

Task Model 3

Response Type:
Multiple Choice,
single correct
response

DOK Level 2

8.F.2

Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.*

Evidence Required:

3. The student recognizes the same function written in different functional forms (algebraic, graphic, tabular, or verbal).

Tools: Calculator

Prompt Features: The student identifies the same function represented in different ways.

Stimulus Guidelines:

- Context should be familiar for 13- to 15-year-olds.
- Tables and graphs must be labeled.
- Item difficulty can be adjusted via this example method:
 - Representations in the answer choice are all equations, all tabular, all graphs, or verbal statements or a combination.

TM3

Stimulus: The student is presented with a function represented in algebraic, graphic, or tabular form.

Example Stem 1: Which table of values can be represented by the function, $y = 3x + 2$?

A.

x	y
-4	-10
-3	-7
-2	-4
-1	-1
0	2

B.

x	y
-10	-4
-7	-3
-4	-2
-1	-1
2	0

C.

x	y
-4	36
-3	35
-2	34
-1	33
0	32

D.

x	y
32	0
33	-1
34	-2
35	-3
36	-4

<p>Task Model 3</p> <p>Response Type: Multiple Choice, single correct response</p> <p>DOK Level 2</p> <p>8.F.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). <i>For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.</i></p> <p>Evidence Required: 3. The student recognizes the same function written in different functional forms (algebraic, graphic, tabular, or verbal).</p> <p>Tools: Calculator</p>	<p>Answer Choices: Choices can be different representations of a function such as an equation, table, or graph. Distractors should include errors such as an equation where the slope and y-intercept are switched or input and output values are switched. Errors in tables include x and y values switched, or where some, but not all, ordered pairs satisfy the equation in a table.</p> <p>Rubric: (1 point) The student selects the correct answer choice (e.g., A).</p> <p>Response Type: Multiple Choice, single correct response</p> <p>Example Stem 2: A swimming pool has 30 gallons of water in it. Water is added to the pool at a rate of 5 gallons per second.</p> <p>Select the equation that models the relationship between the amount of water (W), in gallons, in the swimming pool after t seconds.</p> <p>A. $W = 30t + 5$ B. $W = 5t + 30$ C. $W = 6t + 30$ D. $W = 30t + 6$</p> <p>Rubric: (1 point) The student selects the correct answer (e.g., B).</p> <p>Answer Choices: Each answer choice will be a function represented in a different form than the one given in the stem (i.e., algebraic, graphic, tabular, or verbal). Incorrect answer choices will show error in misinterpreting the verbal statement by switching the slope and y-intercept and inappropriately calculating the rate and gallons.</p> <p>Response Type: Multiple Choice, single correct response</p>
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<p>Task Model 4</p> <p>Response Type: Equation/Numeric</p> <p>DOK Level 2</p> <p>8.F.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). <i>For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.</i></p> <p>Evidence Required: 4. The student compares properties of two functions, each represented in a different way (algebraic, graphic, tabular, or verbal).</p> <p>Tools: Calculator</p>	<p>Prompt Features: The student identifies one or more correct comparisons between the properties of two different functions represented in different ways.</p> <p>Stimulus Guidelines:</p> <ul style="list-style-type: none"> • Comparisons can involve specific values, rates of change, intercepts, starting points, etc. • Context should be familiar to students 13 to 15 years old. • Linear equations should be in either $y = mx + b$, where $b \neq 0$, or $y = ax + by + c = 0$, where $a > 0$ and $c \neq 0$. • Graphs may feature one quadrant or all four quadrants. • Verbal descriptions are of linear functions or data. • Item difficulty can be adjusted via these example methods: <ul style="list-style-type: none"> ○ One function is described verbally. ○ Function is given in algebraic form and compared to a function given in tabular, graph, or verbal form. ○ The property to compare is explicitly shown or described in the representation. ○ The property to compare is not explicitly shown or described in the representation. <p>TM4 Stimulus: The student is presented with linear functions represented in different ways.</p> <p>Example Stem 1: The table and equation shown each represent a different linear function.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>x</th> <th>y</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>4</td> </tr> <tr> <td>2</td> <td>12</td> </tr> <tr> <td>4</td> <td>20</td> </tr> <tr> <td>6</td> <td>28</td> </tr> </tbody> </table> <p style="margin-left: 40px;">$y = 7x + 4$</p> <p>Enter the difference between the rates of change for these two functions.</p> <p>Rubric: (1 point) The student writes the correct difference between the rates of change of the functions (e.g., 3).</p> <p>Response Type: Equation/Numeric</p>	x	y	0	4	2	12	4	20	6	28
x	y										
0	4										
2	12										
4	20										
6	28										

<p>Task Model 4</p> <p>Response Type: Equation/Numeric</p> <p>DOK Level 2</p> <p>8.F.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). <i>For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.</i></p> <p>Evidence Required: 4. The student compares properties of two functions, each represented in a different way (algebraic, graphic, tabular, or verbal).</p> <p>Tools: Calculator</p>	<p>Example Stem 2: This table shows the relationship between the monthly cell phone cost for Plan A and the number of minutes used within a month.</p> <table border="1" style="margin: 10px auto;"> <thead> <tr> <th colspan="2" style="text-align: center;">Cell Phone Cost for Plan A</th> </tr> <tr> <th style="text-align: center;">Time (min)</th> <th style="text-align: center;">Cost in dollars</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0</td> <td style="text-align: center;">30.00</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">30.10</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">30.20</td> </tr> </tbody> </table> <p>The following equation shows the relationship between the monthly cell phone cost (c) for Plan B and the number of minutes used within a month (m).</p> $c = 35 + 0.05m$ <p>The flat rate is defined as the monthly cost for the phone when 0 minutes are used. What is the difference, in dollars, between the flat rate for Plan B and the flat rate for Plan A?</p> <p>Rubric: (1 point) The student enters the correct response (e.g., 5).</p> <p>Response Type: Equation/Numeric</p>	Cell Phone Cost for Plan A		Time (min)	Cost in dollars	0	30.00	2	30.10	4	30.20
Cell Phone Cost for Plan A											
Time (min)	Cost in dollars										
0	30.00										
2	30.10										
4	30.20										

Task Model 5

Response Type:
Multiple Choice,
single correct
response

DOK Level 2

8.F.3

Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points $(1, 1)$, $(2, 4)$ and $(3, 9)$, which are not on a straight line.*

Evidence Required:

5. The student interprets the equation $y = mx + b$ as defining a linear function with a graph that is a straight line.

Tools: Calculator

Prompt Features: The student interprets $y = mx + b$ as a linear function whose graph is a straight line.

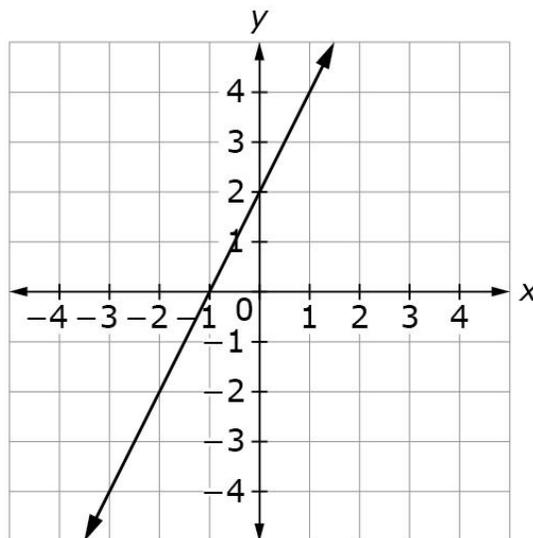
Stimulus Guidelines: Item difficulty can be adjusted via these example methods:

- Graphs may feature one or all four quadrants.
- Equations can be either $y = mx + b$, where $b \neq 0$, or $y = ax + by + c = 0$, where $a > 0$ and $c \neq 0$.
- Equations may include integers or rational numbers.

TM5

Stimulus: The student is presented with a graph that represents a linear function.

Example Stem: This graph represents a linear function.



Select the equation represented by the graph.

- A. $y = \frac{1}{2}x + 2$
- B. $y = -\frac{1}{2}x + 2$
- C. $y = 2x + 2$
- D. $y = -2x + 2$

Answer Choices: There are four answer choices. Each answer choice is an equation that represents a linear graph. Distractors will include equations with incorrect rates of change and/or y -intercepts.

Rubric: (1 point) The student selects the correct equation (e.g., C).

Response Type: Multiple Choice, single correct response

Task Model 6

Response Type:
Matching Tables

DOK Level 2

8.F.3

Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points $(1, 1)$, $(2, 4)$ and $(3, 9)$, which are not on a straight line.*

Evidence Required:

6. The student recognizes and gives examples of functions that are not linear.

Tools: Calculator

Prompt Features: The student recognizes representations of nonlinear functions.

Stimulus Guidelines:

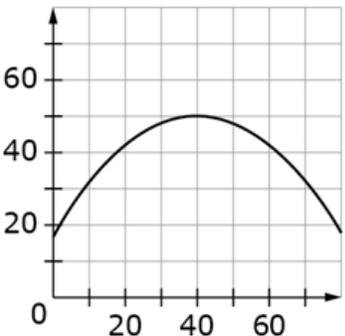
- Tables and graphs should be labeled.
- Tables should include 3–5 sets of values.
- Linear equations can be either $y = mx + b$, where $b \neq 0$, or $y = ax + by + c = 0$, where $a > 0$ and $c \neq 0$.
- Sets of ordered pairs should include between 3–5 pairs.
- Nonlinear functions can include the forms $y = x^2$, $y = |x|$, and $y = \sqrt{x}$ where $x > 0$.
- Item difficulty can be adjusted via these example methods:
 - Functions may be represented as tables or equations rather than graphs.

TM6

Stimulus: The student is presented with linear and nonlinear functions represented in different ways.

Example Stem: Several functions are represented in the table.

Determine whether each function is linear or nonlinear.

Function	Linear	Nonlinear												
$y = \frac{3}{4}x + 2$														
														
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>x</th> <th>y</th> </tr> </thead> <tbody> <tr> <td>-2</td> <td>5</td> </tr> <tr> <td>-1</td> <td>9</td> </tr> <tr> <td>0</td> <td>13</td> </tr> <tr> <td>1</td> <td>17</td> </tr> <tr> <td>2</td> <td>21</td> </tr> </tbody> </table>	x	y	-2	5	-1	9	0	13	1	17	2	21		
x	y													
-2	5													
-1	9													
0	13													
1	17													
2	21													
$\{(2, 2), (1, 2), (0, -2), (-1, -2)\}$														

Rubric: (1 point) The student selects the correct box to identify whether the functions are linear or nonlinear (e.g., L, N, L, N).

Response Type: Matching Tables