Equations and Equality

One-variable equations, preserving equality, and inverse operations.

Name _____ Date _____

32 main | 2-up grid | 11 pages | visible side quests

Completion Reward

Shown here as a small pack artifact, not a preview destination.

1. Why is it valid to add the same number to both sides of an equation?

A. Doing the same thing to both sides preserves equality.
B. It removes the equals sign.
C. It isolates the variable in one step every time.
D. It turns the equation into an identity.

1.1. Solve x - 8 = 11.

A. 3
B. 19
C. -19
D. 88

1.2. Solve 6y = 42.

A. 7
B. 36
C. 48
D. 252

1.3. Solve 3x + 2 = x + 10.

A. 2
B. 4
C. 8
D. 12

1.4. Solve x / 3 = 5.

A. 2
B. 8
C. 15
D. 18

1.5. Which value makes 2n + 1 = 9 true?

A. 3
B. 4
C. 5
D. 6

2. What does it mean for x = 4 to solve an equation?

A. It is the only number that can appear in an equation.
B. It means the equation has no variables.
C. It changes the equation into an inequality.
D. It makes the equation true when substituted in.

2.1. A solution to an equation is a value that:

A. makes the equation true
B. makes both sides bigger
C. removes the variable symbol completely
D. always gives 0

2.2. How do you check whether x = 4 solves 2x + 1 = 9?

A. substitute 4 for x and compare both sides
B. multiply both sides by 4
C. move all terms left
D. graph the equation only

2.3. Which value solves 3n - 2 = 10?

A. 2
B. 3
C. 4
D. 5

2.4. Why is substitution a useful check after solving?

A. it confirms the value really keeps the equation true
B. it changes the operation order
C. it always shortens the work
D. it turns every equation into a graph

2.5. Why is x = 2 not a solution to x + 6 = 11?

A. because 2 + 6 is 8, not 11
B. because x cannot equal 2
C. because 11 is odd
D. because addition cannot be checked

3. Does x = 3 solve 2x + 1 = 7?

A. No
B. Only if x is negative
C. Cannot tell
D. Yes

3.1. A solution to an equation is a value that:

A. makes the equation true
B. makes both sides bigger
C. removes the variable symbol completely
D. always gives 0

3.2. How do you check whether x = 4 solves 2x + 1 = 9?

A. substitute 4 for x and compare both sides
B. multiply both sides by 4
C. move all terms left
D. graph the equation only

3.3. Which value solves 3n - 2 = 10?

A. 2
B. 3
C. 4
D. 5

3.4. Why is substitution a useful check after solving?

A. it confirms the value really keeps the equation true
B. it changes the operation order
C. it always shortens the work
D. it turns every equation into a graph

3.5. Why is x = 2 not a solution to x + 6 = 11?

A. because 2 + 6 is 8, not 11
B. because x cannot equal 2
C. because 11 is odd
D. because addition cannot be checked

4. Solve x + 5 = 12. Answer with a number.

4.1. Solve x + 9 = 14.

A. 5
B. 23
C. -5
D. 14

4.2. Solve y - 8 = 3.

A. 5
B. 11
C. -11
D. 24

4.3. Solve 5m = 35.

A. 5
B. 6
C. 7
D. 8

4.4. Solve n / 4 = 6.

A. 1.5
B. 2
C. 10
D. 24

4.5. To solve 8p = 56, which operation undoes the 8?

A. add 8
B. subtract 8
C. divide by 8
D. multiply by 8

5. Solve 4x = 20. Answer with a number.

5.1. Solve x + 9 = 14.

A. 5
B. 23
C. -5
D. 14

5.2. Solve y - 8 = 3.

A. 5
B. 11
C. -11
D. 24

5.3. Solve 5m = 35.

A. 5
B. 6
C. 7
D. 8

5.4. Solve n / 4 = 6.

A. 1.5
B. 2
C. 10
D. 24

5.5. To solve 8p = 56, which operation undoes the 8?

A. add 8
B. subtract 8
C. divide by 8
D. multiply by 8

6. What does it mean if an equation is an identity?

A. The equation has exactly one solution.
B. The equation has no solution.
C. The variable must equal 0.
D. Every value of the variable makes the equation true.

6.1. If an equation is true for every x, it has:

A. one solution
B. no solution
C. infinitely many solutions
D. only x = 0

6.2. If simplifying an equation gives 5 = 9, the equation has:

A. one solution
B. no solution
C. infinitely many solutions
D. x = 4

6.3. If simplifying gives 0 = 0, what does that mean?

A. no solution
B. one solution
C. infinitely many solutions
D. the variable must be 0

6.4. Which result proves there is no solution?

A. x = 3
B. 0 = 0
C. 7 = 2
D. 2x = 10

6.5. Which result proves there are infinitely many solutions?

A. x = 4
B. 5 = 1
C. 0 = 0
D. x = 0

7. Which equation is true for every value of x?

A. 2x + 1 = 2x + 3
B. x + 4 = x - 4
C. 3(x + 2) = 3x + 6
D. 5x = 5

7.1. If an equation is true for every x, it has:

A. one solution
B. no solution
C. infinitely many solutions
D. only x = 0

7.2. If simplifying an equation gives 5 = 9, the equation has:

A. one solution
B. no solution
C. infinitely many solutions
D. x = 4

7.3. If simplifying gives 0 = 0, what does that mean?

A. no solution
B. one solution
C. infinitely many solutions
D. the variable must be 0

7.4. Which result proves there is no solution?

A. x = 3
B. 0 = 0
C. 7 = 2
D. 2x = 10

7.5. Which result proves there are infinitely many solutions?

A. x = 4
B. 5 = 1
C. 0 = 0
D. x = 0

8. Which equation has no solution?

A. x + 3 = 9
B. 5x = 20
C. 3x - 2 = 10
D. 2(x + 1) = 2x + 5

8.1. If an equation is true for every x, it has:

A. one solution
B. no solution
C. infinitely many solutions
D. only x = 0

8.2. If simplifying an equation gives 5 = 9, the equation has:

A. one solution
B. no solution
C. infinitely many solutions
D. x = 4

8.3. If simplifying gives 0 = 0, what does that mean?

A. no solution
B. one solution
C. infinitely many solutions
D. the variable must be 0

8.4. Which result proves there is no solution?

A. x = 3
B. 0 = 0
C. 7 = 2
D. 2x = 10

8.5. Which result proves there are infinitely many solutions?

A. x = 4
B. 5 = 1
C. 0 = 0
D. x = 0

9. Which equation has no solution?

A. 2x + 3 = 2x + 3
B. x + 4 = 10
C. 3x = 12
D. 2x + 3 = 2x + 5

9.1. If an equation is true for every x, it has:

A. one solution
B. no solution
C. infinitely many solutions
D. only x = 0

9.2. If simplifying an equation gives 5 = 9, the equation has:

A. one solution
B. no solution
C. infinitely many solutions
D. x = 4

9.3. If simplifying gives 0 = 0, what does that mean?

A. no solution
B. one solution
C. infinitely many solutions
D. the variable must be 0

9.4. Which result proves there is no solution?

A. x = 3
B. 0 = 0
C. 7 = 2
D. 2x = 10

9.5. Which result proves there are infinitely many solutions?

A. x = 4
B. 5 = 1
C. 0 = 0
D. x = 0

10. Which equation is true for every x?

A. x + 4 = 10
B. 2x + 1 = 7
C. 3(x + 2) = 3x + 6
D. 5x = 20

10.1. If an equation is true for every x, it has:

A. one solution
B. no solution
C. infinitely many solutions
D. only x = 0

10.2. If simplifying an equation gives 5 = 9, the equation has:

A. one solution
B. no solution
C. infinitely many solutions
D. x = 4

10.3. If simplifying gives 0 = 0, what does that mean?

A. no solution
B. one solution
C. infinitely many solutions
D. the variable must be 0

10.4. Which result proves there is no solution?

A. x = 3
B. 0 = 0
C. 7 = 2
D. 2x = 10

10.5. Which result proves there are infinitely many solutions?

A. x = 4
B. 5 = 1
C. 0 = 0
D. x = 0

11. Which equation is solved by x = 4?

A. 3x - 5 = 4
B. 5x = 15
C. 2x + 1 = 9
D. x/2 + 1 = 5

11.1. A solution to an equation is a value that:

A. makes the equation true
B. makes both sides bigger
C. removes the variable symbol completely
D. always gives 0

11.2. How do you check whether x = 4 solves 2x + 1 = 9?

A. substitute 4 for x and compare both sides
B. multiply both sides by 4
C. move all terms left
D. graph the equation only

11.3. Which value solves 3n - 2 = 10?

A. 2
B. 3
C. 4
D. 5

11.4. Why is substitution a useful check after solving?

A. it confirms the value really keeps the equation true
B. it changes the operation order
C. it always shortens the work
D. it turns every equation into a graph

11.5. Why is x = 2 not a solution to x + 6 = 11?

A. because 2 + 6 is 8, not 11
B. because x cannot equal 2
C. because 11 is odd
D. because addition cannot be checked

12. Solve d = rt for t.

A. t = r/d
B. t = d - r
C. t = d/r
D. t = dr

12.1. In A = lw, if you solve for w, what should you do?

A. multiply by l
B. divide both sides by l
C. add l
D. subtract A

12.2. If v = d / t, solving for d gives:

A. d = vt
B. d = v / t
C. d = t / v
D. d = v - t

12.3. When solving a literal equation for one variable, your goal is to:

A. get that variable alone
B. erase every other variable
C. make both sides 0
D. change the formula

12.4. Why is solving a formula for a different variable useful?

A. it changes the units
B. it lets the formula answer a different unknown
C. it removes all multiplication
D. it guarantees integers

12.5. If P = 2l + 2w, which step helps solve for l?

A. subtract 2w from both sides
B. divide by w first
C. add l to both sides
D. replace P with 0

13. What is the best next step to solve 2(x - 3) = 14?

A. Add 3 to both sides.
B. Multiply both sides by 3.
C. Subtract 14 from both sides.
D. Divide both sides by 2.

13.1. Solve x + 9 = 14.

A. 5
B. 23
C. -5
D. 14

13.2. Solve y - 8 = 3.

A. 5
B. 11
C. -11
D. 24

13.3. Solve 5m = 35.

A. 5
B. 6
C. 7
D. 8

13.4. Solve n / 4 = 6.

A. 1.5
B. 2
C. 10
D. 24

13.5. To solve 8p = 56, which operation undoes the 8?

A. add 8
B. subtract 8
C. divide by 8
D. multiply by 8

14. What is the best next step to solve 6 - 3x = 15?

A. Add 3x to both sides.
B. Divide both sides by 6.
C. Subtract 6 from both sides.
D. Square both sides.

14.1. Solve x - 8 = 11.

A. 3
B. 19
C. -19
D. 88

14.2. Solve 6y = 42.

A. 7
B. 36
C. 48
D. 252

14.3. Solve 3x + 2 = x + 10.

A. 2
B. 4
C. 8
D. 12

14.4. Solve x / 3 = 5.

A. 2
B. 8
C. 15
D. 18

14.5. Which value makes 2n + 1 = 9 true?

A. 3
B. 4
C. 5
D. 6

15. What is the best next step to solve 3x + 5 = 17?

A. Add 5 to both sides.
B. Divide both sides by 3.
C. Multiply both sides by 3.
D. Subtract 5 from both sides.

15.1. Solve x + 9 = 14.

A. 5
B. 23
C. -5
D. 14

15.2. Solve y - 8 = 3.

A. 5
B. 11
C. -11
D. 24

15.3. Solve 5m = 35.

A. 5
B. 6
C. 7
D. 8

15.4. Solve n / 4 = 6.

A. 1.5
B. 2
C. 10
D. 24

15.5. To solve 8p = 56, which operation undoes the 8?

A. add 8
B. subtract 8
C. divide by 8
D. multiply by 8

16. What is the best next step to solve 4(x + 2) = 20?

A. Divide both sides by 4
B. Add 2 to both sides
C. Subtract x from both sides
D. Set x = 20

16.1. Solve 3x + 2 = x + 10. What is the best first step?

A. subtract x from both sides
B. subtract 2 from both sides
C. divide by 3
D. add x to both sides

16.2. Solve 4y + 1 = 2y + 9.

A. 2
B. 3
C. 4
D. 5

16.3. For 2(x + 3) = 14, what is the best first step?

A. divide by 2 or distribute
B. add 3
C. subtract x
D. set x = 0

16.4. Solve x / 5 + 2 = 6.

A. 10
B. 15
C. 20
D. 30

16.5. Why do multi-step equations still use the same operation on both sides?

A. to preserve equality at every step
B. to make the arithmetic shorter
C. to avoid using variables
D. to force the answer to be positive

17. What is the best next step to solve 2x - 4 = x + 7?

A. Add 4 to the left side only.
B. Subtract x from both sides.
C. Multiply everything by 2.
D. Move the 7 to the left and make it negative.

17.1. Solve 3x + 2 = x + 10. What is the best first step?

A. subtract x from both sides
B. subtract 2 from both sides
C. divide by 3
D. add x to both sides

17.2. Solve 4y + 1 = 2y + 9.

A. 2
B. 3
C. 4
D. 5

17.3. For 2(x + 3) = 14, what is the best first step?

A. divide by 2 or distribute
B. add 3
C. subtract x
D. set x = 0

17.4. Solve x / 5 + 2 = 6.

A. 10
B. 15
C. 20
D. 30

17.5. Why do multi-step equations still use the same operation on both sides?

A. to preserve equality at every step
B. to make the arithmetic shorter
C. to avoid using variables
D. to force the answer to be positive

18. A student solves 3x - 4 = 11 and writes 3x = 7 after adding 4. What is wrong?

A. 11 + 4 is 15, so the next line should be 3x = 15.
B. You should subtract 4 instead of adding 4.
C. The coefficient 3 should be added to both sides first.
D. The equation has no solution.

18.1. Solve x - 8 = 11.

A. 3
B. 19
C. -19
D. 88

18.2. Solve 6y = 42.

A. 7
B. 36
C. 48
D. 252

18.3. Solve 3x + 2 = x + 10.

A. 2
B. 4
C. 8
D. 12

18.4. Solve x / 3 = 5.

A. 2
B. 8
C. 15
D. 18

18.5. Which value makes 2n + 1 = 9 true?

A. 3
B. 4
C. 5
D. 6

19. A student subtracts x from both sides of 4x + 2 = x + 14 and writes 4 + 2 = 14. What is wrong?

A. x cannot be subtracted from both sides.
B. The 2 should also become x.
C. The equation should become 4x = 12.
D. 4x - x is 3x, so the equation should become 3x + 2 = 14.

19.1. Solve 3x + 2 = x + 10. What is the best first step?

A. subtract x from both sides
B. subtract 2 from both sides
C. divide by 3
D. add x to both sides

19.2. Solve 4y + 1 = 2y + 9.

A. 2
B. 3
C. 4
D. 5

19.3. For 2(x + 3) = 14, what is the best first step?

A. divide by 2 or distribute
B. add 3
C. subtract x
D. set x = 0

19.4. Solve x / 5 + 2 = 6.

A. 10
B. 15
C. 20
D. 30

19.5. Why do multi-step equations still use the same operation on both sides?

A. to preserve equality at every step
B. to make the arithmetic shorter
C. to avoid using variables
D. to force the answer to be positive

20. A student solves 2x + 3 = 11 by writing 2x = 14. What is wrong?

A. They should divide first.
B. They should multiply both sides by 2.
C. There is no mistake.
D. They should subtract 3, not add 3.

20.1. Solve 3x + 2 = x + 10. What is the best first step?

A. subtract x from both sides
B. subtract 2 from both sides
C. divide by 3
D. add x to both sides

20.2. Solve 4y + 1 = 2y + 9.

A. 2
B. 3
C. 4
D. 5

20.3. For 2(x + 3) = 14, what is the best first step?

A. divide by 2 or distribute
B. add 3
C. subtract x
D. set x = 0

20.4. Solve x / 5 + 2 = 6.

A. 10
B. 15
C. 20
D. 30

20.5. Why do multi-step equations still use the same operation on both sides?

A. to preserve equality at every step
B. to make the arithmetic shorter
C. to avoid using variables
D. to force the answer to be positive

21. How many solutions does 2(x + 5) = 2x + 10 have?

A. One solution: x = 5
B. No solution
C. Infinitely many solutions
D. One solution: x = 0

21.1. If an equation is true for every x, it has:

A. one solution
B. no solution
C. infinitely many solutions
D. only x = 0

21.2. If simplifying an equation gives 5 = 9, the equation has:

A. one solution
B. no solution
C. infinitely many solutions
D. x = 4

21.3. If simplifying gives 0 = 0, what does that mean?

A. no solution
B. one solution
C. infinitely many solutions
D. the variable must be 0

21.4. Which result proves there is no solution?

A. x = 3
B. 0 = 0
C. 7 = 2
D. 2x = 10

21.5. Which result proves there are infinitely many solutions?

A. x = 4
B. 5 = 1
C. 0 = 0
D. x = 0

22. Solve -x + 8 = 3.

A. x = 5
B. x = -5
C. x = 11
D. x = -11

22.1. Solve 3x + 2 = x + 10. What is the best first step?

A. subtract x from both sides
B. subtract 2 from both sides
C. divide by 3
D. add x to both sides

22.2. Solve 4y + 1 = 2y + 9.

A. 2
B. 3
C. 4
D. 5

22.3. For 2(x + 3) = 14, what is the best first step?

A. divide by 2 or distribute
B. add 3
C. subtract x
D. set x = 0

22.4. Solve x / 5 + 2 = 6.

A. 10
B. 15
C. 20
D. 30

22.5. Why do multi-step equations still use the same operation on both sides?

A. to preserve equality at every step
B. to make the arithmetic shorter
C. to avoid using variables
D. to force the answer to be positive

23. Solve x/3 + 5 = 9. Answer with a number.

23.1. Solve x + 9 = 14.

A. 5
B. 23
C. -5
D. 14

23.2. Solve y - 8 = 3.

A. 5
B. 11
C. -11
D. 24

23.3. Solve 5m = 35.

A. 5
B. 6
C. 7
D. 8

23.4. Solve n / 4 = 6.

A. 1.5
B. 2
C. 10
D. 24

23.5. To solve 8p = 56, which operation undoes the 8?

A. add 8
B. subtract 8
C. divide by 8
D. multiply by 8

24. Solve 5 - 2x = -9. Answer with a number.

24.1. Solve x - 8 = 11.

A. 3
B. 19
C. -19
D. 88

24.2. Solve 6y = 42.

A. 7
B. 36
C. 48
D. 252

24.3. Solve 3x + 2 = x + 10.

A. 2
B. 4
C. 8
D. 12

24.4. Solve x / 3 = 5.

A. 2
B. 8
C. 15
D. 18

24.5. Which value makes 2n + 1 = 9 true?

A. 3
B. 4
C. 5
D. 6

25. Solve 4(x + 1) = 28. Answer with a number.

25.1. Solve x - 8 = 11.

A. 3
B. 19
C. -19
D. 88

25.2. Solve 6y = 42.

A. 7
B. 36
C. 48
D. 252

25.3. Solve 3x + 2 = x + 10.

A. 2
B. 4
C. 8
D. 12

25.4. Solve x / 3 = 5.

A. 2
B. 8
C. 15
D. 18

25.5. Which value makes 2n + 1 = 9 true?

A. 3
B. 4
C. 5
D. 6

26. Solve 7x + 9 = 5x + 21. Answer with a number.

26.1. Solve 3x + 2 = x + 10. What is the best first step?

A. subtract x from both sides
B. subtract 2 from both sides
C. divide by 3
D. add x to both sides

26.2. Solve 4y + 1 = 2y + 9.

A. 2
B. 3
C. 4
D. 5

26.3. For 2(x + 3) = 14, what is the best first step?

A. divide by 2 or distribute
B. add 3
C. subtract x
D. set x = 0

26.4. Solve x / 5 + 2 = 6.

A. 10
B. 15
C. 20
D. 30

26.5. Why do multi-step equations still use the same operation on both sides?

A. to preserve equality at every step
B. to make the arithmetic shorter
C. to avoid using variables
D. to force the answer to be positive

27. Solve 0.5x + 4 = 10. Answer with a number.

27.1. Solve x - 8 = 11.

A. 3
B. 19
C. -19
D. 88

27.2. Solve 6y = 42.

A. 7
B. 36
C. 48
D. 252

27.3. Solve 3x + 2 = x + 10.

A. 2
B. 4
C. 8
D. 12

27.4. Solve x / 3 = 5.

A. 2
B. 8
C. 15
D. 18

27.5. Which value makes 2n + 1 = 9 true?

A. 3
B. 4
C. 5
D. 6

28. Solve 2x + 3 = 11. Answer with a number.

28.1. Solve 3x + 2 = x + 10. What is the best first step?

A. subtract x from both sides
B. subtract 2 from both sides
C. divide by 3
D. add x to both sides

28.2. Solve 4y + 1 = 2y + 9.

A. 2
B. 3
C. 4
D. 5

28.3. For 2(x + 3) = 14, what is the best first step?

A. divide by 2 or distribute
B. add 3
C. subtract x
D. set x = 0

28.4. Solve x / 5 + 2 = 6.

A. 10
B. 15
C. 20
D. 30

28.5. Why do multi-step equations still use the same operation on both sides?

A. to preserve equality at every step
B. to make the arithmetic shorter
C. to avoid using variables
D. to force the answer to be positive

29. Solve 3x + 5 = 2x + 11. Answer with a number.

29.1. Solve 3x + 2 = x + 10. What is the best first step?

A. subtract x from both sides
B. subtract 2 from both sides
C. divide by 3
D. add x to both sides

29.2. Solve 4y + 1 = 2y + 9.

A. 2
B. 3
C. 4
D. 5

29.3. For 2(x + 3) = 14, what is the best first step?

A. divide by 2 or distribute
B. add 3
C. subtract x
D. set x = 0

29.4. Solve x / 5 + 2 = 6.

A. 10
B. 15
C. 20
D. 30

29.5. Why do multi-step equations still use the same operation on both sides?

A. to preserve equality at every step
B. to make the arithmetic shorter
C. to avoid using variables
D. to force the answer to be positive

30. If A = lw, solve for w. Answer as an equation.

30.1. In A = lw, if you solve for w, what should you do?

A. multiply by l
B. divide both sides by l
C. add l
D. subtract A

30.2. If v = d / t, solving for d gives:

A. d = vt
B. d = v / t
C. d = t / v
D. d = v - t

30.3. When solving a literal equation for one variable, your goal is to:

A. get that variable alone
B. erase every other variable
C. make both sides 0
D. change the formula

30.4. Why is solving a formula for a different variable useful?

A. it changes the units
B. it lets the formula answer a different unknown
C. it removes all multiplication
D. it guarantees integers

30.5. If P = 2l + 2w, which step helps solve for l?

A. subtract 2w from both sides
B. divide by w first
C. add l to both sides
D. replace P with 0

31. Solve 3(x - 2) + 4 = 19. Answer with a number.

31.1. Solve 3x + 2 = x + 10. What is the best first step?

A. subtract x from both sides
B. subtract 2 from both sides
C. divide by 3
D. add x to both sides

31.2. Solve 4y + 1 = 2y + 9.

A. 2
B. 3
C. 4
D. 5

31.3. For 2(x + 3) = 14, what is the best first step?

A. divide by 2 or distribute
B. add 3
C. subtract x
D. set x = 0

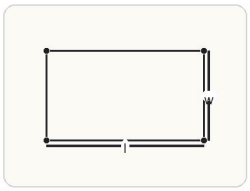
31.4. Solve x / 5 + 2 = 6.

A. 10
B. 15
C. 20
D. 30

31.5. Why do multi-step equations still use the same operation on both sides?

A. to preserve equality at every step
B. to make the arithmetic shorter
C. to avoid using variables
D. to force the answer to be positive

32. Solve A = lw for w. Answer in the form w = ...



Area equals length times width, so dividing by l isolates w.

32.1. Solve x + 9 = 14.

A. 5
B. 23
C. -5
D. 14

32.2. Solve y - 8 = 3.

A. 5
B. 11
C. -11
D. 24

32.3. Solve 5m = 35.

A. 5
B. 6
C. 7
D. 8

32.4. Solve n / 4 = 6.

A. 1.5
B. 2
C. 10
D. 24

32.5. To solve 8p = 56, which operation undoes the 8?

A. add 8
B. subtract 8
C. divide by 8
D. multiply by 8