

Multiplication and Division of Whole Numbers		Interesting Items ▶
Which subclusters will we choose for review?	What are common errors and misconceptions we can help students avoid?	Which items will we use?
Multiplication of Whole Numbers Readiness: 3.6(C) Supporting: 3.4(D), 3.4(E), 3.4(F), 3.4(G), 3.5(C), 3.5(D)	<ul style="list-style-type: none"> counting the number of square units to determine the area and not connecting how multiplication relates to area* not connecting rows and columns of an array to factors in multiplication* not realizing that arrays reflect the combination of equal-sized groups of objects* not recognizing the commutativity of a multiplication representation because the representations look different (e.g., not recognizing that $6 \times 3 = 18$ yields the same product as $3 \times 6 = 18$)* not connecting jumps on a number line to skip counting procedures or repeated addition* not recognizing a number sentence and its inverse as being equivalent (e.g., not recognizing that $6 \times \underline{\quad} = 42$ is the same as $42 \div 6 = \underline{\quad}$)* miscommunicating the factors of a contextual situation (e.g., if there are two girls and six boys on the team, then there are three times as many girls as boys instead of three times as many boys as girls)* misunderstanding how to interchange multiplication and division vocabulary to determine the relationship in a given equation forgetting to add a regrouped digit when applying the traditional algorithm not connecting the relationship between the factors and the product in the problem (e.g., not connecting that 3×24 is 3 times as much as 24 or 3 groups of 24)* trying to apply “key words” to select the appropriate operation instead of understanding the context of the problem* 	3.4(D) 2021 item 16 3.4(E) 2016 item 21 3.4(F) 2017 item 17 3.4(G) 2021 item 25 3.5(C) 2023 item 26 3.5(C) 2018 item 20
Division of Whole Numbers Supporting: 3.4(H), 3.4(I), 3.4(J)	<ul style="list-style-type: none"> not understanding the grouping difference between a representation for $42 \div 7 = 6$ and a representation for $42 \div 6 = 7$ not recognizing a number sentence and its inverse as being equivalent (e.g., not recognizing that $6 \times \underline{\quad} = 42$ is the same as $42 \div 6 = \underline{\quad}$)* misunderstanding how to interchange multiplication and division vocabulary to determine the relationship in a given equation* identifying even/odd but not being able to apply it to divisibility rules 	3.4(H) 2022 item 25 3.4(I) 2023 item 10 3.4(J) 2022 item 11 3.4(J) 2016 item 18
Numerical Patterns Readiness: 3.5(E)	<ul style="list-style-type: none"> identifying a pattern by comparing input to input values and/or output to output values instead of input to output values* confusing a multiplicative pattern for an additive pattern as they view multiplication as repeated addition* not recognizing the equivalency of a verbal description and its inverse (e.g., not selecting a multiple choice answer of “the number of wheels divided by 3 equals the total number of tricycles” as a representation of “the number of tricycles times 3 equals the total number of wheels”)* applying correct relationships only to the first or second row/column of a table (stopping too early)* 	3.5(E) 2023 item 19 3.5(E) 2022 item 27 3.5(E) 2019 item 10 3.5(E) 2016 item 40
Multiplication and Division of Whole Numbers Readiness: 3.4(K), 3.5(B)	<ul style="list-style-type: none"> trying to apply “key words” to select the appropriate operation instead of understanding the context of the problem* incorrectly selecting addition or subtraction as the operation of choice instead of multiplication in one or more steps* only solving the first step in a two-step problem* misunderstanding the context of the problem and incorrectly representing the expression or equation (e.g., not understanding that if Michael scored three times as many baskets as Rayshawn, that means that the number of baskets Michael scored should be higher than Rayshawn) 	3.4(K) 2021 item 10 3.4(K) 2021 item 31 3.4(K) 2019 item 26 3.5(B) 2023 item 4 3.5(B) 2023 item 15 3.5(B) 2023 item 29 3.5(B) 2021 item 29 3.5(B) 2018 item 22 3.5(B) 2016 item 14 3.5(B) 2016 item 24

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

Which words will we prioritize?							
area model	commutative property	divisible	equal groups/shares	input-output table	number pair	product	rule
array*	distributive property	division	even*	multiplication	odd*	quotient	square unit*
associative property	dividend	divisor	factor	multiplicative pattern	partial product	row*	unknown number/quantity
column							

Have we prepared students to respond to different item types?									
Multiselect (2 pts)	Equation Editor (1-2 pts)	Text Entry (1-2 pts)	Graphing (1-2 pts)	Inline Choice (1-2 pts)	Hot Spot (1-2 pts)	Fraction Model (1-2 pts)	Drag and Drop (1-2 pts)	Multiple Choice (1 pt)	