

TEACHER AND STUDENT RESOURCE

Create Models, Solve Constraints, Validate Answers



NC Math 3 • NC.M3.A-CED.1

Creating Equations

Seven instructional sections with 30 multiple-choice and 30 open or performance tasks, teaching scripts, original mathematical visuals, generous workspaces, and worked keys.

Free sample | Contents

NC.M3.A-CED.1 | NC Math 3 mathematics

This sample contains 21 complete selected pages from the 109-page resource, plus this sample contents page. Original printed page numbers are retained. Gaps are intentional.

Included original pages: 1-16, 31-32, 61, 86-87

Representative activities

M01: sample PDF page(s) 17; original page(s) 16

M02: sample PDF page(s) 17; original page(s) 16

O01: sample PDF page(s) 18; original page(s) 31

O02: sample PDF page(s) 19; original page(s) 32

Selected teacher prompts and keys: original page(s) 61, 86-87

Using this sample

Read the preparation and access guidance before using a selected activity.
Keep teacher keys and private preparation pages separate from student copies.
Use the original resource contents to see the scope of the complete packet.

Complete paid download

The complete resource includes the full PDF task bank and teaching materials.

ALIGNMENT

Standard and learning targets

Create equations and inequalities in one variable that represent absolute value, polynomial, exponential, and rational relationships and use them to solve problems algebraically and graphically.

T1 Create and solve absolute-value equations and inequalities for distances, deviations and simultaneous tolerance conditions, checking endpoints and feasible intervals.

T2 Create polynomial equations and inequalities from geometric, revenue and output relationships; solve algebraically and graphically while preserving the contextual domain.

T3 Create exponential equations and inequalities from initial values, multipliers and time intervals; distinguish continuous crossings, strict thresholds and discrete observations.

T4 Create rational equations and inequalities for averages, rates, mixtures and signed responses; use denominator signs, units and domain restrictions to validate solutions.

Each item names its own target. The bank supports multiple sessions; do not assign all 60 tasks in one sitting.

NAVIGATION

Choose evidence deliberately

Warm-up: M01-M04 and O01-O04

I Do: M05-M08 and O05-O08

We Do: M09-M13 and O09-O13

Collaborative practice: M14-M18 and O14-O18

Independent practice: M19-M23 and O19-O23

Small-group reteach: M24-M27 and O24-O27

Exit ticket: M28-M30 and O28-O30

T1: M01, M05, M09, M18, M24, O01, O05, O12, O18, O23, O29

T2: M02, M06, M10, M11, M14, M16, M20, M23, M25, M28, M30, O02, O06, O09, O13, O17, O21, O25, O28

T3: M03, M07, M12, M17, M21, M27, O03, O07, O10, O15, O19, O24, O27

T4: M04, M08, M13, M15, M19, M22, M26, M29, O04, O08, O11, O14, O16, O20, O22, O26, O30

DAILY LEARNING TARGETS

A multi-session teaching path

Session 1: Quantities, units and one-variable models

Learning target: Create distance, polynomial, exponential and rational target statements.

Learning target: Define the variable and domain before solving.

Use Warm-up and I Do tasks to contrast similar-looking contexts with different operations. Collect an individual model before showing the core solution.

Session 2: Complete solution sets and graphical evidence

Learning target: Use graphs and algebra to recover full inequality intervals or multiple solutions.

Learning target: Distinguish continuous domains from integer observations and physical constraints.

Use We Do and Collaborative tasks. Provide separate first attempts before group comparison. Require checks of endpoints and rejected candidates, not just one successful input.

Session 3: Diagnose and transfer across the four families

Learning target: Repair a wrong model or lost solution using original context.

Learning target: Explain infeasible targets, asymptotic behavior and strict thresholds.

Use Independent tasks, targeted Small-group practice and Exit evidence. Ask for model, solution and validation as separate evidence components.

PLANNING

Materials, access and pacing

Materials

Pencils, erasers, straightedge, student pages, and optional graph paper. A calculator may support arithmetic after a learner states the intended relationship. No device or paid software is required.

Prerequisites

Interpret absolute value as distance; factor basic polynomials; use rational-number operations, exponential multipliers and graph intersections. Read interval endpoints and distinguish a quantity from its unit rate.

Pacing

Use a short diagnostic warm-up, a model and shared task in one session; collaborative and independent reasoning in later sessions; then targeted reteaching and an exit task. Select two to four tasks at a time based on evidence. Each section's full bank is reusable, not mandatory in one lesson.

Neutral access

Read directions aloud without interpreting the graph, enlarge a page, supply a writing or pointing response method, and allow a learner to dictate an explanation. Keep axes, units, data and mathematical demand unchanged.

Separate instruction from evidence

Keep the learner's first response. Record answer-supplying cues separately from access supports. A completed teacher graph or worked key is for discussion after independent work, never a student construction template.

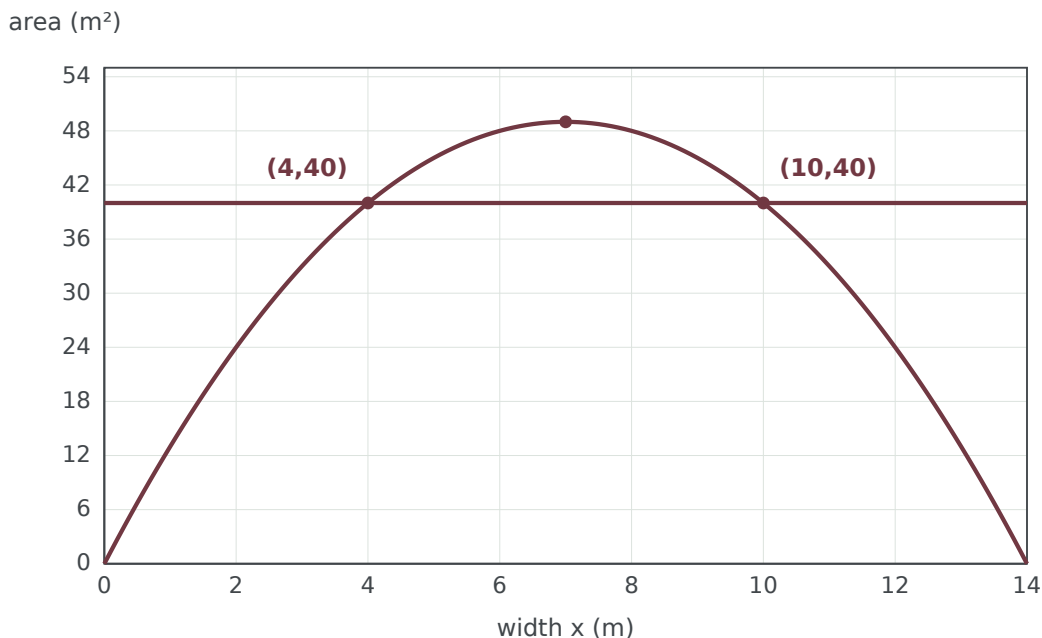
Review convention

All contexts and data are hypothetical instructional models. Exact values are preferred unless an approximation is requested. Inputs are real unless a whole-number domain is explicitly stated. A graph gives evidence but does not replace checking original restrictions. Exponents use $^$ notation; `sqrt` and `cube_root` denote the nonnegative square root and real cube root respectively.

TEACHER MODEL

From a dimension description to a whole feasible interval

A rectangular enclosure has perimeter 28 m and must have area at least 40 m². Define one variable, create the inequality, solve it algebraically, and interpret a graph of the area.



Let width be $x > 0$. Since $2x + 2L = 28$, length $L = 14 - x$ and positivity also requires $x < 14$. Area is $x(14 - x)$, so the model is $x(14 - x) \geq 40$ on $0 < x < 14$. Rearranging gives $x^2 - 14x + 40 \leq 0$, or $(x - 4)(x - 10) \leq 0$, so $4 \leq x \leq 10$. The graph of $A = x(14 - x)$ has vertex (7, 49), meets $A = 40$ at $x = 4$ and 10, and lies above that line between the intersections. All these widths are feasible; $x = 4$ and $x = 10$ describe the same dimensions in opposite orientation. A width such as 7 gives area 49, demonstrating why solving only the boundary equation is not enough.

VISUAL ANCHOR

Model first, solve second, validate last

Define the one variable, its units and its allowed domain.

**Translate the relationship: deviation $\rightarrow$ absolute value;
area/volume/revenue $\rightarrow$ polynomial products.**

**Translate repeated proportional change $\rightarrow$ initial amount $\times$
multiplier^(interval count).**

**Translate averages, times, rates and concentrations $\rightarrow$ rational
expressions with meaningful denominators.**

Match language: exactly $=$, at least $\geq$, at most $\leq$, strictly more $>$.

**Use algebra and graphs to find every branch, interval or isolated
solution.**

**Check original conditions, endpoints, denominator signs and integer
restrictions.**

A correct algebraic calculation can solve the wrong model. Keep a line connecting each symbol and operation to the quantities before manipulating the equation or inequality.

REUSABLE REASONING GUIDE

Represent, justify, interpret

Name: _____ Date: _____

Givens, quantities and restrictions**Representation and calculation****Justification or check****Conclusion, domain and units**

WARM-UP

Teaching script

Core: O01 • T1: Create and solve absolute-value equations and inequalities for distances, deviations and simultaneous tolerance conditions, checking endpoints and feasible intervals.

Optional bank: M01–M04; O01–O04. Select tasks across more than one meeting if needed.

Suggested discussion/work time: 5–8 minutes. Adjust for access and evidence; this is not a speed criterion.

Use O01 to make the meaning of distance from a target visible before algebra. In O02 distinguish the area product from a perimeter sum. O03 counts 2-hour intervals; ask what the exponent equals after exactly one interval. O04 separates total and average cost. For each, collect variable, units and domain before any solving.

Core task

An instrument accepts temperature T when it is within 0.4 degrees of 37.5, including the boundary. Create and solve an absolute-value inequality. Draw deviation versus temperature and the tolerance line, label the two boundary temperatures, and explain the accepted portion of your graph.

Teacher solution and discussion

Deviation from the target is $|T-37.5|$. The model $|T-37.5| \leq 0.4$ becomes $-0.4 \leq T-37.5 \leq 0.4$, so $37.1 \leq T \leq 37.9$. Draw the V-shaped graph $y=|T-37.5|$ with vertex $(37.5,0)$ and horizontal $y=0.4$. Their intersections are $(37.1,0.4)$ and $(37.9,0.4)$. The V is on or below the line between these temperatures, including both intersections. At either endpoint the deviation is exactly 0.4.

Evidence and response

Connect the two-sided tolerance to an inclusive inequality, complete the labeled graph, and interpret all accepted temperatures rather than only its boundary points. Ask the learner to point to the calculation or representation supporting the claim. A selected option alone does not identify a unique misconception.

Closure: Ask learners to state one feature they verified and one check they used. Use the worked key for M01 to compare all alternatives after evidence is collected.

I DO

Teaching script

Core: 005 • T1: Create and solve absolute-value equations and inequalities for distances, deviations and simultaneous tolerance conditions, checking endpoints and feasible intervals.

Optional bank: M05–M08; 005–008. Select tasks across more than one meeting if needed.

Suggested discussion/work time: 10–12 minutes. Adjust for access and evidence; this is not a speed criterion.

Model 005 by three line regions and explain why an equation can have no middle-interval solutions. 006 has two feasible boxes, so trace both intersections before rejecting the third root. 007 separates the equality crossing from the inclusive later-time interval. 008 tracks solute amount and total volume on separate lines before making their ratio.

Core task

Beacons lie at positions -2 and 4 on a straight line. Create an equation for positions whose sum of distances to the beacons is 10. Solve by considering the three position intervals, check every solution, and explain why the interval between the beacons contributes no solution.

Teacher solution and discussion

The equation is $|x+2|+|x-4|=10$. For $x \leq -2$, the sum is $-(x+2)+(4-x)=2-2x$, giving $x=-4$, which fits that interval. For $-2 \leq x \leq 4$, the sum is $(x+2)+(4-x)=6$, never 10. For $x \geq 4$, the sum is $(x+2)+(x-4)=2x-2$, giving $x=6$. At -4 the distances are 2 and 8; at 6 they are 8 and 2. Both sums are 10, and the interval analysis exhausts every real position.

Evidence and response

Write both distances, use piecewise signs with valid interval checks, and establish that no unexamined positions or middle-interval solutions remain. Ask the learner to point to the calculation or representation supporting the claim. A selected option alone does not identify a unique misconception.

Closure: Ask learners to state one feature they verified and one check they used. Use the worked key for M05 to compare all alternatives after evidence is collected.

WE DO

Teaching script

Core: 009 • T2: Create polynomial equations and inequalities from geometric, revenue and output relationships; solve algebraically and graphically while preserving the contextual domain.

Optional bank: M09–M13; 009–O13. Select tasks across more than one meeting if needed.

Suggested discussion/work time: 10–15 minutes. Adjust for access and evidence; this is not a speed criterion.

In O09 ask which prices lie above the target, not merely where graphs meet. O10 exhausts a finite integer domain with a table; avoid turning a finite check into an unsupported all-time proof. O11 requires the still-water speed to exceed the current. O12 uses one counterexample to expose a missing lower bound. O13 uses a positive quadratic factor to make the inequality solution complete.

Core task

A continuous pricing model predicts $60-3p$ sales at price p dollars, for $0 \leq p \leq 20$. Create and solve an inequality for revenue at least \$225. Draw revenue and its target, and interpret why selecting only the two intersection prices would miss valid choices.

Teacher solution and discussion

Revenue is $R(p) = p(60-3p) = 60p-3p^2$. The requirement is $60p-3p^2 \geq 225$. Dividing the rearranged inequality by -3 gives $p^2-20p+75 \leq 0$, so $(p-5)(p-15) \leq 0$ and $5 \leq p \leq 15$. This is within the stated domain. The graph is a downward parabola with vertex $(10,300)$, crossing $R=225$ at $p=5$ and 15 . It lies on or above the line throughout $[5,15]$. Those two prices meet the target exactly; interior prices exceed it, so an equation-only answer is incomplete.

Evidence and response

Create revenue rather than sales, solve and graph an inequality with both boundary prices, and interpret the whole feasible interval in the continuous planning model. Ask the learner to point to the calculation or representation supporting the claim. A selected option alone does not identify a unique misconception.

Closure: Ask learners to state one feature they verified and one check they used. Use the worked key for M09 to compare all alternatives after evidence is collected.

COLLABORATIVE PRACTICE

Teaching script

Core: O14 • T4: Create rational equations and inequalities for averages, rates, mixtures and signed responses; use denominator signs, units and domain restrictions to validate solutions.

Optional bank: M14–M18; O14–O18. Select tasks across more than one meeting if needed.

Suggested discussion/work time: 15–20 minutes. Adjust for access and evidence; this is not a speed criterion.

For O14 assign a units checker to compare job-per-hour rates with completion times. O15 requires dividing observations across two periods, then taking the positive multiplier. O16 reconstructs a rational model before imposing a new budget. In O17 compare the isolated zero-time solution with the negative interval. O18 requires every distance-sign region, including positions beyond both stations.

Core task

A pump alone fills a tank in 6 hours. A second pump alone takes x hours. With both pumping at constant rates, the tank fills in 2 hours. Create and solve an equation, then explain why adding their individual completion times is not the correct model.

Teacher solution and discussion

The first rate is $\frac{1}{6}$ tank per hour, the second is $\frac{1}{x}$, and the combined rate is $\frac{1}{2}$. Thus $\frac{1}{6} + \frac{1}{x} = \frac{1}{2}$ with $x > 0$. Subtracting yields $\frac{1}{x} = \frac{1}{3}$, so $x = 3$ hours. In 2 hours, the first pump fills $\frac{2}{6} = \frac{1}{3}$ of the tank and the second fills $\frac{2}{3}$, summing to 1. Adding $6 + x$ instead combines durations of separate full-tank jobs, not simultaneous fractions completed in the same time.

Evidence and response

Convert completion times to rates, solve with positive time, and verify a full tank by the two contributions over the shared 2-hour interval. Ask the learner to point to the calculation or representation supporting the claim. A selected option alone does not identify a unique misconception.

Closure: Ask learners to state one feature they verified and one check they used. Use the worked key for M14 to compare all alternatives after evidence is collected.

INDEPENDENT PRACTICE

Teaching script

Core: O19 • T3: Create exponential equations and inequalities from initial values, multipliers and time intervals; distinguish continuous crossings, strict thresholds and discrete observations.

Optional bank: M19–M23; O19–O23. Select tasks across more than one meeting if needed.

Suggested discussion/work time: 15–20 minutes. Adjust for access and evidence; this is not a speed criterion.

O19 separates a one-time loss from repeated gains. O20 requires both denominator signs and a graph with two branches. O21 charges only for the new path, not the existing garden. O22 asks why approaching a horizontal target does not attain it. O23 reverses the usual task: construct an absolute-value model with a prescribed interval and explain the constants.

Core task

A hypothetical stock of material starts at 1000 units, immediately loses 10%, and then gains 20% after each completed cycle. Create an inequality for reaching at least 1500 units after the loss. Find the first whole cycle and show checks that establish minimality.

Teacher solution and discussion

The immediate loss leaves $1000 \cdot 0.90 = 900$ units. After n completed cycles the amount is $900(1.20)^n$, with n a nonnegative integer. The condition is $900(1.20)^n \geq 1500$. The sequence increases. At $n=2$ it gives $900 \cdot 1.44 = 1296 < 1500$; at $n=3$ it gives $900 \cdot 1.728 = 1555.2 \geq 1500$. Therefore the first whole cycle is 3. The initial loss is a multiplier applied once, not a subtraction of 10 units or a recurring loss every cycle.

Evidence and response

Place a one-time percentage change in the initial factor, a repeated change in the exponent, and prove the earliest integer crossing with neighboring values. Ask the learner to point to the calculation or representation supporting the claim. A selected option alone does not identify a unique misconception.

Closure: Ask learners to state one feature they verified and one check they used. Use the worked key for M19 to compare all alternatives after evidence is collected.

SMALL-GROUP RETEACH

Teaching script

Core: O24 • T3: Create exponential equations and inequalities from initial values, multipliers and time intervals; distinguish continuous crossings, strict thresholds and discrete observations.

Optional bank: M24–M27; O24–O27. Select tasks across more than one meeting if needed.

Suggested discussion/work time: 10–15 minutes. Adjust for access and evidence; this is not a speed criterion.

Choose O24 for strict versus observed thresholds, O25 for a solution lost by division, O26 for a physically impossible mixture, or O27 for a zero asymptote confused with a positive crossing. Ask learners to identify exactly which modeling condition or algebraic assumption failed. Then collect a fresh uncued explanation from another family.

Core task

A continuous exponential model starts at 50 units and doubles every 4 hours. Create and solve an inequality for strictly more than 400 units. If it is checked only at whole-hour times, when is the first successful check? How would that first check change if observations were made only every 4 hours, starting at time zero?

Teacher solution and discussion

The model is $A(t) = 50 \cdot 2^{(t/4)}$, $t \geq 0$. Requiring $A > 400$ gives $2^{(t/4)} > 8 = 2^3$. Since base 2 is greater than 1, $t/4 > 3$, so $t > 12$. At $t = 12$ the amount is exactly 400 and fails the strict condition. The first whole-hour check is $t = 13$, with amount $400 \cdot 2^{(1/4)} > 400$. On the coarser observation times 0, 4, 8, 12, 16, ..., the first successful check is $t = 16$, when the amount is 800. Sampling changes the first observed success, not the underlying continuous crossing.

Evidence and response

Separate the continuous strict solution from two allowed observation schedules and explain why rounding to the equality time would be wrong. Ask the learner to point to the calculation or representation supporting the claim. A selected option alone does not identify a unique misconception.

Closure: Ask learners to state one feature they verified and one check they used. Use the worked key for M24 to compare all alternatives after evidence is collected.

EXIT TICKET

Teaching script

Core: O28 • T2: Create polynomial equations and inequalities from geometric, revenue and output relationships; solve algebraically and graphically while preserving the contextual domain.

Optional bank: M28–M30; O28–O30. Select tasks across more than one meeting if needed.

Suggested discussion/work time: 5–8 minutes. Adjust for access and evidence; this is not a speed criterion.

O28 tests a positive-edge domain and an odd-power inequality without an unnecessary sign branch. O29 intersects two tolerance sets and checks each endpoint against both tests. O30 distinguishes no exact integer solution from a feasible budget interval. Record evidence separately for model creation, solving and original-condition validation; a selected answer alone does not establish all three.

Core task

A device makes cubes with edge $2t-1$ cm at setting t . The edge must be positive and volume must be at least 125 cm^3 . Create and solve the polynomial inequality and give the smallest feasible setting. Explain why taking a real cube root does not create a second sign branch.

Teacher solution and discussion

Positive edge requires $t > 1/2$. Volume is $(2t-1)^3$, so the condition is $(2t-1)^3 \geq 125$. The real cube function is strictly increasing; therefore taking its real cube root preserves the inequality and gives $2t-1 \geq 5$, hence $t \geq 3$. This already satisfies the positive-edge requirement. At $t=3$ the edge is 5 cm and volume 125 cm^3 . Unlike squaring, cubing is one-to-one on the reals; -5 cubes to -125 , so no ± 5 branch belongs to the cube-root step.

Evidence and response

Construct the volume from the entire edge expression, use monotonicity of a real odd power, and intersect with the original positive-edge domain. Ask the learner to point to the calculation or representation supporting the claim. A selected option alone does not identify a unique misconception.

Closure: Ask learners to state one feature they verified and one check they used. Use the worked key for M28 to compare all alternatives after evidence is collected.

MULTIPLE-CHOICE BANK

M01 / M02 • Select and justify**M01 | Warm-up | T1**

A rod is acceptable when its length L is no more than 0.2 cm from 20 cm.

Which one-variable model and interval describe acceptance?

- A. $|L-20| < 0.2$; $19.8 < L < 20.2$.
- B. $|L-20| \geq 0.2$; $L \leq 19.8$ or $L \geq 20.2$.
- C. $|L-20| \leq 0.2$; $19.8 \leq L \leq 20.2$.
- D. $|L| \leq 20.2$; $-20.2 \leq L \leq 20.2$.

Reasoning: _____

M02 | Warm-up | T2

A square picture has side 4 cm. A uniform border of width x cm makes the total outside area 64 cm^2 . Which equation and feasible width follow?

- A. $(4+2x)^2 = 64$; $x = -6$.
- B. $4^2 + 4x^2 = 64$; $x = \sqrt{12}$.
- C. $(4+2x)^2 = 64$; $x = 2$.
- D. $(4+x)^2 = 64$; $x = 4$.

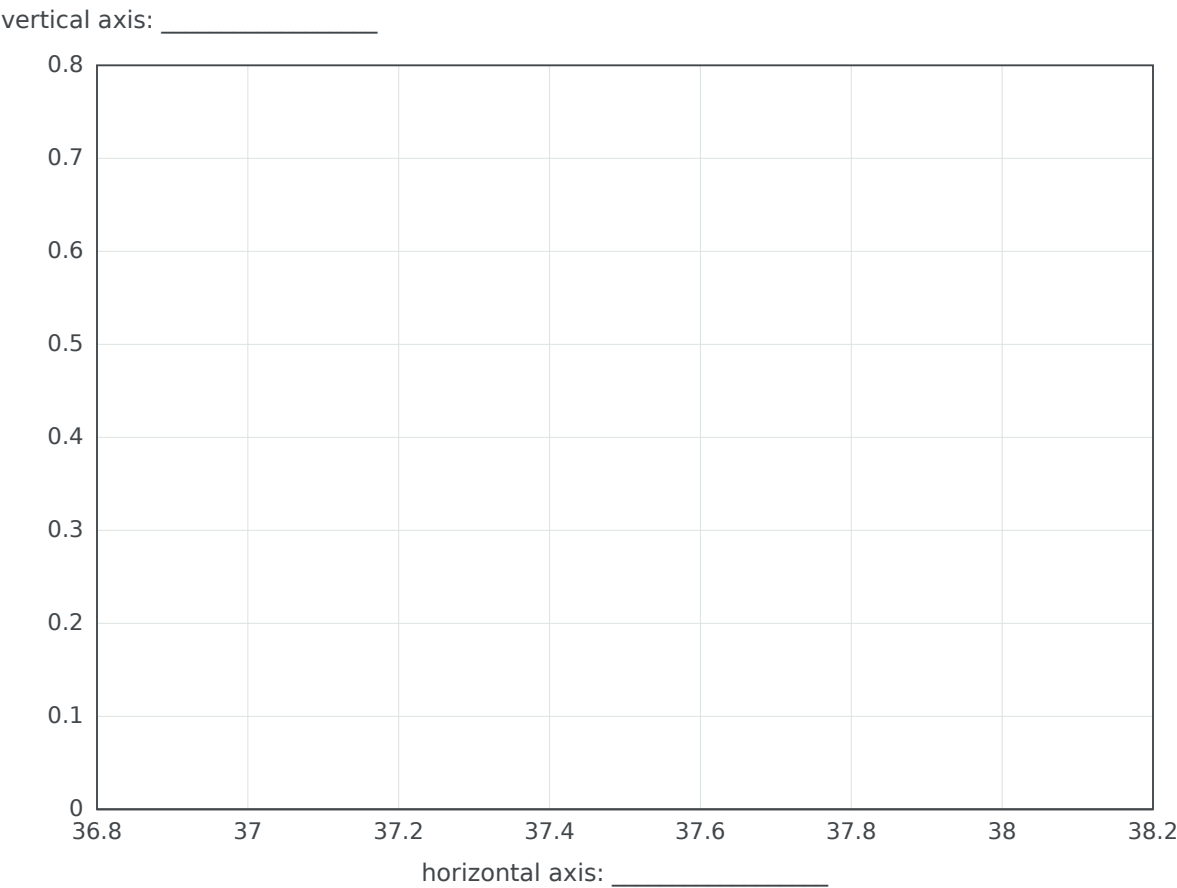
Reasoning: _____

WARM-UP

001 • Show your reasoning

T1: Create and solve absolute-value equations and inequalities for distances, deviations and simultaneous tolerance conditions, checking endpoints and feasible intervals.

An instrument accepts temperature T when it is within 0.4 degrees of 37.5, including the boundary. Create and solve an absolute-value inequality. Draw deviation versus temperature and the tolerance line, label the two boundary temperatures, and explain the accepted portion of your graph.



Explanation and check

WARM-UP

002 • Show your reasoning

T2: Create polynomial equations and inequalities from geometric, revenue and output relationships; solve algebraically and graphically while preserving the contextual domain.

A garden is 5 m longer than it is wide and has area 84 m². Define one variable, create an equation, solve it algebraically, and verify every feasible dimension. Explain why the other real root does not describe the garden.

Representation / calculation

Explanation / check

WORKED TEACHER KEYS

M01 / M02

M01 • T1: Create and solve absolute-value equations and inequalities for distances, deviations and simultaneous tolerance conditions, checking endpoints and feasible intervals.

Answer: C. $|L-20| \leq 0.2$; $19.8 \leq L \leq 20.2$.

Absolute difference measures deviation from 20. Thus $|L-20| \leq 0.2$ is equivalent to $-0.2 \leq L-20 \leq 0.2$, giving $19.8 \leq L \leq 20.2$. Both boundary lengths are acceptable because equality is allowed.

Check each alternative

- A. No more than includes lengths exactly 0.2 cm from the target.
- B. This describes deviations at least as large as the tolerance, not at most that tolerance.
- C. Correct. Absolute difference measures deviation from 20. Thus $|L-20| \leq 0.2$ is equivalent to $-0.2 \leq L-20 \leq 0.2$, giving $19.8 \leq L \leq 20.2$. Both boundary lengths are acceptable because equality is allowed.
- D. This measures distance from zero instead of from the target length 20.

Evidence to assess

Translate deviation and inclusive language, then recover both endpoints with their units.

M02 • T2: Create polynomial equations and inequalities from geometric, revenue and output relationships; solve algebraically and graphically while preserving the contextual domain.

Answer: C. $(4+2x)^2=64$; $x=2$.

Each outside side is $4+2x$ and $x \geq 0$. Squaring gives the area model. From $4+2x = \pm 8$, the algebraic roots are 2 and -6; only $x=2$ is feasible. The outside square then has side 8 and area 64.

Check each alternative

- A. This is an algebraic root but gives a negative border width and outside side.
- B. This omits the four rectangular strips along the picture sides.
- C. Correct. Each outside side is $4+2x$ and $x \geq 0$. Squaring gives the area model. From $4+2x = \pm 8$, the algebraic roots are 2 and -6; only $x=2$ is feasible. The outside square then has side 8 and area 64.
- D. A border is added at both ends of each outside side, so the increase is $2x$.

Evidence to assess

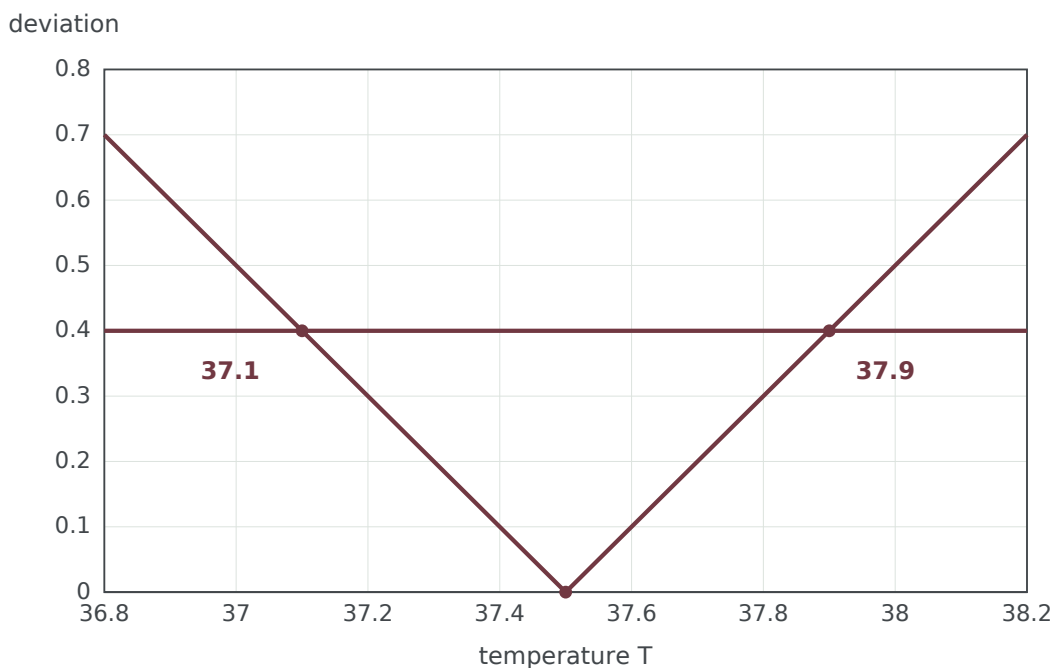
Build the outside dimension before squaring and reject a root using the original length domain.

WORKED TEACHER KEYS

001

001 • T1: Create and solve absolute-value equations and inequalities for distances, deviations and simultaneous tolerance conditions, checking endpoints and feasible intervals.

Deviation from the target is $|T-37.5|$. The model $|T-37.5| \leq 0.4$ becomes $-0.4 \leq T-37.5 \leq 0.4$, so $37.1 \leq T \leq 37.9$. Draw the V-shaped graph $y=|T-37.5|$ with vertex $(37.5,0)$ and horizontal $y=0.4$. Their intersections are $(37.1,0.4)$ and $(37.9,0.4)$. The V is on or below the line between these temperatures, including both intersections. At either endpoint the deviation is exactly 0.4.

**Evidence to assess**

Connect the two-sided tolerance to an inclusive inequality, complete the labeled graph, and interpret all accepted temperatures rather than only its boundary points.

WORKED TEACHER KEYS

002 / 003

002 • T2: Create polynomial equations and inequalities from geometric, revenue and output relationships; solve algebraically and graphically while preserving the contextual domain.

Let x be the width in meters, with $x > 0$; the length is $x + 5$. Area gives $x(x + 5) = 84$, or $x^2 + 5x - 84 = 0 = (x + 12)(x - 7)$. The real roots are -12 and 7 . Width -12 is impossible and would also give a negative length -7 . The feasible width is 7 m and length 12 m. Their difference is 5 m and their product is 84 m², verifying both original conditions.

Evidence to assess

Define a meaningful variable and domain, construct the product equation, solve both roots and use both original conditions to validate the positive dimensions.

003 • T3: Create exponential equations and inequalities from initial values, multipliers and time intervals; distinguish continuous crossings, strict thresholds and discrete observations.

Let $t \geq 0$ be hours. The number of 2-hour intervals is $t/2$, so $A(t) = 200(1.5)^{(t/2)}$. The target equation reduces to $(1.5)^{(t/2)} = 675/200 = 27/8 = (3/2)^3$. Therefore $t/2 = 3$ and $t = 6$ hours. This is the unique first time because the model strictly increases. Exponent $2t$ would count two intervals per hour and would reach exponent 3 after only 1.5 hours; it describes a half-hour growth interval rather than a 2-hour interval.

Evidence to assess

Create the model from its initial amount and clock, solve by matching powers, and explicitly distinguish elapsed hours from the count of growth intervals.