Linear Functions

Subcluster	Learning from Mistakes Students may make the following mistakes:	Interesting Items ▶
Solving Linear Equations Readiness: A.5(A) Supporting: A.2(D), A.12(E)	• making arithmetic errors with integers when combining like terms* • when applying the distributive property, not distributing a coefficient to both terms inside the parentheses* • being inconsistent in their attempt to keep the equation balanced (e.g., adding 14 to one side of the equation but not the other or attempting to add 14 to each term in the equation)* • failing to distribute a negative sign when a subtraction symbol is in front of terms grouped with parentheses* • combining unlike terms* • incorrectly canceling terms • substituting incorrectly into the equation $y = kx$ • solving for k but forgetting to solve for additional values of x or y • over-generalizing that all linear relationships involve direct variation	A.5(A) 2017 item 11 A.5(A) 2016 item 8 A.2(D) 2021 item 42 A.2(D) 2016 item 42 A.12(E) 2016 item 18
Writing Linear Equations Readiness: A.2(C), A.3(B) Supporting: A.2(B), A.2(E), A.2(F), A.2(G), A.3(A), A.4(C), A.12(C), A.12(D)	• confusing the y-intercept with the x-intercept* • switching values for x and y in the slope formula, or in the point-slope form of a linear equation* • confusing the signs of a line's slope or y-intercept (positive or negative) • having difficulty representing equations in different forms* • making sign errors when computing rate of change (positive or negative)* • neglecting to note the scale when determining rate of change from a graphical representation* • making sign errors or arithmetic mistakes when distributing and combining terms in changing from point-slope to slope-intercept form or vice versa* • failing to identify the correct slope for the perpendicular line (e.g., neglecting to the take the opposite sign and/or the reciprocal of the original slope) • mixing up or incorrectly identifying vertical and horizontal, undefined* and zero slope*, etc. • dividing y and x values to determine slope (instead of dividing the differences) • identifying slope as the coefficient A in standard form (instead of m in slope-intercept form)* • incorrectly identifying the slope and y-intercept from a regression equation* • in making predictions, confusing or misinterpreting the x and y variables (whether to evaluate or solve) • subtracting terms in the wrong order when computing the common difference* • confusing the number of the term (n) with the term itself (a_n) • using the recursive formula instead of the explicit formula (e.g., given {2, 5, 8, 11, 14…} mistakenly writing the equation as $a_n = n + 3$)	A.2(C) 2018 item 43 A.2(C) 2017 item 50 A.2(C) 2016 item 35 A.3(B) 2017 item 26 A.3(B) 2017 item 52 A.2(B) 2022 item 25 A.2(B) 2016 item 46 A.2(G) 2018 item 32 A.2(G) 2017 item 36 A.2(F) 2019 item 10 A.4(C) 2019 item 22 A.4(C) 2018 item 12 A.4(C) 2016 item 26 A.12(D) 2018 item 9
Describing Linear Functions Readiness: A.2(A), A.3(C) Supporting: A.3(E), A.4(A), A.4(B), A.12(A), A.12(B)	• confusing x and y values (domain and range)* • confusing domain and range on the graph (e.g., seeing domain as the "height" of the graph instead of the "width") • confusing which inequality symbol to use (< or >, > or ≥, etc.) to represent domain and range • confusing which inequality symbol to use (< or >, > or ≥, etc.) to represent the inclusive (closed circle) and exclusive data (open circle)* • having trouble recognizing whether a real-world situation should be represented with discrete or continuous variables* • switching values for the change in x and the change in y when identifying slope • making sign errors (positive or negative) when identifying slope • identifying slope as the coefficient A in standard form (instead of m in slope-intercept form)* • confusing x-intercepts and y-intercepts • describing the transformation incorrectly, possibly by misidentifying the original and new functions* • switching the values of the slope and y-intercept from the regression equation • failing to identify strong correlations (close to 1 or -1, instead of close to zero) • misinterpreting the relationship between the variables* • confusing association with causation* • confusing the rule about repeated y-values (which can be a function) with repeated x-values (which is not a function)* • making sign errors or arithmetic mistakes in evaluating expressions • after evaluating a function, thinking that this requires "solving for f" (e.g., given the expression $f(4) = 20$, thinking they need to divide both sides by 4 to "solve for f ")	A.2(A) 2022 item 18 A.2(A) 2021 item 33 A.2(A) 2018 item 13 A.2(A) 2016 item 30 A.2(A) 2016 item 44 A.3(C) 2019 item 26 A.3(C) 2017 item 12 A.3(E) 2021 item 20 A.3(E) 2019 item 52 A.3(E) 2016 item 11 A.4(A) 2017 item 19 A.4(B) 2017 item 9 A.12(A) 2016 item 36 A.12(B) 2016 item 27

Stimulus

Word Problem*	Verbal Description*	Chart/ Table*	Graph*	Equation/ Expression*	Manipulatives	Diagram/ Image	Number Line	Base Ten Blocks	Measurement Tool	Formula	Geometric Figures

Academic Vocabulary

arithmetic sequence	direct variation	function*	perpendicular*	slope-intercept form (of a linear equation)	variable
association/correlation	directly proportional*	horizontal	point	standard form* (of a linear equation)	varies directly*
causation*	discrete	inequality*	point-slope form (of a linear equation)	strength (of correlation)	vertical
common difference	distributive property	linear equation*	range*	term*	x-axis
common ratio	domain*	linear function*	rate of change*	transformation	x-intercept*
constant	equation*	linear regression	scatterplot*	translation (up, down, right, left)	y-axis
constant of proportionality	equivalent*	opposite reciprocal	sequence	undefined*	y-intercept*
continuous	formula	parallel*	slope*		zeros*
correlation coefficient	function notation	parent function			