Mai's acceptable water amounts

Mai wants 40 liters of water, plus or minus 4 liters. Exactly 4 liters below or above 40 is acceptable.

Let x be the amount of water in liters. The center is 40; the allowed distance is 4 liters or less.

At 40 liters, the difference is zero. The tank still contains 40 liters.

(a) Write the condition

$$|x - 40| \leq 4$$

The amount is no more than 4 liters from 40.

(b) Solve it

The difference lies between −4 and 4.

$$-4 \leq x - 40 \leq 4$$

Add 40 to all three parts.

$$-4 + 40 \leq x - 40 + 40 \leq 4 + 40$$

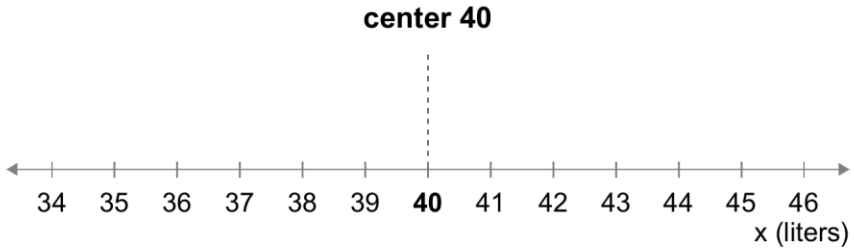
$$36 \leq x \leq 44$$

x is at least 36 AND at most 44.

40 is the center. 36 and 44 are the boundaries.

(c) Your turn Graph the solution

Mark both boundaries. Choose open or filled circles. Shade every acceptable amount.



(d) Explain what the solution means

Complete the statement using liters.

Mai can have at least _____ liters

AND at most _____ liters.

Check a boundary Does exactly 44 liters meet the requirement?

Substitute 44 into the original absolute value inequality. Explain why it passes or fails.

The graph shows amounts of water, not differences from 40.

TOPIC ID: **26A-C1**	TOPIC TITLE: Absolute value inequalities	
NAME:	BLOCK:	DATE: October 13, 2026

FORESTHILL HIGH SCHOOL

LEARNING PAPER EVIDENCE

Mai's unacceptable water amounts

Mai still wants 40 liters, plus or minus 4 liters. Both limit values are acceptable.

An amount fails when it is more than 4 liters from 40: too little OR too much.

Let x be the water amount in liters. Keep the same center and boundaries; change which values qualify.

(a) Write the failure condition

$$|x - 40| > 4$$

(b) Complete the branches and solve

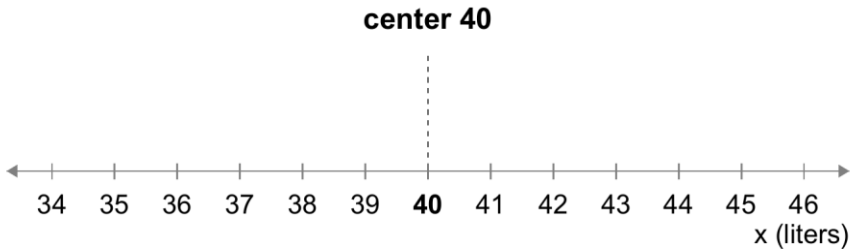
The difference is below −4 OR above 4.

$$x - 40 < ____ \quad or \quad x - 40 > ____$$

Add 40 to both sides of each inequality.
Show the operations, then write both solutions.

(c) Graph all amounts that fail

Mark the boundaries. Choose open or filled circles and shade all solutions.



(d) Explain which amounts fail

Include liters and use OR.

Check the boundary Does exactly 44 liters fail?

Use |44 − 40| > 4 to justify your answer and your choice of boundary circles.

Try a new center

A wood strip must be 10 inches long, plus or minus 0.5 inch. Both limits pass. Let x be its length in inches.

For |x − 10| ≤ 0.5, write the two conditions on x. Join them with AND or OR.

Keep both sheets for Day 2. Algebraic rays continue indefinitely; actual water amounts and lengths cannot be negative.