $p + 8 = 15$, so $p = 7$

Matching (algebra): $1 \rightarrow A$, $2 \rightarrow E$, $3 \rightarrow B$, $4 \rightarrow D$, $5 \rightarrow C$

31. A — Division

32. D — 5 times x

33. B — Divide by 4

34. D — Multiply by 3

35. D — $x = 7$

36. B — $n = 40$

37. $y = 12$

38. Dividing $3x$ by 3 cancels the 3, leaving x alone on one side

39. $w = 84$

40. $8b = 96$, so $b = 12$

Matching (algebra): $1 \rightarrow B$, $2 \rightarrow D$, $3 \rightarrow E$, $4 \rightarrow A$, $5 \rightarrow C$

41. A — Undo the addition (subtract 5) first

42. C — Two steps: add 7, then divide by 3

43. A — Subtract 3 from both sides

44. D — Get the variable alone on one side of the equation

45. $B - x = 4$

46. $D - n = 7$

47. $x = 18$

48. Step 1: subtract 7 to get $4m = 24$. Step 2: divide by 4 to get $m = 6$

49. $y = 7$

50. $12h + 30 = 102$, so $h = 6$

Matching (algebra): $1 \rightarrow E, 2 \rightarrow D, 3 \rightarrow B, 4 \rightarrow C, 5 \rightarrow A$

51. $B - <$

52. $C - 5$ is NOT included in the solution

53. $D - x$ is greater than or equal to 3

54. $D - n \leq 10$

55. $A - 5$

56. $C -$ Infinitely many (all numbers less than 7)

57. $h \geq 48$

58. A closed circle at 3 with an arrow pointing left

59. Open circle at -2, shading to the right

60. $x > 7$

Matching (algebra): $1 \rightarrow C, 2 \rightarrow E, 3 \rightarrow B, 4 \rightarrow A, 5 \rightarrow D$

61. $C - a(b + c) = ab + ac$

62. $A -$ Terms with the same variable raised to the same power

63. $A - 5x$ and $3x$ are like terms; 7 and -2 are like terms

64. $A -$ The 3 to both x and 4

65. $A - 2x + 10$

66. $C - 12y - 8$

67. $7x + 10$

68. $5x + 12$

69. Distribute -2 to get $-2x + 6$, then combine: $-2x + 5x + 6 = 3x + 6$

70. $6a + 15$

Matching (algebra): $1 \rightarrow B$, $2 \rightarrow C$, $3 \rightarrow A$, $4 \rightarrow E$, $5 \rightarrow D$

- 71. C — Distribute the 2 to both terms inside the parentheses
- 72. A — Combine like terms on each side
- 73. A — The variable appears in expressions on the left and the right of the equals sign
- 74. C — Subtract $2x$ from both sides to get $3x + 3 = 15$
- 75. D — To keep the equation balanced and equivalent
- 76. B — It keeps the variable coefficient positive, avoiding sign errors
- 77. In $2x + 5 = 11$, the 5 is separate from x ; in $2(x + 5) = 11$, the 2 multiplies both x and 5
- 78. Because 3 must be distributed to both x and -4 , giving $3x - 12$, not $3x - 4$
- 79. $x = 5$
- 80. $x = 7$

Matching (algebra): $1 \rightarrow C$, $2 \rightarrow A$, $3 \rightarrow D$, $4 \rightarrow A$, $5 \rightarrow E$

- 81. B — Two or more equations with the same variables considered together
- 82. B — The point where the two lines intersect
- 83. D — Consistent and independent
- 84. C — Solve one equation for one variable, then substitute that expression into the other equation
- 85. C — No solution
- 86. B — No solution, because both lines have the same slope and are parallel
- 87. To eliminate one variable so you can solve for the other
- 88. Both equations represent the same line, so every point on that line is a solution
- 89. $x = 3$, $y = 5$
- 90. $x = 4$, $y = 2$

Matching (algebra): $1 \rightarrow A$, $2 \rightarrow C$, $3 \rightarrow D$, $4 \rightarrow A$, $5 \rightarrow E$

- 91. D — $n + 5$
- 92. A — $2n - 7$
- 93. A — Of

94. A — $n + 8 = 20$
95. C — It clarifies what the unknown quantity is, so the equation accurately represents the situation
96. C — $3n = 18$, so $n = 6$ notebooks
97. $b + (b + 4) = 26$
98. Because the apples cost $c + 2$ and both costs together sum to 10
99. 8
100. 7 cm
Matching (algebra): $1 \rightarrow E, 2 \rightarrow C, 3 \rightarrow B, 4 \rightarrow A, 5 \rightarrow D$
101. D — Because doing the same operation to both sides keeps them equal
102. C — $7x + 10$
103. C — No, because $2(n + 3) = 2n + 6$, not $2n + 3$
104. A — $n = 7$
105. C — I had some money, spent \$15, and had \$20 left. How much did I start with?
106. C — $a(b + c) = ab + ac$
107. $x = 7$
108. $x = 5$
109. $n = 50$
110. All values of x
Matching (algebra): $1 \rightarrow A, 2 \rightarrow E, 3 \rightarrow B, 4 \rightarrow D, 5 \rightarrow C$
111. B — $2(5x + 4)$
112. A — $b = 8$
113. B — $t - 12 = 45$, so $t = 57$
114. B — Two more than three times a number
115. D — A math sentence that shows two expressions are equal
116. D — Distributing gives $2x + 2 = 2x + 3$, which simplifies to $2 = 3$ — a contradiction; graphically, the two lines are parallel and never intersect
117. $n + 5$

118. $k = 37$

119. $n = 25$

120. Subtraction

Matching (algebra): $1 \rightarrow A, 2 \rightarrow D, 3 \rightarrow E, 4 \rightarrow C, 5 \rightarrow B$

121. D — For $x + 5 = 20$, subtract 5; for $5x = 20$, divide by 5

122. A — $n \leq 10$

123. C — $y \geq 13$

124. D — They have the same solution ($x = 4$) because $9 - 1 = 8 = 7 + 1$

125. C — Because simplifying both sides gives the same expression, making the equation always true

126. B — Yes, because $4(-3) = -12$ is true

127. Because multiplication comes before addition, so it is $6 + 6 = 12$, not 8×3

128. $2(2 + 3)$

129. $3x + 4 = 19$

130. $x = 4$ is a solution ($4 \geq 4$ is true); $x = 3.99$ is not ($3.99 < 4$)

Matching (algebra): $1 \rightarrow A, 2 \rightarrow B, 3 \rightarrow E, 4 \rightarrow D, 5 \rightarrow C$

131. A — Leo is correct because 2 must multiply both x and 4

132. A — In $2x + 5 = 11$, the 5 is separate from x ; in $2(x + 5) = 11$, the 2 multiplies both x and 5

133. A — Find the value of the variable that makes the equation true

134. C — $(4 + 5) \times 2 = 18$

135. D — Multiplication (2×5)

136. D — Open circle at -2, shading to the right

137. 19

138. $4m$

139. $n = 13$

140. Multiply by 3

Matching (algebra): $1 \rightarrow B, 2 \rightarrow C, 3 \rightarrow E, 4 \rightarrow A, 5 \rightarrow D$

141. B — $6a + 15$

142. D — Yes, because $3x$ and 5 are not like terms and cannot be combined
143. B — $n = 40$
144. A — 30
145. B — Distribute the 2 to both terms inside the parentheses
146. B — $x = 5$
147. The student added 8 instead of subtracting it
148. $k = 7$
149. $8b = 96$, so $b = 12$
150. $x = 7$
Matching (algebra): $1 \rightarrow D, 2 \rightarrow A, 3 \rightarrow E, 4 \rightarrow C, 5 \rightarrow B$
151. A — 9
152. C — $12h + 30 = 102$, so $h = 6$
153. B — $y = 12$
154. C — Do the operation inside the parentheses first
155. A — Division by zero is undefined because no number multiplied by 0 gives a non-zero result; 0 divided by any non-zero number is always 0
156. A — Subtract $2x$ from both sides to get $3x + 3 = 15$
157. $t = 135$
158. $5x$ and $3x$ are like terms; 7 and -2 are like terms
159. Two steps: add 7 , then divide by 3
160. $2w + 2(w + 4)$
Matching (algebra): $1 \rightarrow D, 2 \rightarrow B, 3 \rightarrow A, 4 \rightarrow C, 5 \rightarrow E$
161. A variable! Letters like x , y , and n represent unknown values.
162. An equation! Like $3x + 2 = 14$.
163. A coefficient! I tell you how many of the variable you have.
164. The distributive property!
165. A one-step equation! Like $x + 5 = 12$ (subtract 5 from both sides to get $x = 7$).
166. An inverse operation! Addition undoes subtraction, and multiplication undoes

division.

167. I'm 8! Because $8 + 7 = 15$ and $8 \times 2 = 16$.

168. An equation with variables on both sides! Like $3x + 5 = x + 13$.

169. Because you never knew what it stood for until you solved the equation!

170. To work on both sides equally!

171. Because everyone was always trying to find it, but nobody ever just accepted it for who it was!

172. "Nice belt!"

173. Because it knew it wasn't greater than or less than anyone else!

174. To improve their di-vision!

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