

TEACHER AND STUDENT RESOURCE

Interpret and evaluate linear predictions



NC Math 1 • NC.M1.S-ID.7

Statistics and Probability

Seven instructional sections • 30 multiple-choice tasks • 30 open or performance tasks. Includes exact alignment, teaching models, technology directions where needed, reusable organizers, student workspaces, worked keys and evidence records.

Free sample | Contents

NC.M1.S-ID.7 | NC Math 1 mathematics

This sample contains 30 complete selected pages from the 203-page resource, plus this sample contents page. Original printed page numbers are retained. Gaps are intentional.

Included original pages: 1-22, 51-54, 111-112, 141, 143

Representative activities

M01: sample PDF page(s) 22; original page(s) 21

M02: sample PDF page(s) 23; original page(s) 22

O01: sample PDF page(s) 24-25; original page(s) 51-52

O02: sample PDF page(s) 26-27; original page(s) 53-54

Selected teacher prompts and keys: original page(s) 8, 111-112, 141, 143

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

Interpret in context the rate of change and the intercept of a linear model. Use the linear model to interpolate and extrapolate predicted values. Assess the validity of a predicted value.

T1 • Interpret model rate of change in context and units.

T2 • Interpret the intercept and assess whether zero is meaningful.

T3 • Use a model to interpolate and extrapolate values.

T4 • Assess prediction validity using domain, fit and process limits.

Current NC Math 1 standards apply during 2026–27 and 2027–28. Newly adopted standards begin in 2028–29. Course content is not assigned to a fixed high-school grade.

NAVIGATION

Plan several learning sessions

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, M06, M07, M12, M13, M18, M19, M24, M25, M30, O01, O02, O03, O04, O05, O06, O07, O08, O09, O10, O11, O12, O13, O14, O15, O16, O17, O18, O19, O20, O21, O22, O23, O24, O25, O26, O27, O28, O29, O30

T2: M02, M08, M14, M20, M26, O01, O02, O03, O04, O05, O06, O07, O08, O09, O10, O11, O12, O13, O14, O15, O16, O17, O18, O19, O20, O21, O22, O23, O24, O25, O26, O27, O28, O29, O30

T3: M03, M04, M09, M10, M15, M16, M21, M22, M27, M28, O01, O02, O03, O04, O05, O06, O07, O08, O09, O10, O11, O12, O13, O14, O15, O16, O17, O18, O19, O20, O21, O22, O23, O24, O25, O26, O27, O28, O29, O30

T4: M05, M11, M17, M23, M29, O01, O02, O03, O04, O05, O06, O07, O08, O09, O10, O11, O12, O13, O14, O15, O16, O17, O18, O19, O20, O21, O22, O23, O24, O25, O26, O27, O28, O29, O30

PLANNING

Materials, access and evidence

Materials

Student pages, pencil, straightedge and graph paper. A calculator may support substitution; the interpretation and graph must remain the learner's work. Teacher keys are revealed after learners produce evidence.

Prerequisites

Read ordered pairs, distinguish explanatory and response variables, interpret units, evaluate formulas, and use a coordinate plane. Understand that a model is an estimate, not a promise that every observation lies on the line.

Pacing

Use two to four selected items per meeting, with more time for technology and study-design tasks. Session 1: interpret representations and model the process. Session 2: construct and analyze jointly. Session 3: collaborate and independently transfer. Session 4: targeted reteaching and exit evidence. The 60-item bank is reusable across multiple sessions.

Access

Read directions, enlarge graphs, allow dictation or alternate input devices, and provide neutral technology navigation support. Keep the data and mathematical demand unchanged. Record answer-supplying cues separately from access support.

Precision

Data are exactly the displayed fictional values. Keep full precision in regression coefficients and intermediate calculations. Final numerical results use 3 decimals unless stated otherwise, with halfway cases rounded away from zero. For open responses, accept values within 0.002 of full-precision calculations. For MC, select the correctly rounded option exactly. Do not use rounded coefficients to judge more precise predictions.

Evidence

Preserve the first independent response, the learner's original diagram or graph, and the explanation. Record neutral access supports separately from hints or answer-supplying cues. A copied teacher model is not evidence of independent understanding.

TEACHER MODEL

From data to a defensible claim

A fictional tank has $\hat{y} = 3.2x + 12$ liters for x minutes, with observed times 2–8 minutes. The slope means 3.2 additional predicted liters per minute. The intercept predicts 12 liters at time zero, outside the observed interval, so it needs contextual verification. At $x=5$, $\hat{y}=28$ L: interpolation. At $x=12$, $\hat{y}=50.4$ L: extrapolation. A 45 L tank cannot contain 50.4 L, so the later prediction is physically invalid even though substitution is correct.

Ask: “Which part is an arithmetic question, and which part needs knowledge of the process?” Compute the modeled capacity time: $(45-12)/3.2=10.3125$ minutes. That time is itself beyond the observed range; use it as a warning that the model cannot remain valid indefinitely, not a verified filling time. Request additional observations and capacity information.

REUSABLE ORGANIZER

Build an evidence chain

Variables, units, domain or study design

Representation / calculations / proposed causal diagram

Evidence supporting and challenging the claim

Conclusion, uncertainty and next evidence needed

WARM-UP

Teaching script and response plan

Core task O01. Optional bank: M01–M04; O01–O04. Select a few tasks; allow additional sessions for construction and technology.

Learning target: Interpret model rate of change in context and units.; Interpret the intercept and assess whether zero is meaningful.; Use a model to interpolate and extrapolate values.; Assess prediction validity using domain, fit and process limits.

Collect a first response. Ask learners to name the two variables and identify what the evidence can establish before calculating or debating the claim.

Ask: “What do the units or study design let you conclude? Which extra assumption does the stronger claim require?”

WARM-UP

001 • Core-task teacher solution

Slope 4.07 meters per minute: each additional minute increases the predicted distance-counter reading by 4.07 meters. Intercept 27 meters predicts the distance-counter reading at $x=0$. Zero is in the observed interval, but this is still a fitted estimate. The counter may already have a nonzero reading when timing starts. At $x=4.8$: $\hat{y} = 4.07(4.8) + 27 \approx 46.536$ meters, interpolation. At $x=16$: $\hat{y} = 4.07(16) + 27 = 92.12$ meters, extrapolation. Draw the observed segment through $(0, 27)$ and $(12, 75.84)$; mark both requested predictions. The roughly straight scatter and small pattern-free residuals support descriptive fit on the observed interval. The ± 1.2 residual range is not a guaranteed future error bound. A conveyor may stop or change speed. The interior estimate has better support; the later estimate needs new distance readings and confirmation of the operating speed.

Evidence response: distinguish a wrong calculation from an unsupported interpretation. Revisit the relevant representation, then choose a fresh item from the bank. Suggested discussion: 10–20 minutes; adjust to evidence and access, never a fluency cutoff.

I DO

Teaching script and response plan

Core task O05. Optional bank: M05–M08; O05–O08. Select a few tasks; allow additional sessions for construction and technology.

Learning target: Interpret model rate of change in context and units.; Interpret the intercept and assess whether zero is meaningful.; Use a model to interpolate and extrapolate values.; Assess prediction validity using domain, fit and process limits.

Model the core task aloud using the exact data. Predict the form first, show each operation or causal arrow, and explain why the conclusion follows. Do not let learners copy a completed graph as independent evidence.

Ask: “What do the units or study design let you conclude? Which extra assumption does the stronger claim require?”

I DO

005 • Core-task teacher solution

Slope -4.07 meters per minute: each additional minute decreases the predicted remaining cable length by 4.07 meters. Intercept 44 meters predicts the remaining cable length at $x=0$. Zero is in the observed interval, but this is still a fitted estimate. At $x=4$: $\hat{y} = -4.07(4) + 44 \approx 27.72$ meters, interpolation. At $x=18$: $\hat{y} = -4.07(18) + 44 = -29.26$ meters, extrapolation. Draw the observed segment through $(0, 44)$ and $(10, 3.3)$; mark both requested predictions. The roughly straight scatter and small pattern-free residuals support descriptive fit on the observed interval. The ± 1.2 residual range is not a guaranteed future error bound. The later prediction -29.26 meters is physically invalid: remaining cable cannot be negative. More observations cannot validate a negative remaining length; the process/model must change when the spool empties. The modeled emptying time is 10.811 minutes, itself an extrapolation rather than a verified time. The interior prediction has better support but still has uncertainty.

Evidence response: distinguish a wrong calculation from an unsupported interpretation. Revisit the relevant representation, then choose a fresh item from the bank. Suggested discussion: 10–20 minutes; adjust to evidence and access, never a fluency cutoff.

WE DO

Teaching script and response plan

Core task O09. Optional bank: M09–M13; O09–O13. Select a few tasks; allow additional sessions for construction and technology.

Learning target: Interpret model rate of change in context and units.; Interpret the intercept and assess whether zero is meaningful.; Use a model to interpolate and extrapolate values.; Assess prediction validity using domain, fit and process limits.

Ask learners to propose one step at a time. Have a second learner verify units, data pairing and the meaning of a sign or arrow. Invite a competing interpretation and test it against the prompt.

Ask: “What do the units or study design let you conclude? Which extra assumption does the stronger claim require?”

WE DO

009 • Core-task teacher solution

Slope 4.07 pages per minute: each additional minute increases the predicted page-counter reading by 4.07 pages. Intercept 12 pages predicts the page-counter reading at $x=0$. Zero is outside the observed interval, so the intercept needs contextual verification. The counter may already have a nonzero reading when timing starts. At $x=3.8$: $\hat{y} = 4.07(3.8) + 12 \approx 27.466$ pages, interpolation. At $x=13$: $\hat{y} = 4.07(13) + 12 = 64.91$ pages, extrapolation. Draw the observed segment through (1, 16.07) and (8, 44.56); mark both requested predictions. The roughly straight scatter and small pattern-free residuals support descriptive fit on the observed interval. The ± 1.2 residual range is not a guaranteed future error bound. Fractional predictions describe a model, not a fractional printed page. Check later counter readings, paper supply and pauses before using the extrapolation; the interior estimate has better support.

Evidence response: distinguish a wrong calculation from an unsupported interpretation. Revisit the relevant representation, then choose a fresh item from the bank. Suggested discussion: 10–20 minutes; adjust to evidence and access, never a fluency cutoff.

COLLABORATIVE PRACTICE

Teaching script and response plan

Core task O14. Optional bank: M14–M18; O14–O18. Select a few tasks; allow additional sessions for construction and technology.

Learning target: Interpret model rate of change in context and units.; Interpret the intercept and assess whether zero is meaningful.; Use a model to interpolate and extrapolate values.; Assess prediction validity using domain, fit and process limits.

Use reader, representer, checker and explainer roles. Each learner records an initial claim before the group compares evidence. Require each learner to produce a personal conclusion.

Ask: “What do the units or study design let you conclude? Which extra assumption does the stronger claim require?”

COLLABORATIVE PRACTICE

O14 • Core-task teacher solution

Slope 1.17 pages per minute: each additional minute increases the predicted page-counter reading by 1.17 pages. Intercept 15 pages predicts the page-counter reading at $x=0$. Zero is outside the observed interval, so the intercept needs contextual verification. The counter may already have a nonzero reading when timing starts. At $x=4.85$: $\hat{y} = 1.17(4.85) + 15 \approx 20.675$ pages, interpolation. At $x=11$: $\hat{y} = 1.17(11) + 15 = 27.87$ pages, extrapolation. Draw the observed segment through (1, 16.17) and (8, 24.36); mark both requested predictions. The roughly straight scatter and small pattern-free residuals support descriptive fit on the observed interval. The ± 1.2 residual range is not a guaranteed future error bound. Fractional predictions describe a model, not a fractional printed page. Check later counter readings, paper supply and pauses before using the extrapolation; the interior estimate has better support.

Evidence response: distinguish a wrong calculation from an unsupported interpretation. Revisit the relevant representation, then choose a fresh item from the bank. Suggested discussion: 10–20 minutes; adjust to evidence and access, never a fluency cutoff.

INDEPENDENT PRACTICE

Teaching script and response plan

Core task O19. Optional bank: M19–M23; O19–O23. Select a few tasks; allow additional sessions for construction and technology.

Learning target: Interpret model rate of change in context and units.; Interpret the intercept and assess whether zero is meaningful.; Use a model to interpolate and extrapolate values.; Assess prediction validity using domain, fit and process limits.

Provide the complete task and neutral access supports. Preserve unaided work, technology records and explanations before discussion. Ask only neutral clarification questions.

Ask: “What do the units or study design let you conclude? Which extra assumption does the stronger claim require?”

INDEPENDENT PRACTICE

019 • Core-task teacher solution

Slope 4.07 pages per minute: each additional minute increases the predicted page-counter reading by 4.07 pages. Intercept 15 pages predicts the page-counter reading at $x=0$. Zero is outside the observed interval, so the intercept needs contextual verification. The counter may already have a nonzero reading when timing starts. At $x=5.9$: $\hat{y} = 4.07(5.9) + 15 \approx 39.013$ pages, interpolation. At $x=16$: $\hat{y} = 4.07(16) + 15 = 80.12$ pages, extrapolation. Draw the observed segment through (1, 19.07) and (8, 47.56); mark both requested predictions. The roughly straight scatter and small pattern-free residuals support descriptive fit on the observed interval. The ± 1.2 residual range is not a guaranteed future error bound. Fractional predictions describe a model, not a fractional printed page. Check later counter readings, paper supply and pauses before using the extrapolation; the interior estimate has better support.

Evidence response: distinguish a wrong calculation from an unsupported interpretation. Revisit the relevant representation, then choose a fresh item from the bank. Suggested discussion: 10–20 minutes; adjust to evidence and access, never a fluency cutoff.

SMALL-GROUP RETEACH

Teaching script and response plan

Core task O24. Optional bank: M24–M27; O24–O27. Select a few tasks; allow additional sessions for construction and technology.

Learning target: Interpret model rate of change in context and units.; Interpret the intercept and assess whether zero is meaningful.; Use a model to interpolate and extrapolate values.; Assess prediction validity using domain, fit and process limits.

Use prior evidence to identify the missing connection. Model one contrast, such as observed minus predicted versus its reverse, or association versus random assignment. Then check transfer on a fresh task.

Ask: “What do the units or study design let you conclude? Which extra assumption does the stronger claim require?”

SMALL-GROUP RETEACH

O24 • Core-task teacher solution

Slope 3.33 pages per minute: each additional minute increases the predicted page-counter reading by 3.33 pages. Intercept 12 pages predicts the page-counter reading at $x=0$. Zero is outside the observed interval, so the intercept needs contextual verification. The counter may already have a nonzero reading when timing starts. At $x=2.75$: $\hat{y} = 3.33(2.75) + 12 \approx 21.158$ pages, interpolation. At $x=14$: $\hat{y} = 3.33(14) + 12 = 58.62$ pages, extrapolation. Draw the observed segment through (1, 15.33) and (8, 38.64); mark both requested predictions. The roughly straight scatter and small pattern-free residuals support descriptive fit on the observed interval. The ± 1.2 residual range is not a guaranteed future error bound. Fractional predictions describe a model, not a fractional printed page. Check later counter readings, paper supply and pauses before using the extrapolation; the interior estimate has better support.

Evidence response: distinguish a wrong calculation from an unsupported interpretation. Revisit the relevant representation, then choose a fresh item from the bank. Suggested discussion: 10–20 minutes; adjust to evidence and access, never a fluency cutoff.

EXIT TICKET

Teaching script and response plan

Core task O28. Optional bank: M28–M30; O28–O30. Select a few tasks; allow additional sessions for construction and technology.

Learning target: Interpret model rate of change in context and units.; Interpret the intercept and assess whether zero is meaningful.; Use a model to interpolate and extrapolate values.; Assess prediction validity using domain, fit and process limits.

Collect a concise claim with mathematical or design evidence. Do not show a completed answer until responses are preserved; use the evidence to plan the next meeting.

Ask: “What do the units or study design let you conclude? Which extra assumption does the stronger claim require?”

EXIT TICKET

028 • Core-task teacher solution

Slope -1.17°C per minute: each additional minute decreases the predicted temperature by 1.17°C . Intercept 57°C predicts the temperature at $x=0$. Zero is outside the observed interval, so the intercept needs contextual verification. At $x=3.75$: $\hat{y} = -1.17(3.75) + 57 \approx 52.613^{\circ}\text{C}$, interpolation. At $x=12$: $\hat{y} = -1.17(12) + 57 = 42.96^{\circ}\text{C}$, extrapolation. Draw the observed segment through $(2, 54.66)$ and $(9, 46.47)$; mark both requested predictions. The roughly straight scatter and small pattern-free residuals support descriptive fit on the observed interval. The ± 1.2 residual range is not a guaranteed future error bound. Measure the ambient temperature and later sample temperatures. Passive cooling cannot continue at a constant decreasing rate forever under fixed ambient conditions. A negative Celsius value is not automatically impossible; compare it with the actual physical limit. The interior estimate has better support.

Evidence response: distinguish a wrong calculation from an unsupported interpretation. Revisit the relevant representation, then choose a fresh item from the bank. Suggested discussion: 10–20 minutes; adjust to evidence and access, never a fluency cutoff.

WARM-UP

M01 • Select and justify

Target: Interpret model rate of change in context and units.

Fictional calibration: a conveyor has model $\hat{y} = 3.7x + 19$, where x is running time (minutes) and y is the distance-counter reading (meters). Observations cover $0 \leq x \leq 12$. How should the slope be interpreted?

- A. Predicted distance changes by 3.7 meters per additional minute.
- B. Every observed distance equals 3.7 meters.
- C. Predicted running time changes by 3.7 minutes per additional meter.
- D. At $x = 0$ the prediction is 3.7 meters.

Reasoning / evidence

WARM-UP

M02 • Select and justify

Target: Interpret the intercept and assess whether zero is meaningful.

Fictional calibration: a filling tank has model $\hat{y} = 1.3x + 8$, where x is filling time (minutes) and y is water volume (liters). Observations cover $1 \leq x \leq 10$. What does the model predict at $x = 0$, in response units?

- A. 21
- B. 1.3
- C. 9.3
- D. 8

Reasoning / evidence

WARM-UP

001 • Construct and explain

Target: Interpret model rate of change in context and units.; Interpret the intercept and assess whether zero is meaningful.; Use a model to interpolate and extrapolate values.; Assess prediction validity using domain, fit and process limits.

Fictional calibration 1: a conveyor. x = running time (minutes); y = the distance-counter reading (meters). The fitted model is $\hat{y} = 4.07x + 27$; measurements cover $0 \leq x \leq 12$. Scatter is roughly straight and residuals on this interval range from -1.2 to 1.2 meters without a visible pattern. Interpret slope and intercept with units. Compute predictions at $x = 4.8$ and $x = 16$; classify each as interpolation or extrapolation. Draw the model over the observed interval and mark the two predictions on a separate graph. Assess both predictions: use domain, residual information and a plausible process limit. State what additional evidence would help. Do not treat residual range as a guaranteed error bound.

Calculations and contextual interpretation**Validity, assumptions and additional evidence**

WARM-UP

002 • Construct and explain

Target: Interpret model rate of change in context and units.; Interpret the intercept and assess whether zero is meaningful.; Use a model to interpolate and extrapolate values.; Assess prediction validity using domain, fit and process limits.

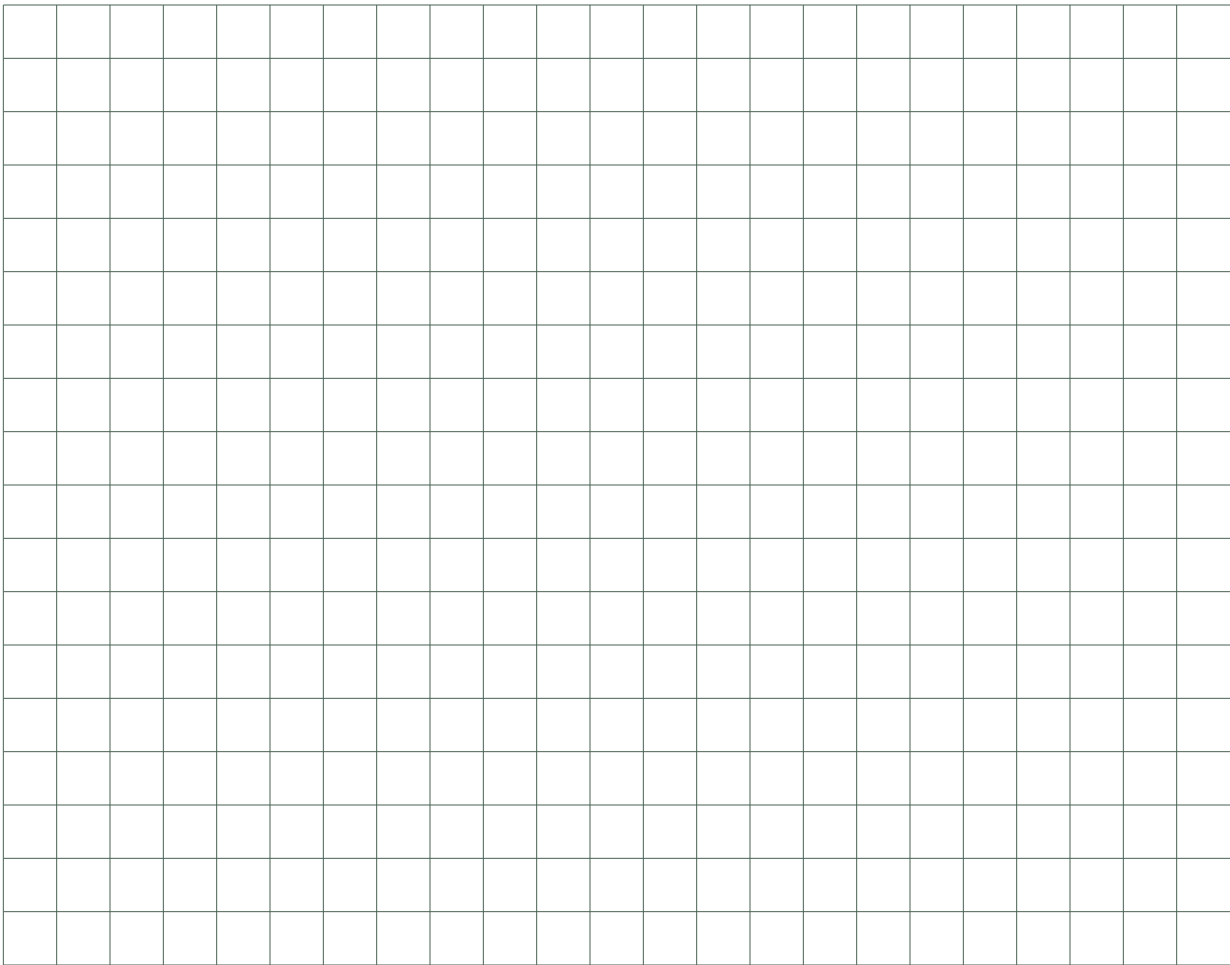
Fictional calibration 2: a filling tank. x = filling time (minutes); y = water volume (liters). The fitted model is $\hat{y} = 1.17x + 17$; measurements cover $1 \leq x \leq 10$. Scatter is roughly straight and residuals on this interval range from -1.2 to 1.2 liters without a visible pattern. Interpret slope and intercept with units. Compute predictions at $x = 5.95$ and $x = 15$; classify each as interpolation or extrapolation. Draw the model over the observed interval and mark the two predictions on a separate graph. Assess both predictions: use domain, residual information and a plausible process limit. State what additional evidence would help. Do not treat residual range as a guaranteed error bound.

Calculations and contextual interpretation**Validity, assumptions and additional evidence**

STUDENT CONSTRUCTION

002 • Model and prediction graph

Label axes, units, scale, observed interval and both predictions



Graph-based explanation and limitations

WORKED TEACHER KEY

M01 • Reasoning and evidence

Target: Interpret model rate of change in context and units.

Answer: A. Predicted distance changes by 3.7 meters per additional minute.

The slope is 3.7 meters per minute: the predicted distance-counter reading increases by 3.7 meters for each additional minute. The intercept 19 is the predicted response at $x=0$. A rate is not a fixed observed response, and its units are response units per minute, not the reverse.

- A. Correct: this gives the signed response change per additional minute.
- B. This treats the slope as a fixed response rather than a rate.
- C. This reverses explanatory and response units; it is not the model slope.
- D. The $x=0$ prediction is the intercept 19, not the slope 3.7.

WORKED TEACHER KEY

M02 • Reasoning and evidence

Target: Interpret the intercept and assess whether zero is meaningful.

Answer: D. 8

Substitute $x = 0$: $\hat{y} = 1.3 \cdot 0 + 8 = 8$ liters. Zero is outside the observed interval, so this intercept lacks direct observational support.

- A. This is not the requested result. The required operation is $1.3(0) + 8$, giving 8 liters, not 21.
- B. This is not the requested result. The required operation is $1.3(0) + 8$, giving 8 liters, not 1.3.
- C. This is not the requested result. The required operation is $1.3(0) + 8$, giving 8 liters, not 9.3.
- D. Correct: $1.3(0) + 8 = 8$ liters.

WORKED TEACHER KEY

001 • Reasoning and evidence

Target: Interpret model rate of change in context and units.; Interpret the intercept and assess whether zero is meaningful.; Use a model to interpolate and extrapolate values.; Assess prediction validity using domain, fit and process limits.

Slope 4.07 meters per minute: each additional minute increases the predicted distance-counter reading by 4.07 meters. Intercept 27 meters predicts the distance-counter reading at $x=0$. Zero is in the observed interval, but this is still a fitted estimate. The counter may already have a nonzero reading when timing starts. At $x=4.8$: $\hat{y} = 4.07(4.8) + 27 \approx 46.536$ meters, interpolation. At $x=16$: $\hat{y} = 4.07(16) + 27 = 92.12$ meters, extrapolation. Draw the observed segment through $(0, 27)$ and $(12, 75.84)$; mark both requested predictions. The roughly straight scatter and small pattern-free residuals support descriptive fit on the observed interval. The ± 1.2 residual range is not a guaranteed future error bound. A conveyor may stop or change speed. The interior estimate has better support; the later estimate needs new distance readings and confirmation of the operating speed.

Assess separately: representation, calculations or design logic, reasoning, and contextual interpretation. Accept valid alternative diagrams, explanations and equivalently precise computations.

WORKED TEACHER KEY

002 • Reasoning and evidence

Target: Interpret model rate of change in context and units.; Interpret the intercept and assess whether zero is meaningful.; Use a model to interpolate and extrapolate values.; Assess prediction validity using domain, fit and process limits.

Slope 1.17 liters per minute: each additional minute increases the predicted water volume by 1.17 liters. Intercept 17 liters predicts the water volume at $x=0$. Zero is outside the observed interval, so the intercept needs contextual verification. At $x=5.95$: $\hat{y} = 1.17(5.95) + 17 \approx 23.962$ liters, interpolation. At $x=15$: $\hat{y} = 1.17(15) + 17 = 34.55$ liters, extrapolation. Draw the observed segment through (1, 18.17) and (10, 28.7); mark both requested predictions. The roughly straight scatter and small pattern-free residuals support descriptive fit on the observed interval. The ± 1.2 residual range is not a guaranteed future error bound. Check tank capacity and whether filling continues at the same rate. Without capacity and later measurements, the later prediction cannot be validated; the interior estimate has better support.

Assess separately: representation, calculations or design logic, reasoning, and contextual interpretation. Accept valid alternative diagrams, explanations and equivalently precise computations.