CHANGE THE SUBJECT (TWO STEPS)

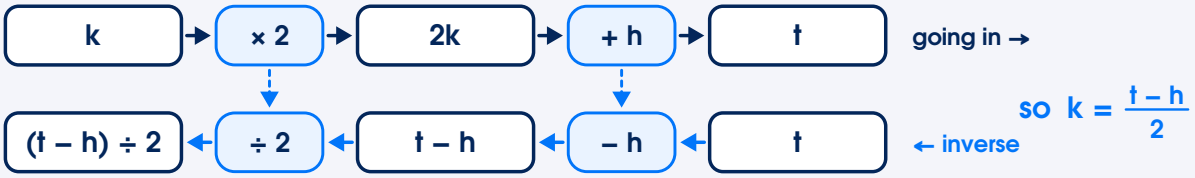
BUILDING BLOCKS

NAME _____ CLASS _____ DATE _____

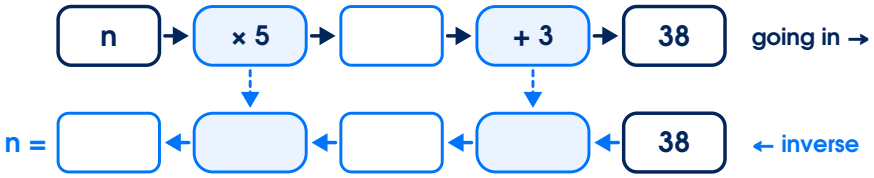
KEY IDEA

Undo the operations in reverse order.

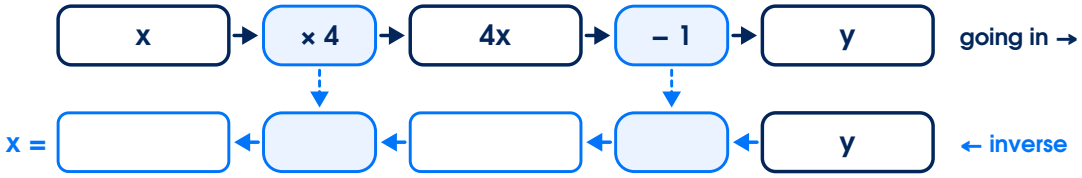
Example: make k the subject of $t = 2k + h$



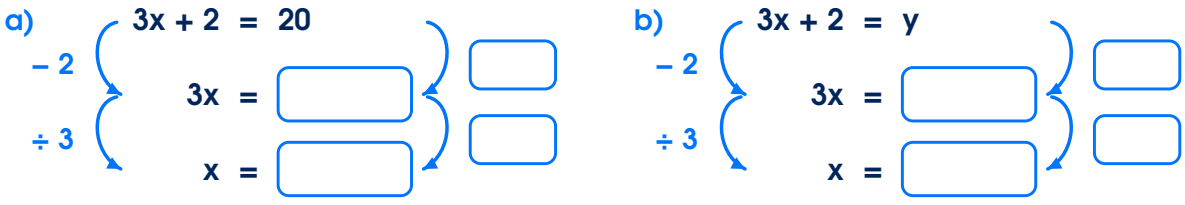
1 Fill in the inverse machine underneath, working right to left, to find n.



2 Now the machine uses letters. Use the inverse machine to make x the subject.



3 Solve the equation in a). Rearrange the formula in b) with the same steps – a letter replaces the number.



4 To make x the subject of $y = 2x + 7$, circle the right word each time.

First ADD SUBTRACT 7 on both sides.

Then MULTIPLY DIVIDE both sides by 2.

x = _____

CHANGE THE SUBJECT (TWO STEPS)

SUPPORT

NAME _____ CLASS _____ DATE _____

KEY IDEA

Make p the subject of $w = 3p + 6$

Undo + 6 first, then undo × 3.

The subject can be on the right.

$w = 3p + 6$

-6: $w - 6 = 3p$

$\div 3$: $\frac{w - 6}{3} = p$

-6, $\div 3$

1 Make x the subject. Fill in the boxes.

a) $y = 3x + 4$

-4: $\square = 3x$

$\div 3$: $\square = x$

b) $y = 5x - 2$

$\square$: $\square = \square$

$\square$: $\square = x$

2 Make x the subject.

a) $p = 2x + q$ $x =$ ☐

b) $w = \frac{x}{3} + 1$ $x =$ ☐

3 Make x the subject of $y = 4(x + 1)$. Divide by 4 first.

$y = 4(x + 1)$

$\div 4$: $\square = x + 1$

-1: $\square = x$

Check:

When $x = 2$, $y = 4(2 + 1) =$ ☐

Put this y into your answer: $x =$ ☐

4 Circle the correct way to make n the subject of $m = 2n - 5$.

$n = \frac{m + 5}{2}$ $n = \frac{m}{2} + 5$ $n = \frac{m - 5}{2}$

Explain your choice: .....

CHANGE THE SUBJECT (TWO STEPS)

CORE

NAME _____ CLASS _____ DATE _____

KEY IDEA

Undo the operations in the reverse order to how they were applied to the new subject. Check by substituting values into the original and the rearranged formula.

FLUENCY

1 Make the letter shown the subject of each formula.

a) $v = u + at$ $a =$ ☐

b) $y = mx + c$ $x =$ ☐

c) $P = 2l + 2w$ $l =$ ☐

d) $A = \frac{bh}{2}$ $h =$ ☐

e) $x = 5(y + 3)$ $y =$ ☐

f) $s = \frac{u + v}{2}$ $v =$ ☐

2 This formula converts temperatures from °C to °F.

$F = 1.8C + 32$

a) Make C the subject. ☐

b) Use your formula to find C when F = 59. ☐

REASONING

3 Here are two formulae.

$y = \frac{x}{3} + 2$ $y = \frac{x + 6}{3}$ Are they the same? Explain.

.....

.....

4 Ben makes x the subject of a formula. Here is his working.

$y = 4x - 9$ so $x = \frac{y}{4} + 9$

a) Explain Ben's mistake. .....

b) Write the correct formula. x = ☐

CHANGE THE SUBJECT (TWO STEPS)

GREATER DEPTH

NAME _____ CLASS _____ DATE _____

REASONING

1 Is each statement always, sometimes or never true? Circle your answer.

If it is sometimes true, give an example of when it is true and when it is not.

a) $(p + q) \div 2 = p \div 2 + q \div 2$ — ALWAYS / SOMETIMES / NEVER

b) $x \div a + b = (x + b) \div a$ — ALWAYS / SOMETIMES / NEVER

c) If $y = 2(x + 3)$, then $x = y \div 2 - 3$. — ALWAYS / SOMETIMES / NEVER

PROBLEM SOLVING

2 A taxi company uses this formula.

F = 2.5d + 4

F = fare in £, d = distance in miles

a) Make d the subject. ____ **b)** How far is a £29 journey? ____

c) Ola has £20. What is the longest journey she can afford? ____

3 A formula was made with a two-step function machine. Fill in the machine.

x → ____ → ____ → ____ → y

Rearranged: $x = \frac{y + 6}{5}$

What was the original formula? y = ____

★ CHALLENGE FOR ALL

4 The new subject appears twice. Collect those terms first.

a) Make a the subject of $3ab + a = c$ ____

Hint: factorise the left side.

b) Make x the subject of $2x + 5 = kx + 9$ ____

CHANGE THE SUBJECT (TWO STEPS) – ANSWERS

ANSWERS

BUILDING BLOCKS

1 35 · backwards: – 3 gives 35, ÷ 5 gives n = 7
2 backwards: + 1 gives y + 1, ÷ 4 gives (y + 1)/4 · x = (y + 1)/4
3 a) 3x = 18, x = 6 · b) 3x = y – 2, x = (y – 2)/3
4 SUBTRACT · DIVIDE · x = (y – 7)/2

SUPPORT

1 a) y – 4 = 3x, (y – 4)/3 = x · b) + 2: y + 2 = 5x, ÷ 5: (y + 2)/5 = x
2 a) x = (p – q)/2 · b) x = 3(w – 1) (or 3w – 3)
3 y/4 = x + 1, y/4 – 1 = x · check: y = 12, then 12/4 – 1 = 2 ✓
4 n = (m + 5)/2: undo – 5 by adding 5, then divide by 2

CORE

1 a) a = (v – u)/t · b) x = (y – c)/m · c) l = (P – 2w)/2 · d) h = 2A/b · e) y = x/5 – 3 · f) v = 2s – u
2 a) C = (F – 32)/1.8 · b) 15
3 Yes: (x + 6)/3 = x/3 + 6/3 = x/3 + 2 (e.g. x = 3 gives 3 for both)
4 a) He undid the operations in the wrong order: add 9 first, then divide by 4 · b) x = (y + 9)/4

GREATER DEPTH

1 a) always · b) sometimes (true when a = 1 or b = 0; false for a = 2, b = 4, x = 2) · c) always
2 a) d = (F – 4)/2.5 · b) 10 miles · c) 6.4 miles
3 × 5 then – 6: y = 5x – 6
4 a) a(3b + 1) = c, a = c/(3b + 1) · b) 2x – kx = 4, x(2 – k) = 4, x = 4/(2 – k)