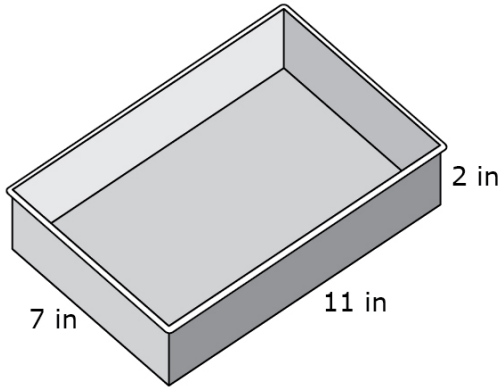
High School, Claim 2

**Example Item 2A.1a**

Primary Target 2A (Content Domain N-Q), Secondary Target 1C (CCSS N-Q.A), Tertiary Target 2D

A company that makes rectangular baking pans labels each pan with the dimensions, in inches, and the capacity in quarts. A company employee needs to label a rectangular pan with dimensions 7 inches by 11 inches by 2 inches.




1 quart = 57.75 cubic inches

What is the capacity, in quarts, of this pan? Round your answer to the nearest tenth.

**Rubric:** (1 point) The student correctly determines that the capacity in quarts of the pan (e.g., accept 2.66 - 2.7).

**Response Type:** Equation/Numeric

**Commentary on Example Item 2A.1:** Ways to vary this item to increase or decrease its complexity include (a) presenting the conversion from quarts to cubic inches in a less direct manner, e.g., by giving the dimensions of a cylindrical quart measure, or by saying that a certain number of quarts completely fills another vessel with different dimensions, or (b) varying the shape of the vessel, e.g., by making it a circular cake pan or a conical sieve. When the geometric work to be done is more complex, the item might fall more naturally within Task Model 2A.5. The difficulty can also be varied by varying the numerical complexity of the dimensions, but care should be taken not to do so in a way that merely increases the computational complexity. For example, if the dimensions are given as two-digit decimals, a calculator should be provided, since the target is problem solving, not computation. On the other hand, changing the dimensions to 7.5 x 10 x 2, with the expectation that students who look for structure will see that the 2 x 7.5 = 15 and 10 x 15 = 150, is a valid increase in the problem-solving demand of the task. Any version of this task would require students to identify quantities of interest and to map the relationship between them, and so draws on the skill set identified in Target 2D.

## Task Model 2A.2

**Expectations:**

- The student sets up an equation in one variable given a real-world context and solves it to answer a question about the context.
- A task that both names the variable and scaffolds the equation to be set up through the use of key words or the order in which operations are described is not appropriate for Claim 2; however, tasks which do one but not the other of these things are acceptable. Tasks which do neither are at the more difficult end of the range
- Dimensions along which to vary the task include (a) varying the context, (b) naming the variable (easier) or expecting the student to identify the quantity of interest and choose a variable to represent it (harder), (c) intending an equation of the form "expression = constant" (easier) or "expression = expression" (harder, as in the example given here); having one or more constants represented by letters so that the solution is expressed in terms of those constants, not given numerically (hardest), or (d) varying the difficult of extracting the expressions involved in the equation from the context given.

**Example Item 2A.2a**
Primary Target 2A (Content Domain A-CED), Secondary Target 1G (CCSS A-CED.A), Tertiary Target 2D

The $1000 prize for a lottery is to be divided evenly among the winners. Initially, there are *x* winners. However, one more winner comes forward, causing each winner to receive $50 less.

Enter an equation that represents the situation and can be used to solve for *x*, the initial number of winners. Enter your equation in the response box.

**Rubric:** (1 point) The student creates a correct equation (e.g., $\frac{1000}{x} - 50 = \frac{1000}{x+1}$).

**Response Type:** Equation/Numeric

## Task Model 2A.3

**Expectations:**

- The student sets up a system of linear equations given a real-world context and solves it to answer a question about the context. Most tasks should involve a system of two linear equations in two variables.
- A task that both names the variables and scaffolds the equations to be set up through the use of key words or the order in which operations are described is not appropriate for Claim 2; however, tasks which do one but not the other of these things are acceptable. Tasks which do neither are at the more difficult end of the range
- Dimensions along which to vary the task include (a) varying the context, (b) naming the variables (easier) or expecting the student to identify the quantities of interest and choose variables to represent then (harder), (c) intending equations of the form "expression = number" (easier, as in the example given here) or "expression = expression" (harder), or (d) varying the difficulty of extracting the expressions involved in the equation from the context given.

### Example Item 2A.3a

Primary Target 2A (Content Domain A-REI), Secondary Target 1J (CCSS A-REI.6), Tertiary Target 2D

A restaurant serves a vegetarian and a chicken lunch special each day. Each vegetarian special is the same price. Each chicken special is the same price. However, the price of the vegetarian special is different from the price of the chicken special.

- On Thursday, the restaurant collected $467 selling 21 vegetarian specials and 40 chicken specials.
- On Friday, the restaurant collected $484 selling 28 vegetarian specials and 36 chicken specials.

Enter the cost, in dollars, of the **vegetarian** lunch special.

**Rubric:** (1 point) The student correctly determines the cost of the vegetarian special (7).

**Response Type:** Equation/Numeric

**Commentary on Example Item 2A.3a:** The task given here, while not naming the variables, provides a clear structure for setting up the two equations by bulleting out the two days corresponding to equations.

**Example Item 2A.3b**
Primary Target 2A (Content Domain A-REI), Secondary Target 1J (CCSS A-REI.C)
(Source: Adapted from Illustrative Mathematics 8.EE Quinoa Pasta 1)

A type of pasta is made of two ingredients, quinoa and corn. The pasta company is not disclosing the amount of each ingredient in the pasta, but we know that the quinoa in the pasta contains 16.2% protein, and the corn in the pasta contains 3.5% protein. Overall, each 57 gram serving of pasta contains a total of 4 grams of protein.

How many grams of quinoa and how many grams of corn is in one serving of the pasta?

Enter the number of grams of quinoa in the first response box, Enter the number of grams of corn in the second response box. Round each amount to the nearest gram.

Quinoa: ☐

Corn: ☐

**Rubric:** (2 points) The student enters the correct number of grams for quinoa and corn into the response boxes (16 and 41). (1 point) Either the student reverses the answers (confused between quinoa and corn) or only answers one correctly.

**Response Type:** Equation/Numeric (2 response boxes)

**Commentary on Example Item 2A.3b:** This task illustrates a more difficult variant of this task model. In this task, one of the equations is $q + c = 57$, where $q$ is the number of grams of quinoa and $c$ is the number of grams of corn. This equation might not be apparent to the student because the coefficients of the variables are not evident in the problem statement. In Example Item 2A.3a, by contrast, the numbers 21, 40, 28, and 36 were all evident.

**Example Item 2A.3c**
Primary Target 2A (Content Domain G-SRT), Secondary Target 1O (CCSS G-SRT.C)

Melissa drew a right triangle.

- The length of the hypotenuse is $\sqrt{130}$ units.
- The perimeter is $14 + \sqrt{130}$ units.

Find the other two side lengths of Melissa's triangle. Enter one side length into each response box.

**Rubric:** (1 point) The student enters the correct side lengths in the response boxes (3 and 11).

**Response Type:** Equation/Numeric (2 response boxes)

## Task Model 2A.4

**Expectations:**

- The student creates an equation in two variables or builds a function to represent a relationship in a mathematical or real-world context and uses the equation or function to answer a question about the context, by evaluating the function at one or more inputs or recognizing and using some feature of the function or its graph (such as the fact that the values are always positive, or that the graph is linear with a negative slope).
- Some items in this task model should reward looking for and making use of structure. For example, the student should select the form of the expression that defines the function that is appropriate for the purpose of the task.
- Dimensions along which to vary the task include (a) varying the context, (b) naming the independent or dependent variables (easier) or expecting the student to identify the quantities of interest and choose variables to represent them (harder), (c) varying the type of function built (linear, quadratic, exponential, power, or a combination of these), (d) naming (easier) or not naming (harder) the type of function to be used, or giving an explicit form for it (easiest), or (e) varying the difficulty of extracting the function from the context given (quite difficult in this case).

**Example Item 2A.4a**
Primary Target 2A (Content Domain F-BF), Secondary Target 1N (CCSS F-BF.A)
(Source: Adapted from Illustrative Mathematics A-SSE Course of Antibiotics)

Susan has an ear infection. Her doctor prescribes an antibiotic. The doctor tells Susan to take a 250-milligram dose of the antibiotic every 12 hours for the next 10 days.

- Susan finds out that 4% of the antibiotic is still in her body after 12 hours.
- Assume that each dose is exactly 250 milligrams and that Susan takes one dose every 12 hours.

***Part A***
How much of the antibiotic, in milligrams, is in Susan's body immediately after taking the **2nd** dose? Enter your answer in the first response box.

***Part B***
How much of the antibiotic, in milligrams, is in Susan's body immediately after taking the **10th** dose? Enter your answer in the second response box.

**Rubric:** (2 points) The student enters the correct amount of antibiotic in Susa's body for Part *A* and *B* (e.g., 260, 260.4167). Note: An acceptable range for Part *B* is 260.4-260.422.
(1 point) The student enters the correct amount for Part *A* or Part *B*, but not both.

**Response Type:** Equation/Numeric (2 response boxes)

**Example Item 2A.4b**
Primary Target 2A (Content Domain F-BF), Secondary Target 1N (CCSS F-BF.A), Tertiary Target 2D

$P(x)$ represents the cost that an online bookstore charges for shipping items and packaging material that together weigh $x$ pounds. The packaging material weighs 1 pound.

A competitor charges the same rate per pound but does not charge for the weight of the packaging material. However, the competitor does charge an additional $5 processing fee for each shipment.

Which expression represents the cost of shipping $x$ pounds with the competitor?

A. $P(x + 5) + 1$
B. $P(x + 5) - 1$
C. $P(x + 1) + 5$
D. $P(x - 1) + 5$

**Rubric:** (1 point). The student selects the correct answer choice (D).

**Response Type:** Multiple choice, single correct response.

**Commentary on Example Item 2A.4b:** This task requires the student to interpret information given about a function in a context and express that information using function notation. Students must determine the relationship between the price to ship a certain weight for two different companies, and so must draw on the skill set identified in Target 2D.

## Task Model 2A.5

**Expectations:**

- The student solves a well-posed problem involving geometric measurement.
- Dimensions along which to vary the task include (a) varying the measurement context (circles, squares, triangles, compound figures composed out of these; cubes, rectangular prisms, pyramids, cones, spheres, compound figures composed out of these), (b) naming the unknown quantities explicitly and/or labeling them in a diagram (easier) or expecting the student to identify the quantities of interest and choose variables to represent them (harder), (c) requiring students to draw auxiliary lines in the figure, or (d) requiring students to use congruence or similarity concepts in the course of solving the problem.

### Example Item 2A.5a

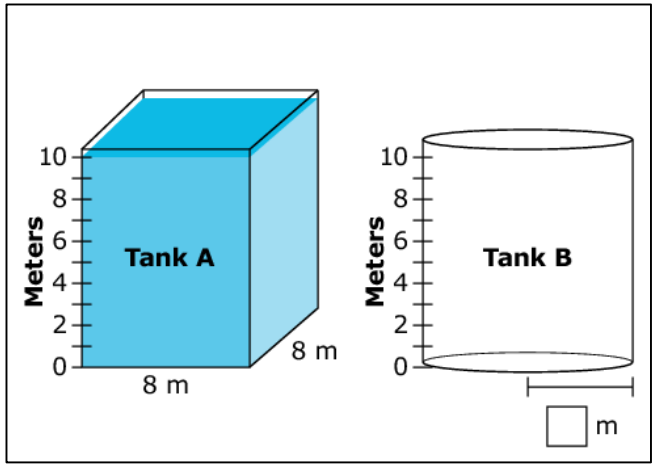
Primary Target 2A (Content Domain G), Secondary Target 1I (CCSS 8.G.C), Tertiary Target 2D

Two water tanks are shown. Tank A is a rectangular prism and Tank B is a cylinder. The tanks are not drawn to scale.

Tank A is filled with water to the 10-meter mark.

Click Tank A to change the water level. The volume of water that leaves Tank A is transferred to Tank B, and then the height of the water in Tank B is shown.

Find the radius of Tank B, rounded to the nearest meter. Enter Your answer in the response box.




**Rubric:** (1 point). The student enters the correct radius in the response box (5).

**Response Type:** Equation/numeric with animation.

**Task Model 2A.6**

**Expectations:**

- The student solves a well-posed problem about geometric figures in the plane that require geometric reasoning; for example performing constructions or applying transformations.
- Dimensions along which to vary the task include (a) varying the types of geometric figure used (lines, circles, triangles, quadrilaterals, polygons), (b) varying the number of steps required to extract the desired feature, or (c) including a coordinate system or not.
- Note that tasks of this type can also be considered for Claim 3B, constructing autonomous chains of reasoning, depending on the balance between the problem solving aspect (making sense of the problem, for example) and the reasoning aspect (the depth and complexity of reasoning required to extract the desired feature).

**Example Item 2A.6a**

Primary Target 2A (Content Domain G), Secondary Target 1X (CCSS G-C.A)

A circle with center (6, 7) includes the point (1, 4). A second circle also include the point (1, 4), and contains the same area but has a different center.

Enter the ordered pair that corresponds to the center of the second circle.

( ☐ , ☐ )

**Rubric:** (1 point) The student correctly enters the ordered pair in the response box [(–4, 1)].

**Response Type:** Fill-in Table

**Commentary on Item 2A.6a:** A more difficult variant on this item is the following: A circle has its center at (6, 7) and goes through the point (1, 4). A second circle is tangent to the first circle at the point (1, 4) and has one-fourth the area. What are the coordinates for the center of the second circle? Show your work or explain how you found your answer.

## Target 2B: Select and use appropriate tools strategically.

### General Task Model Expectations for Target 2B

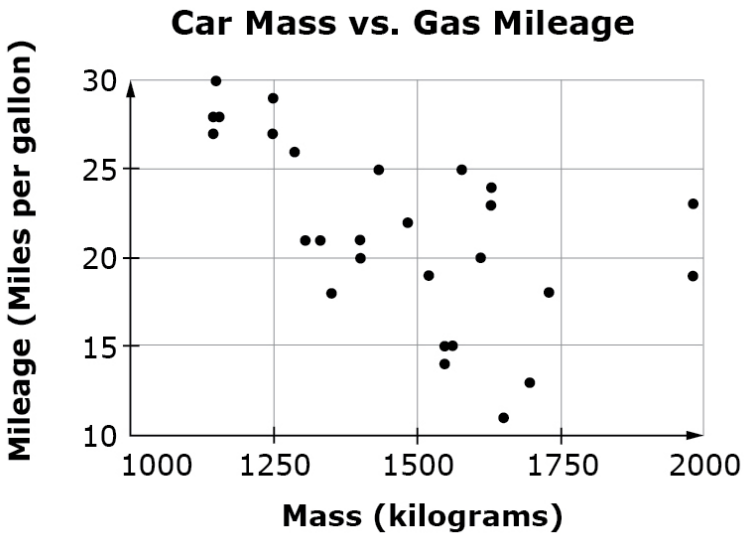
- The student uses a tool or makes a strategic selection of tools in the course of solving a problem.
- Mathematical information is presented in a table, graph, diagram, or equation or is extracted from a verbal description or pictorial representation of a context.
- Tools include drawing tools, graphing tools, and geometric transformation tools.

### Task Model 2B.1

**Expectations:**

- The student is asked to use a given tool to
    - produce a desired figure or graph given a mathematical or real-world context, or
    - produce a desired geometric transformation.
- Dimensions along which to vary tasks include (a) varying the tool used (b) varying the mathematical or real-world context and (c) varying the amount of supplemental reasoning and calculation necessary to achieve the task.
- Tasks have DOK Level 1 or 2.

The scatterplot shows the weight and gas mileage for 31 cars.



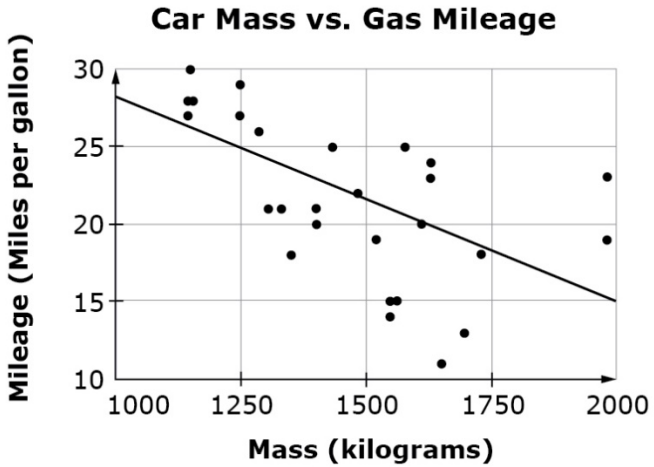

***Part A:*** Use the Add Arrow tool to create a line of best fit on the scatterplot.

***Part B:*** What is the meaning of the slope of the line of best fit in terms of the situation?

A. For every additional kilogram of mass, the gas mileage is predicted to increase 0.013 miles per gallon.
B. For every additional kilogram of mass, the gas mileage is predicted to decrease 0.013 miles per gallon.
C. For every additional kilogram of mass, the gas mileage is predicted to increase 3 miles per gallon.
D. For every additional kilogram of mass, the gas mileage is predicted to decrease 3 miles per gallon.

**Rubric:** (1 points) The student adds a line of best fit and selects the correct interpretation of the slope (e.g., see graph on the following page; answer choice B).

High School, Claim 2
**Response Type:** Graphing, Hot Spot




## Example Item 2B.1b

Primary Target 2B (Content Domain F-IF), Secondary Target 1M (CCSS F-IF.C), Tertiary Target 2C

The function *f* models the amount of a chemical that can be extracted from a mixture given the percent of ethanol used in the extraction process, *x*, for $0 \leq x \leq 100$. What value of *x* between 0 and 100 gives the maximum value for this function?

$$f(x) = -0.002x^3 + 0.255x^2 - 4.5x + 165$$

Enter your answer in the response box.

**Interaction:** The student uses the graphing calculator and estimates the value for *x* that produces the maximum value of the function.

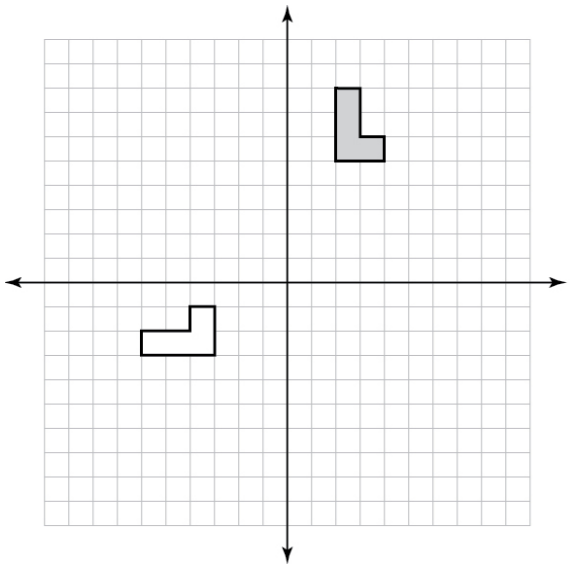
**Rubric**: (1 point) The student enters the correct value for *x*, with a tolerance of 5 percentage points (e.g., 75+/-5)

**Response Type:** Equation/Numeric

**Commentary on Example Item 2B.1b:** While a student in calculus could answer this question without technology, even then it would be computationally burdensome and prone to error. Using a graphing device to answer the question is the only way a student who does not know calculus can answer this question, although the concept of the maximum value of a function over a given domain is one that students learn about starting in grade 8.

**Example Item 2B.1c**

Primary Target 2B (Content Domain G-CO), Secondary Target 1G (CCSS G-CO.B)



Translate

Rotate

Reflect

Use the tools to the right of the graph to choose a sequence of transformations that demonstrate that the shaded figure is congruent to the unshaded figure.

**Interaction:** The student uses the Translate, Rotate, and Reflect Tools to execute a series of translations, reflections, and rotations around the origin that would move the shaded figure onto the unshaded figure. An example of the interaction can found at this link: https://www.khanacademy.org/preview/content/items/x3a8afe95369d317e

**Rubric:** (1 point) The student selects a sequence of transformations where the shaded figure maps onto the unshaded figure (e.g., Step 1: Rotate 90 degrees counterclockwise around the origin. Step 2: Translate to the right two units. Step 3: Translate up one unit.)

**Response Type:** Graphing/Transformation (slated for field-testing in 2017 or later)

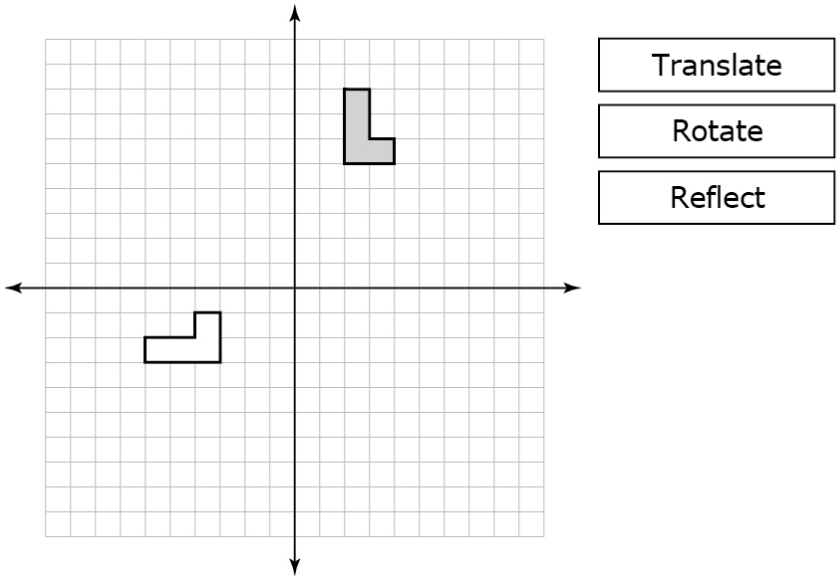
**Commentary on Example Item 2B.1c:** This task requires the student to use a transformation tool to produce a desired geometric figure from a given geometric figure. The required figure is not described explicitly, but must be extracted from a mathematical or real-world context. In this task, the student must understand the definition of congruence in terms of transformations; this item would not have been suitable for this model if it had told the student explicitly to move the shaded figure onto the hollow figure.

**Expectations:**

- Student is asked to decide whether or not to use a tool to produce a desired figure or graph, or to produce a desired geometric transformation. The task can be correctly performed with or without the available tools.
- Mathematical information is presented in a table, graph, diagram, or equation or is extracted from a verbal description or pictorial representation of a context.
- Tools include drawing tools, graphing tools, and geometric transformation tools.

**Example Item 2B.2a**

Primary Target 2B (Content Domain G-CO), Secondary Target 1G (CCSS G.CO.B)




Use the drop down-menus below to choose a sequence of transformations that would move the shaded figure onto the unshaded figure. If you wish, you can use the tools to the right of the graph to experiment before submitting your answer.

**Interaction:** The student chooses to use the Translate, Rotate, and Reflect Tools before entering the sequence of transformations.

**Rubric:** (1 point) The student selects a correct series of transformations from the dropdown menu (e.g., Step 1: Rotate 90 degrees counterclockwise around the origin. Step 2: Translate to the right two units. Step 3: Translate up one unit.)

**Response Type:** Drop-down menu.

**Commentary on Example Item 2B.2a:** This task requires the student to describe a transformation that produces a desired geometric figure from a given geometric figure. The required figure can be described explicitly, in contrast with Item 2B.1c. The emphasis in this task model is on providing the student with the option to choose the tool or not, so the complexity required in presenting the figure is correspondingly reduced. More complex variations may still require the desired figure to be extracted from a mathematical or real-world context.

**Example Item 2B.2b**

Primary Target 2B (Content Domain A-APR), Secondary Target 1F (CCSS A-APR.B)

Find all the zeros of the following polynomial function and enter them into the boxes.

$f(x) = x^5 - 37x^3 - 24x^2 + 180x$

Zeros:

| | | | | |
|---|---|---|---|---|
| | | | | |

**Interaction:** The student has access to a graphing calculator which can be used to identify the zeros of the polynomial.

**Rubric:** (1 point). Student enters the correct zeros in the response boxes (–6, –2, 0, 3, 5; the numbers may be in any order).

**Response type:** Fill-in Table

**Variations on this item:** This item requires students to give information about a function, expression, or equation that can be obtained either algebraically or graphically. Students can choose whether or not to use the graphing calculator to answer the question. Dimensions along which to vary the item include (a) varying the desirability of using the tool or not (for example, this item favors using the calculator because of the difficulty of factoring a degree 5 polynomial; another item might require the student to find the exact roots of □(□) = □$^3$ − 3□, which would favor factorization, since it would be difficult to recognize $\sqrt{3}$ exactly from the graph), (b) varying the type of object presented and the information required (e.g., factors of a polynomial, maximum of a quadratic function, solutions to an equation of the form *f*(*x*) = *g*(*x*)).

## Target 2C: Interpret results in the context of a situation.

### General Task Model Expectations for Target 2C

- Student is asked to solve a well-posed problem arising in a context from everyday life, society, or the workplace, and then to interpret the solution in terms of the context.
- Possible interpretations include: giving the units of an answer and explaining their meaning, interpreting parameters in a function or parts of an expression, interpreting the solution to an equation, interpreting a statement involving function notation. Problems involving interpreting data are more likely to fit Claim 4 than Claim 2C
- Because the focus is on interpreting the solution, items in this task model will generally have lower cognitive demand in the problem solving phase than items in Task Models 1 and 2.
- Mathematical information from the context is presented in a table, graph, or diagram, or is extracted from a verbal description or pictorial representation of the context.
- Solving the problem requires either using units, writing an expression in an equivalent form, setting up and solving an equation or system of equations, or interpreting and building functions, performing a geometric construction or transformation, or calculating geometric measures.
- Tasks have DOK Level 2.

### Task Model 2C.1

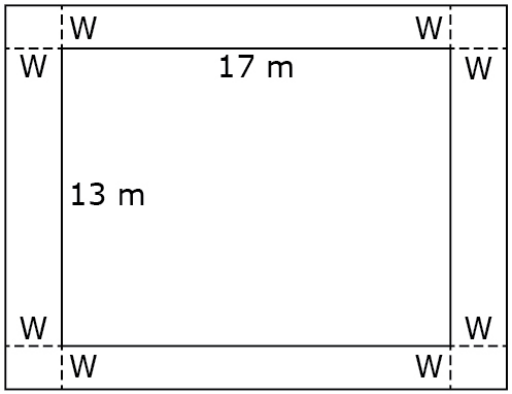
**Expectations:**

- The student sets up an equation arising from a thin or real-world context.
  - If the equation is in one variable, the student solves the equation and interprets the solution in terms of the context.
  - If the equation represents a function, the student interprets a parameter in the context.
- The wording of the problem should not reveal the answer to the interpretation step.
- Dimensions along which to vary the item include, (a) varying the context, (b) varying the type of equation to be solved (linear, quadratic, other), or (c) varying the complexity of the interpretation asked for.

**Example Item 2C.1a**

Primary Target 2C (Content Domain A-CED), Secondary Target 1G (CCSS A-CED.A), Tertiary Target 2A

A rectangular garden, shown in the diagram, measures 13 meters by 17 meters. The garden has a cement walkway around its perimeter, as shown. The width, W, of the walkway remains constant on all four sides, as shown in the figure. The garden and walkway have a combined area of 396 square meters.




***Part A***

Enter an equation in the first response box that can be used to find the width, W.

***Part B***

Determine the width, W (in meters), of the walkway. Enter your answer in the second response box.

**Rubric**: (2 points) The student enters the correct equation and width in the response boxes [$(13+2W)(17+2W)=396$; 2.5]. (1 point) The student answers only one part correctly.

**Response Type:** Equation/Numeric (2 response boxes)

**Commentary on Example Item 2C.1a:** A variation of this item would ask for the dimensions of the garden rather than asking for the width).

High School, Claim 2
**Example Item 2C.1b**
Primary Target 2C (Content Domain F-LE), Secondary Target 1K (CCSS F-LE.B), Tertiary Target 2A

For his science experiment, Julio placed a pan of water in his refrigerator to see how long it would take to evaporate. After 2 days, there were 280 ml of water in the pan, and after 4 days, there were 240 ml of water in the pan. In his report, he noted that the same amount of water evaporated each day.

How many milliliters of water were in the pan to start?
Enter your answer in the first response box.

At this rate, how many days until no water remains in the pan?
Enter your answer in the second response box.

**Rubric**: (1 point) The student correctly enters the initial amount of water and the time until the water is completely evaporated (320 and 16).

**Response Type:** Equation/Numeric (2 response boxes)

**Commentary on Example Item 2C.1b:** The amount of water in the pan can be modeled by linear relationship. The two questions correspond to interpreting the two intercepts.

**Example Item 2C.1c**

Primary Target 2C (Content Domain F-BF), Secondary Target 1N (CCSS F-IF.C), Tertiary Target 2A

Lisa plans to build a rectangular fenced garden. She has 500 feet of fencing to use for the project. She determines that if her garden has a width of $w$ meters, then the area of her garden $A(w)$, in square meters, is given by the following function.

$A(w) = 250w - w^2$

Which of the following expressions is equivalent to $250w - w^2$?

A. $-(w - 125)^2$
B. $-(w - 250)^2$
C. $-(w - 125)^2 + 15{,}625$
D. $-(w - 250)^2 + 62{,}500$

What is the largest garden area, in square meters, that Lisa can enclose with 500 meters of fencing?
Enter your answer in the response box.

Area: ☐

**Rubric:** (2 points) The student selects the correct expression (C) and identifies the largest area possible (15625).
(1 point) The student is able to correctly identify the expression **or** identify the largest area.

**Response Type:** Multiple choice/single answer and Equation/numeric

**Commentary on Example Item 2C.1c:** Natural variations on this item include presenting some of the information about the function with a graph; for example, showing the parabola with the $x$-intercepts labeled.

## Task Model 2C.2

**Task Expectations:**

- The student is presented with an expression, a solution to an equation, or a statement involving function notation, where the expression, equation or function represents a context from everyday life, society, or the workplace, and asked to interpret it in terms of the context.
- Possible interpretations include: giving the units of an answer and explaining their meaning; interpreting parts of an expression, interpreting the solution to an equation, interpreting a statement involving function notation. Problems involving interpreting data are more likely to fit into Claim 4B than Claim 2C.
- Mathematical information from the context is presented in a table, graph, or diagram, or is extracted from a verbal description or pictorial representation of the context.

**Example Item 2C.2a**
Primary Target 2C (Content Domain F-IF), Secondary Target 1K (CCSS F-IF.A), Tertiary Target 2D

Kiki starts her run at 5:00 p.m. Let $f(t)$ represent Kiki's speed, in miles per hour, $t$ hours after she starts running for $0 \leq t \leq 4$. The following information holds for the function $f$:

- $f(1) = 5$
- $f(4) = 2$
- $f(2) = 8$
- $f(1) < f(3)$.

Kiki's fastest speed occurs at 7:00 p.m. Given this information, which of the following **must** be true? Select **all** that apply.

A. At 8:00 p.m., Kiki's speed was at least 5 miles per hour.
B. At 6:30 p.m., Kiki's speed was at most 8 miles per hour.
C. Kiki ran at most 32 miles.

**Rubric**: (1 point) The student selects all three options.

**Response Type:** Multiple-choice, multiple-select response

**Example Item 2C.2b**
Primary Target 2C (Content Domain F-IF), Secondary Target 1K (CCSS F-IF.B)

The height, in meters, of a golf ball $t$ seconds after it was hit is given by the function $h(t) = -9.8(t - 8)^2 + 36$. The number 36 appears in the expression that defines the function. What does it tell you about the golf ball?

A. The time it takes for the golf ball to hit the ground.
B. The time it takes for the golf ball to reach it's greatest height.
C. The greatest height the golf ball reaches.
D. The speed at which the golf ball is traveling.

**Rubric:** The student selects the appropriate answer choice (C).

**Response Types:** Multiple Choice, single correct response

**Example Item 2C.2c**
Primary Target 2C (Content Domain F-IF), Secondary Target 1K (CCSS F-IF.B), Tertiary Target 2D

The relationship between the Fahrenheit (F) and Kelvin (K) scales for measuring temperatures can be represented by a linear function. A temperature of 68° F corresponds to 293.15° K, and a temperature of 185° F corresponds to 358.15° K.

Which statement is the best interpretation of the slope of the graph of this function?

A. A temperature of 0° K corresponds to –459.67° F.
B. A temperature of 0° F corresponds to 255.37° K.
C. For each change of one degree in the Fahrenheit scale, there is a change of $\frac{5}{9}$ degree in the Kelvin scale.
D. For each change of one degree in the Fahrenheit scale, there is a change of $\frac{9}{5}$ degree in the Kelvin scale.

**Rubric:** The student selects the appropriate answer choice (C).

**Response Types:** Multiple Choice, single correct response.

## Target 2D: Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flowcharts, or formulas).

Target 2D identifies a key step in the modeling cycle, and is thus frequently present in problems with real-world contexts. Note that Target 2D is rarely the primary target for an item, but is frequently a Secondary or Tertiary Target for an item with primary alignment to 2A, 2B, or 2C; see example items for many of the task models in those Targets.