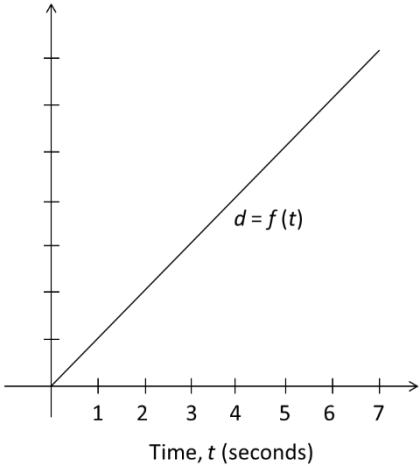| **Task Model 1**

Response Type: Multiple Choice, single correct response

DOK Level 1

N-Q.A.1
Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

Evidence Required:
1. The student chooses units consistently in formulas.

Tools: Calculator | **Prompt Features:** The student is prompted to choose the units of measurement that are appropriate for quantities represented in formulas.

Stimulus Guidelines: Item difficulty can be adjusted via these example methods, but is not limited to these methods:

   o One-step problems, such as finding units for V in $V = \frac{d}{t}$, given units for d and t
   o Two- or three-step problems, such as finding units for E in $E = mc^2$, given units for m and c
   o Three- or more step problems, where not all units are given for all variables
   o Problems where units are calculated for a variable in one equation in order to find units for a variable in another given equation in context where units may not be familiar

TM1a
Stimulus: The student is presented with a formula that uses measurements given in different units.

Example Stem: Given the formula, $K = \frac{1}{2}mv^2$ where

  • K represents kinetic energy*,*
  • m represents mass and has units of kilograms (*kg*), and
  • v represents velocity and has units of meters per second (*m/s*).

Select an appropriate measurement unit for kinetic energy.

A. $\frac{kg\,m^2}{s}$

B. $\frac{kg^2\,m^2}{s^2}$

C. $\frac{kg\,m}{s^2}$

D. $\frac{kg\,m^2}{s^2}$

Rubric: (1 point) Student selects the correct response (e.g., D).

Response Type: Multiple Choice, single correct response |

Task Model 1
 	
Response Type: Drag and Drop
 	
DOK Level 1
 	
N-Q.A.1
Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
 	
Evidence Required:
1. The student chooses units consistently in formulas.
 	
Tools: Calculator
 	
Accessibility Note: Drag and Drop items are not currently able to be Brailled. Minimize the number of items developed to this TM.
	Prompt Features: The student is prompted to choose the units of measurement that are appropriate for quantities represented in formulas.
	
	Stimulus Guidelines: Item difficulty can be adjusted via these example methods, but are not limited to these methods:
	    o Two-step problems
	    o Three- or more step problems
	
	TM1b
	Stimulus: The student is presented with a context in which a number needs to be expressed in a different unit.
	
	Example Stem: The density of water at a certain temperature is $62.4 \ \frac{lb}{ft^3}$.
	
	Drag a rate or quantity from the box to each blank to calculate the density of water in units of kilograms per cubic meter, $\frac{kg}{m^3}$.
	
	Interaction: The student drags and drops the correct rate or quantity from the box in order to calculate the density of water in $\frac{kg}{m^3}$.
	
	Rubric: (1 point) The student chooses the following correct three rates or quantities (order does not matter): $\frac{62.4 \ lb}{1 \ ft^3}$, $\left(\frac{3.28 \ ft}{1 \ m}\right)^3$, $\frac{1 \ kg}{2.205 \ lb}$
	One such ordering would be: $\frac{62.4 \ lb}{1 \ ft^3} \cdot \left(\frac{3.28 \ ft}{1 \ m}\right)^3 \cdot \frac{1 \ kg}{2.205 \ lb}$.
	
	Response Type: Drag and Drop

Task Model 2	**Prompt Features:** The student is prompted to choose the graphing window for a graph.

Task Model 2

**Response Type:
Matching Tables**

DOK Level 2

N-Q.A.1
Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

Evidence Required:
2. The student chooses the scales for graphs and data displays.

Tools: Calculator

Version 3 Update:
Retired TM2b.

Prompt Features: The student is prompted to choose the graphing window for a graph.

Stimulus Guidelines: Item difficulty can be adjusted via these example methods, but are not limited to these methods:
- Using different types of functions (e.g., linear, quadratic, etc.)
- Asking students to identify windows where certain key features would be visible

TM2a
Stimulus: The student is presented with a contextual situation where the equation for the function may or may not be given.

Example Stem: A company makes 3,000 liters of juice per day. Let y represent the total amount of juice, in liters, made in x days.

An equation representing this situation is entered into a graphing calculator. Determine whether a graph created with each calculator display window defined in the table will show all points representing the total amount of juice made in 0 to 7 days.

Select Yes or No for each display window.

The calculator display window shows:	Yes	No
$-100 \le x \le 3,100$ and $-1 \le y \le 8$		
$-1 \le x \le 8$ and $-100 \le y \le 3,100$		
$-1 \le x \le 8$ and $-100 \le y \le 21,100$		
$-100 \le x \le 21,100$ and $-100 \le y \le 3,100$		

Rubric: (1 point) The student selects the correct response for each display window (e.g., NNYN).

Response Type: Matching Tables

Task Model 2	**Prompt Features:** The student will select appropriate scale for one of the coordinate axes in a context.

Response Type: **Multiple Choice, single correct response**	**Stimulus Guidelines:** The student is presented with a contextual situation.
	 • Item difficulty can be adjusted via these example methods, but are not limited to these methods:
	     o graph is linear
	     o graph is non-linear

DOK Level 1	
N-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.	**TM2c** **Stimulus:** The student is presented with a contextual situation and a graph of the situation. **Example Stem:** The speed of sound at sea level is approximately 340 meters per second. The graph shows the distance, d, a sound wave created by a loud noise at sea level has traveled after t seconds.
Evidence Required: 2. The student chooses the scales for graphs and data displays. **Tools:** Calculator **Version 3 Update:** Retired TM2b and added new TM2c.	
	Each of the following sets of numbers represents meters. Assuming the graph is correct, which set of numbers is most appropriate to label the seven tick marks along the vertical axis (distance)? A. 1, 2, 3, 4, 5, 6, 7 B. 50, 100, 150, 200, 250, 300, 350 C. 100, 200, 300, 400, 500, 600, 700 D. 340, 680, 1020, 1360, 1700, 2040, 2380 **Rubric:** (1 point) The student selects the correct list of numbers (e.g., D). **Response Type:** Multiple Choice, single correct response

Task Model 3 **Response Type: Multiple Choice, multiple correct response** **DOK Level 1** **N-Q.A.1** Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. **Evidence Required:** 3. The student chooses appropriate quantities for answering a question in a real-world context. **Tools:** Calculator **Version 3 Update:** Added new "Evidence Required" statement 3 and TM3.	**Prompt Features:** The student will choose appropriate quantities for answering a question in a real-world context. **Stimulus Guidelines:** The student is presented with a contextual situation. **TM3** **Stimulus:** The student is presented with a contextual situation. **Example Stem:** A farmer is comparing costs for different fertilizers to use on her 45-acre field. Different brands of fertilizer come in different sizes that cover different areas of land. Choose two or more quantities that, when **multiplied** together, would give a quantity that could be used as a single measure to decide which fertilizer would be least expensive for her to use on her field. A. The cost per bag of fertilizer in dollars B. The cost per cubic foot of fertilizer in dollars C. The volume of each bag of fertilizer in cubic feet D. The number of bags needed to fertilize one acre E. The number of acres a bag of fertilizer can cover **Rubric:** (1 point) The student selects the correct combination of options (e.g., A and D or B, C, and D). **Response Type:** Multiple Choice, multiple correct response