

LESSON 3 | MEET THE IDEA

Rearranging formulas and literal equations

Tuesday, October 20, 2026 . 6:00–7:00 PM Central

By the end, I can...

Rearrange a formula to isolate a chosen letter, explain each operation, and state when a denominator cannot be zero.

A **formula** connects quantities. In $A = lw$, the area A depends on the length l and width w . A **literal equation** has more than one letter. We can rearrange it using the same balanced steps as a numerical equation.

Your job	How to think about it
Choose the subject	The subject is the letter you want alone on one side.
Treat other letters as quantities	If you are finding w , undo what is happening to w .
Keep the relationship true	Do the same valid operation to both sides.
Check restrictions	You cannot divide by a quantity that is zero.

A first rearrangement | Make w the subject of $A = lw$

$$A / l = lw / l$$

Divide both sides by l , assuming $l \neq 0$.

$$w = A / l$$

The factor l cancels on the right.

If $A = 24$ square units and $l = 6$ units, $w = 24/6 = 4$ units.

Say it aloud: “The width is the area divided by the length.” A formula should make sense in words as well as symbols.

LESSON 3 | WORKED EXAMPLES

Undo operations in reverse order

Example 1 | Make w the subject of $P = 2l + 2w$

$$P - 2l = 2w$$

Subtract $2l$ from both sides.

$$w = (P - 2l) / 2$$

Divide the whole remaining expression by 2.

$$w = P/2 - l$$

An equivalent simplified form.

Check: if $P = 30$ and $l = 9$, then $w = (30 - 18)/2 = 6$. The perimeter is $2(9) + 2(6) = 30$.

Example 2 | Make C the subject of $F = (9/5)C + 32$

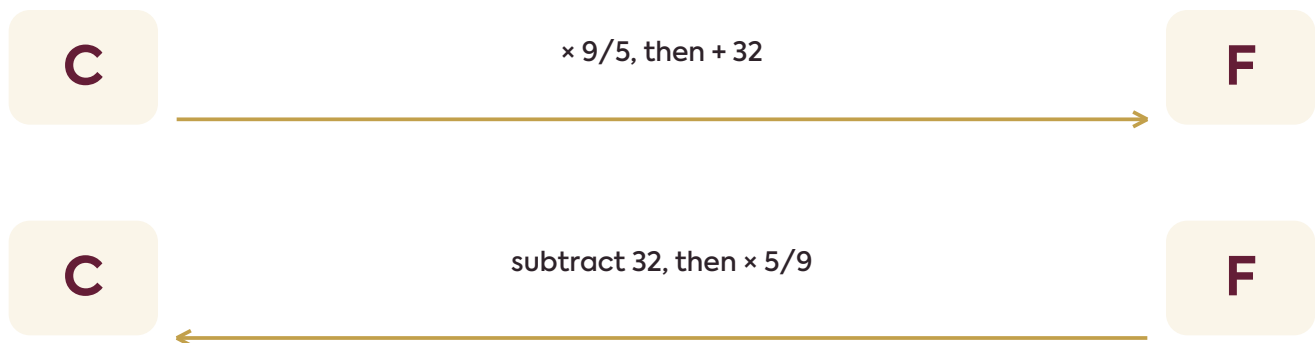
$$F - 32 = (9/5)C$$

Undo the addition of 32 first.

$$C = (5/9)(F - 32)$$

Multiply the whole side by the reciprocal $5/9$.

At $F = 68^\circ\text{F}$: $C = (5/9)(68 - 32) = (5/9)(36) = 20^\circ\text{C}$.



The return journey reverses the order: subtract 32 first, then multiply by $5/9$. Multiplying F alone by $5/9$ would leave out part of the expression.

LESSON 3 | TWO USEFUL PATTERNS

A letter in a denominator

Example 3 | Make t the subject of $v = d/t$

$$vt = d$$

Multiply both sides by t . The original formula needs $t \neq 0$.

$$t = d/v$$

Divide both sides by v , assuming $v \neq 0$.

For $d = 120$ miles and $v = 40$ miles per hour, $t = 120/40 = 3$ hours.

A condition is part of the answer

The rearranged formula $t = d/v$ requires $v \neq 0$. If v is zero, return to the original relationship; division by zero cannot tell you the time.

Example 4 | Make x the subject of $y = ax + bx$

$$y = (a + b)x$$

Factor out the x that appears in both terms.

$$x = y / (a + b)$$

Divide by the whole coefficient, assuming $a + b \neq 0$.

Check with $a = 2$, $b = 3$ and $y = 20$: $x = 20/5 = 4$, and $2(4) + 3(4) = 20$.

If $a + b = 0$: the original equation becomes $y = 0$. If $y = 0$, every real x works; if $y \neq 0$, no x works. The divided formula does not cover those cases.

Common mistake

$(P - 2I)/2$ means divide **both** terms by 2. It equals $P/2 - I$, not $P - I$.

LESSON 3 | SHORT CHECKS

Your turn

Make the requested letter the subject. Keep brackets around a whole numerator or denominator when needed.

1. $A = bh$. Make h the subject. State the restriction on b .

2. $P = 2l + 2w$. Make l the subject.

3. Use $C = (5/9)(F - 32)$ to convert 95°F to degrees Celsius.

4. $d = rt$. Make t the subject and state the restriction on r . Then find t when $d = 150$ miles and $r = 50$ miles per hour.

5. $y = ax + bx$. Make x the subject. Explain why the denominator needs brackets and cannot equal zero.

Checking tip: try simple values in both the original and rearranged formula. A numerical check can reveal a mistake; the balanced algebra explains why the rearrangement works.

LESSON 3 | WORKED ANSWERS AND RECAP

Check your thinking

1. Divide both sides by b : $h = A/b$, with $b \neq 0$.
2. $P - 2w = 2l$, so $l = (P - 2w)/2 = P/2 - w$. The entire difference is divided by 2.
3. $C = (5/9)(95 - 32) = (5/9)(63) = 35^\circ\text{C}$. Subtract before multiplying.
4. $t = d/r$, with $r \neq 0$. For the given values, $t = 150/50 = 3$ hours.
5. Factor first: $y = (a + b)x$. Then $x = y/(a + b)$, with $a + b \neq 0$. The whole sum is the coefficient of x , so divide by the whole sum.

A rearrangement keeps the same relationship

Choose the target letter. Undo operations in reverse order. If it appears twice, look for a common factor. State the conditions needed for any division.

I can...

- ☐ Explain which letter I am isolating and why.
- ☐ Rearrange a formula before substituting numbers.
- ☐ State and interpret a nonzero-denominator condition.

Next class: investigate when an input-output relationship is a function. Curriculum focus: TEKS A.12E.