

Solving linear equations - Support route

Try each question first. Show each step. Use only if assigned the Support route.

Department / teacher instructions:

Editable toolkit / reminders:

Name: _____ Class: _____ Date: _____

A. Conversions

1.	Solve $x + 3 = 8$.
	Prompt: Subtract 3 from both sides.
2.	Solve $2x = 14$.
	Prompt: Divide both sides by 2.
3.	Solve $x - 5 = 9$.
	Prompt: Add 5 to both sides.
4.	Solve $3x + 2 = 17$.
	Prompt: Subtract 2, then divide by 3.
5.	Solve $4x - 7 = 13$.
	Prompt: Add 7, then divide by 4.
6.	Check $x = 5$ in $4x - 7 = 13$.
	Prompt: Substitute x back into the equation.
7.	What is the inverse of multiplication by 6?
	Prompt: Think of the opposite operation.

B. One-step and two-step equations

1.	Solve $x + 9 = 16$.
	Prompt: Subtract 9.
2.	Solve $5x = 35$.
	Prompt: Divide by 5.
3.	Solve $x - 8 = 3$.
	Prompt: Add 8.
4.	Solve $2x + 4 = 18$.
	Prompt: Subtract 4, then divide by 2.
5.	Solve $3x - 6 = 15$.
	Prompt: Add 6, then divide by 3.
6.	Explain why the same operation must be done to both sides.
	Prompt: Think about balance.
7.	Solve $4x + 1 = 21$.
	Prompt: Undo addition before multiplication.
8.	Solve $7x - 2 = 40$.
	Prompt: Undo subtraction before division.

Support route continued

Complete the remaining work if time allows. Show enough working for another person to follow your method.

C. Explain and check

1.	Solve $4(x + 2) - 3x = 17$.
	Prompt: Expand the bracket, then collect x-terms.
2.	Solve $3(x + 2) = 21$.
	Prompt: Divide by 3, then subtract 2.
3.	Solve $2(x - 4) = 10$.
	Prompt: Divide by 2, then add 4.
4.	Explain why inverse operations undo each other.
	Prompt: Give an addition/subtraction example.
5.	Solve $4x + 5 = 2x + 17$.
	Prompt: Collect x-terms on one side.
6.	Create an equation with solution $x = 6$.
	Prompt: Start with $x = 6$ and add an operation.

D. Mixed practice

1.	Solve $3x + 2(x - 1) = 20$.
	Prompt: Expand the bracket first.
2.	Solve $5x - 3 = 2x + 12$.
	Prompt: Collect x-terms on one side.
3.	Solve $3(2y - 1) = 4y + 9$.
	Prompt: Expand, then collect y-terms.
4.	Solve $2(3x + 1) - x = 14$.
	Prompt: Expand before collecting.
5.	Explain how to check a solution.
	Prompt: Substitute the value back.
6.	Write a general rule for keeping an equation balanced.
	Prompt: Describe what must be done to both sides.

Support route answers

Answers are grouped by section. Accept equivalent correct methods and explanations.

A: $x=5$; $x=7$; $x=14$; $x=5$; $x=5$; divide by 6.

B: $x=7$; $x=7$; $x=11$; $x=7$; $x=7$; balance; $x=5$; $x=6$.

C: $x=5$; $x=5$; $x=9$; inverse operations; $x=6$; answers vary.

D: $x=22/5$; $x=5$; $y=6$; $x=5$; check by substitution; same operation both sides.

Solving linear equations - Core route

Work independently. Use this worksheet only if your teacher assigned the Core route.

Department / teacher instructions:

Editable toolkit / reminders:

Name: _____ Class: _____ Date: _____

A. Conversions

1.	Solve $x + 9 = 16$.
2.	Solve $5x = 35$.
3.	Solve $x - 8 = 3$.
4.	Solve $2x + 4 = 18$.
5.	Solve $3x - 6 = 15$.
6.	Explain why the same operation must be done to both sides.

B. Mixed equation practice

1.	Solve $4x + 1 = 21$.
2.	Solve $7x - 2 = 40$.
3.	Solve $3(x + 2) = 21$.
4.	Solve $2(x - 4) = 10$.
5.	Solve $4x + 5 = 2x + 17$.
6.	Solve $3x + 2(x - 1) = 20$.
7.	Create an equation with solution $x = 6$.
8.	Solve $2(3x + 1) - x = 14$.

Complete the remaining work if time allows. Show enough working for another person to follow your method.

C. Compare and reason

1.	Explain why inverse operations undo each other.
2.	Solve $4(x + 2) - 3x = 17$ and explain the bracket step.
3.	A pupil divides only one side by 3. Explain the error.
4.	Solve $5x - 3 = 2x + 12$ and explain each balance step.
5.	Find two different equations with solution $x = 5$.
6.	Explain how substitution checks a solution.

D. Mixed and check

1.	Solve $3(2y - 1) = 4y + 9$.
2.	Solve $2(3x - 1) = 4x + 10$.
3.	Solve $4(x + 2) - 3x = 17$.
4.	Solve $3x + 4 = 4x + 3$.
5.	Write an equation for a rectangle perimeter of 26 with sides $x + 2$ and $x + 5$.
6.	Create an equation whose solution is $x = 7$.

Core route answers

Answers are grouped by section. Accept equivalent correct methods and explanations.

A: $x=7$; $x=7$; $x=11$; $x=7$; $x=7$; balance.

B: $x=5$; $x=6$; $x=5$; $x=9$; $x=6$; $x=22/5$; answers vary; $x=12/5$.

C: inverse operations; $x=9$; both sides must be balanced; $x=5$; answers vary; substitute and compare.

D: $y=6$; $x=6$; $x=9$; $x=1$; equation: $4x+14=26$; answers vary.

Solving linear equations - Stretch route

Choose efficient methods. Use this worksheet only if your teacher assigned the Stretch route.

Department / teacher instructions:

Editable toolkit / reminders:

Name: _____ Class: _____ Date: _____

A. Flexible conversion

1.	Solve $3x + 2(x - 1) = 20$.
2.	Solve $5x - 3 = 2x + 12$.
3.	Solve $3(2y - 1) = 4y + 9$.
4.	Explain why inverse operations undo each other.
5.	Solve $4x + 5 = 2x + 17$.
6.	Create an equation with solution $x = 6$.

B. Equations with brackets

1.	Solve $2(3x + 1) - x = 14$.
2.	Solve $4(x + 2) - 3x = 17$.
3.	Solve $2(3x - 1) = 4x + 10$.
4.	Solve $3(2m + 1) = 4m + 11$.
5.	Solve $7n - 2 = 3n + 18$.
6.	Explain why brackets should be expanded before collecting terms.

Complete the remaining work if time allows. Show enough working for another person to follow your method.

C. Reasoning

1.	Explain the balance structure of $3(x + 2) = 21$.
2.	Which is larger as a solution: $3x + 4 = 19$ or $2x + 7 = 17$? Justify.
3.	Explain why doing the same operation to both sides preserves equality.
4.	Find two different equations with solution $x = 8$.
5.	A pupil says $2(x + 3) = 2x + 3$. Explain the mistake.
6.	Explain how substitution checks an equation.

D. Challenge

1.	Solve $3(2x + 1) - 2(x - 4) = 25$.
2.	Solve $2(3a - 1) + 4(a + 2) = 30$.
3.	Write a general rule for solving two-step equations.
4.	Write a general rule for equations with brackets.
5.	Find all whole-number x for $2x + 3 < 15$.
6.	Create a challenging equation with solution $x = 4$.

Stretch route answers

Answers are grouped by section. Accept equivalent correct methods and explanations.

A: $x=22/5$; $x=5$; $y=6$; inverse operations; $x=6$; answers vary.

B: $x=5$; $x=9$; $x=6$; $m=4$; $n=5$; expand first.

C: divide by 3 then subtract 2; first equation gives $x=5$; same operation preserves equality; answers vary; expand brackets carefully; substitute and compare.

D: $x=7/2$; $a=12/5$; equation rules vary; bracket rule varies; $x=0,1,2,3,4,5$; answers vary.