INSTITUTE for LEARNING

SOAR: Intervention Checklist

GRADES
6 and Up

Ratios and Proportional Reasoning

SOAR: Supporting Ongoing Achievement Responsively

INSTITUTE for LEARNING

Student Name: _____ Grade: _____ Teacher Name: _____

Administration Date/Administrator Initials: Date 1: _____ /_____ Date 2: _____ /_____ Date 3: _____/_____

Category I	1. Write a Ratio Described in a Context Problems			
	1a. Simple Ratio *There are 4 elephants at the zoo. What is the ratio of the elephants' ears to the elephants' eyes?*	**1b. Rate** *After 10 minutes, you notice that you have walked 7 laps. What is the rate at which you are walking?*	**1c. Percent** *40% of the pizzas sold at Speedy's Pizzeria are pepperoni pizzas. What is the ratio of pepperoni pizzas to all pizzas sold at Speedy's Pizzeria?*	***To look across all 8 items of Category I, affix page 2 of the Category I checklist here.***
Makes Sense	___ Restates the problem accurately ___ Recognizes information given in the problem ___ Identifies what is to be determined	___ Restates the problem accurately ___ Recognizes information given in the problem ___ Identifies what is to be determined	___ Restates the problem accurately ___ Recognizes information given in the problem ___ Identifies what is to be determined	
Creates Representations	___ Makes a drawing ___ Creates a table	___ Makes a drawing ___ Makes a tape diagram ___ Constructs a double number line ___ Creates a table ___ Makes use of a calculator	___ Makes a drawing ___ Makes a tape diagram ___ Constructs a double number line ___ Creates a table ___ Makes use of a calculator ___ Writes a known fact ___ Writes a proportion	
Uses a Reliable Strategy	___ Shows/draws 8 ears and 8 eyes (may use 4 ears and 4 eyes, 2 ears and 2 eyes, or 1 ear and 1 eye) ___ Uses repeated addition (2 + 2 + 2 + 2) ___ Uses multiplication (4 x 2) to count ears and/or eyes; may say that the number of ears is the same as the number of eyes	___ Uses repeated addition; adds tens until reaching 60, then adds six 7s repeatedly ___ Uses multiplication (6 x ?) = 60 or division (60 ÷ 10) to find the number of 10-minute "chunks;" then multiplies 6 x 7 to find laps per hour	___ Shows/draws a rectangle into 2 pieces, one just under half, the other just over half of the figure ___ Uses known facts, 40% = $\frac{40}{100}$ ___ Uses a calculator to change 40% into a fraction	
Provides Explanation	___ Identifies the meaning of the ratio ___ Identifies the multiplicative relationship/number of iterations ___ Uses "to" or "of"	___ Identifies the meaning of the ratio ___ Identifies the multiplicative relationship/number of iterations ___ Uses "to" or "of" ___ Uses fraction notation	___ Identifies the meaning of the ratio. ___ Identifies the multiplicative relationship/number of iterations ___ Uses "to" or "of" ___ Identifies meaning of x	

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Category I	**2. Given Part:Part, Requires Part:Whole Problem** *Ricardo notices that the ratio of red houses (light grey) to blue houses (dark grey) on his street can be represented with the diagram below.*  *If Ricardo's street has 20 houses and all are either red or blue, how many houses on his street are blue?*	**3. Given Part:Whole, Requires Part:Part Problem** *In Sarah's class, 1 out of 5 students did not turn in homework on Tuesday. If there are 30 students in Sarah's class on Tuesday, how many students did turn in homework?*	**4. Unit Rate or Price Problem** *You need to buy 24 cupcakes for your party tonight. You have $6.00. Cindy's Bakery sells 3 cupcakes for $1.00. Do you have enough money to buy 24 cupcakes? Explain why or why not.*	***To look across all 8 items of Category I, affix page 3 of the Category I checklist here.***
Makes Sense	___ Restates the problem accurately ___ Recognizes information given in the problem ___ Identifies what is to be determined	___ Restates the problem accurately ___ Recognizes information given in the problem ___ Identifies what is to be determined	___ Restates the problem accurately ___ Recognizes information given in the problem ___ Identifies what is to be determined	
Creates Representations	___ Makes a drawing ___ Makes a tape diagram ___ Constructs a double number line ___ Creates a table ___ Writes a proportion	___ Makes a drawing ___ Makes a tape diagram ___ Constructs a double number line ___ Creates a table ___ Writes a proportion	___ Makes a drawing ___ Makes a tape diagram ___ Constructs a double number line ___ Creates a table ___ Writes a proportion	
Uses a Reliable Strategy	___ Shows/draws iterations of the ratio 2:5 until 8:20 is represented ___ Uses repeated addition ___ Uses multiplication ___ Scales the ratio up or down ___ Uses cross multiplication to determine equivalent ratios $\frac{2}{5} = \frac{4(2)}{4(5)} = \frac{8}{20}$ ___ Writes a proportion	___ Shows/draws iterations of 5 students until reaching 30, notes that 6 students did not do homework. ___ Uses repeated addition ___ Uses multiplication ___ Scales the ratio up or down ___ Uses cross multiplication to determine equivalent ratios to form equivalent ratios ___ Writes a proportion and cross-multiplies	___ Shows/draws Iterations of sets of 3 cupcakes until reaching 24; notes there are 8 sets, so $8 ___ Shows/draws iterations of sets of 3 cupcakes, noting each costs $1, until reaching $6; notes there are 6 sets, so 18 cupcakes ___ Uses repeated addition ___ Scales the ratio up or down; may scale up to $\frac{18}{6}$; $6 (3 cupcakes per dollar) = 18 cupcakes ___ Uses cross multiplication to determine equivalent ratios $\frac{1}{3} = \frac{x}{24}$ *or* division 24 ÷ 3 = 8 sets of 3 ___ Uses cross multiplication to determine equivalent ratios $\frac{3}{1} = \frac{3(8)}{1(8)} = \frac{24}{8}$; or 8 ($1 per 3 cupcakes) = $24	
Provides Explanation	___ Identifies meaning of the ratio ___ Identifies the multiplicative relationship/ number of iterations ___ Explains the meaning of a proportional relationship ___ Identifies meaning of *x*	___ Identifies meaning of the ratio ___ Identifies the multiplicative relationship/number of iterations ___ Explains the meaning of a proportional relationship ___ Identifies meaning of *x*	___ Identifies meaning of the ratio ___ Identifies the multiplicative relationship/number of iterations ___ Explains the meaning of a proportional relationship ___ Discusses equivalent ratios ___ Identifies the meaning of *x*	

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Category I	**5. Constant Speed Problem** *Mr. Smith rides a motorcycle to school each day. He travels at a rate of 30 miles per hour.* *a. How long does it take him to get to school if the distance he travels is 10 miles?* *b. At that rate, how far will he be able to travel in 4 hours?*	**6. Measurement Conversion Problem** *A map is drawn using a scale of 150 kilometers to 3 centimeters. The distance between Pittsburgh and Philadelphia is 500 kilometers. How far apart will the two cities be on the map?*	**7. Percent Problem** *20% of the pizzas that Speedy Pizza Shop sells are sausage pizzas.* *a. What is the ratio of sausage pizzas to all the pizzas sold today?* *b. If the pizza shop sells 45 pizzas, how many of them are sausage?*	***To look across all 8 items of Category I, affix page 4 of the Category I checklist here.***
Makes Sense	___ Restates the problem accurately ___ Recognizes information given in the problem ___ Identifies what is to be determined	___ Restates the problem accurately ___ Recognizes information given in the problem ___ Identifies what is to be determined	___ Restates the problem accurately ___ Recognizes information given in the problem ___ Identifies what is to be determined	
Creates Representations	___ Creates a table ___ Writes a proportion	___ Makes a drawing ___ Makes a tape diagram; labels the scales appropriately ___ Constructs a double number line (or single number lines with different scales on each side) ___ Creates a table ___ Writes a proportion ___ May use "to," ":," or "/" notation ___ Makes use of a calculator	___ Makes a drawing ___ Writes a proportion, $\frac{20}{100} = \frac{x}{45}$ ___ Represents the percent as a ratio using "to," ":," or "/" or represents it using decimal notation	
Uses a Reliable Strategy	___ Shows/draw iterations of the ratio ___ Draws a tape diagram and partitions it into thirds or copies it 3 times to represent 4 hours ___ Creates a double number ___ Scales the ratio up or down; divides both parts by 3 (scaling down) or multiplies both parts by 4 (scaling up) ___ Uses cross multiplication to form equivalent ratios $\frac{30}{1} = \frac{10}{x}$ or $\frac{30}{1} = \frac{x}{4}$	___ Shows/draws iterations of the ratio ___ Uses a double (or single) number line ___ Draws a tape diagram, with both scales labeled; partitions the diagram to determine the unit distance (per cm) and then iterates or multiplies to determine distance in cm between the cities ___ Scales the ratio up or down; 50:1; 500:10; 650:13 ___ Uses cross multiplication to determine equivalent ratios to form equivalent ratios, $\frac{150}{3} = \frac{500}{x}$ or $\frac{150}{1} = \frac{650}{x}$	___ Shows/draws iterations of the ratio; Shows/draws a double number line to represent the ratio 20:100 and ?:45; labels the numbers appropriately ___ Creates a double number line; partitions 100% into 5 equal parts; partitions 45 pizzas into 5 equal parts to determine that 9 pizzas are sausage pizzas ___ Scales the ratio down to find the unit ratio 1:5 and then scales up to obtain 9:45 (explains that these are equivalent ratios) ___ Uses cross multiplication to determine equivalent ratio $\frac{20}{100} = \frac{x}{45}$ ___ Creates a grid (perhaps 9 x 5) to represent the 45 pizzas sold and shades 1 out of every 5 cells to represent the sausage pizzas	
Provides Explanation	___ Identifies meaning of the ratio ___ Identifies the multiplicative relationship/number of iterations ___ Explains the meaning of a proportional relationship ___ Identifies the meaning of *x* ___ Discusses equivalent ratios	___ Identifies meaning of the ratio ___ Identifies the multiplicative relationship/number of iterations ___ Explains the meaning of a proportional relationship ___ Identifies the meaning of *x* ___ Discusses equivalent ratios	___ Identifies meaning of the ratio ___ Identifies the multiplicative relationship/number of iterations ___ Explains the meaning of a proportional relationship ___ Identifies the meaning of *x* ___ Discusses equivalent ratios	

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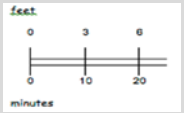
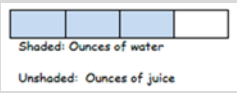
Category I	8. Recognizing Ratios in Models Problems			
	8a. Parts Represented in Picture Form *What ratio is modeled in the diagram below? Explain in words how you made your decision.* 	**8b. Parts Represented in Tape Diagram** *What ratio is modeled in the diagram below? Explain in words how you made your decision.* 	**8c. Parts Represented in Double-Number Line** *What ratio is modeled in the diagram below? Explain in words how you made your decision.* 	**8d. Part and Whole Represented in Table** *What ratio is modeled in the diagram below? Explain in words how you made your decision.* 
Connects Ratios to Visual Models	___ States that s/he needs to find the ratio ___ Recognizes information given in the problem ___ Writes 3:5, 5:3, 3:8, 5:8, May invert ratios ___ May use "to" or fraction notation	___ States that s/he needs to find the ratio ___ Recognizes information given in the problem ___ Writes 7:5, May invert ratios ___ May use "to" or fraction notation; may orally use "for each," "for every," etc.	___ States that s/he needs to find the ratio ___ Recognizes information given in the problem ___ Writes 3:10 or 6:20, May invert ratios ___ May use "to" or fraction notation; may orally use "for each," "for every," etc.	___ States that s/he needs to find the ratio ___ Recognizes information given in the problem ___ Writes 3:1 or 1:3, 3:4 or 4:3 ___ May use "to" or fraction notation; may orally use "for each," "for every," etc.
Identifies Meaning of Ratio	States the following: *(Note whether student chooses part:part or part:whole ratio.)* ___ There are 3 diamonds and 5 triangles (3:5) ___ There are 3 diamonds and 8 symbols (3:8) ___ There are 5 triangles and 8 symbols (5:8) Note: May invert ratios and describe correctly.	States the following: ___ There are 7 gallons of lime paint for every 5 gallons of peach paint Note: May invert ratios and describe correctly.	States the following: ___ 3 feet per 10 minutes ___ 6 feet in every 20 minutes ___ 3 (or 6) represents feet; 10 (or 20) represents time in minutes Note: May invert ratios and describe correctly.	States the following: *(Note whether student chooses part:part or part:whole ratio.)* ___ 3 ounces of water for each ounce of juice (3:1) ___ 1 ounce of juice for every 3 ounces of water (1:3) ___ 3 ounces of water for every 4 ounces of mix (3:4) ___ 1 ounce of juice for every 4 ounces of mix (1:4) Note: May invert ratios and describe correctly.

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Category II	**9. Test for Proportionality Problem** *The table (below) contains ticket-buying data from 3 different classrooms. Is the relationship between the number of students who purchased tickets to the school dance and the total number of students in the class a proportional relationship? Justify your answer.* |	Class A	Class B	Class C | |---|---|---|---| | Students who Purchased Tickets | 18 | 24 | 15 | | Total Number of Students | 24 | 32 | 20 |	**10. Unit Rate or Constant of Proportionality Problem** *Trent gets thirsty when he mows lawns. He often buys 6 bottles of sports drink for $9.36.* *a. At that price, how much does Trent pay for 1 bottle of sports drink?* *b. If Trent wants to buy 21 bottles of sports drink, how much money will he need?* *c. Write an equation to express the relationship between the number of bottles of sports drink he buys and the price he pays.*	*To look across all 5 items of Category II, affix page 2 of the Category II checklist here.*
Makes Sense	___ Restates the problem accurately ___ Recognizes information given in the problem ___ Identifies what is to be determined	___ Restates the problem accurately ___ Recognizes information given in the problem ___ Identifies what is to be determined	
Creates Representations	___ Writes the ratio using "to" or "/"notation ___ Shows a unit rate (or base rate) for each class ___ Creates a ratio table of values with appropriate labels ___ Writes a proportion	___ Writes the ratio using "to" or "/"notation ___ Determines unit rate (or base rate) for each class ___ Creates a ratio table of values with appropriate labels ___ Writes a proportion	
Uses a Reliable Strategy	___ Makes use of the unit rate; the total number of students to the students who purchased tickets is $\frac{4}{3}$: 1 for all classes or students who purchased tickets to the total number of students is $\frac{3}{4}$: 1 for all classes ___ Scales the ratio up or down; $\frac{18}{24}$ to $\frac{24}{32}$ and $\frac{15}{20}$. May invert all ratios. May scale one down to base rate of $\frac{3}{4}$ and scale up to the others ___ Represents data as a graph and determines that the line passing through (0,0) ___ Writes an equation that describes the relationship between the *y*, total number of students and *x*, the students who purchased tickets from each class; $y = \frac{4}{3}x$ ___ Writes an equation that describes the relationship between *y*, the students who purchased tickets and x, the total number of students for each class; $y = \frac{3}{4}x$	___ Forms the ratio 6:9.36 (with appropriate labeling) ___ Scales the ratio up or down; 1:1.56 and 21:32.76 ___ Makes use of the unit rate; uses division to determine that 1 bottle costs $1.56 and then multiplies to determine that 21 bottles cost $32.70; or writes the equation p = 1.56 n, and then uses the equation to find the price of 21 bottles ___ Uses cross-multiplication to determine the cost of 1 bottle and 21 bottles of sports drink in the cost of $\frac{6}{9.36} = \frac{1}{x}$ or $\frac{6}{9.36} = \frac{21}{x}$	
Provides Explanation	___ The ratios (equations) describe the relationship between, e.g., the total number of students and the students who purchased tickets for each class ___ If the relationship is proportional, the ratios (equations) must be constant (or equivalent) ___ In proportional relationships, the points all fall on a straight line that passes through the origin	___ The ratio describes the relationship between the 6 bottles of sports drink and the cost of $9.36, so therefore 1 bottle will cost $1.56 ___ 1.56*n* = *p* where *n* = number of bottles and *p* = price ___ The *x* represents how much 1 (or 21) bottles of sports drink will cost; $9.36 is how much 6 bottles cost and $32.76 is the cost of 21 bottles ___ Since 1 bottle costs $1.56, I can multiply 1.56 x 21 to determine that 21 bottles cost $32.76	

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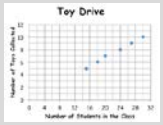
Category II	**11. Graphing Problem** *The graph (below) shows the number of toys that students in 6 middle school classes collected for charity.* **a.** *Is the relationship between the number of students in the class and the number of toys collected a proportional relationship?* **b.** *If the relationship is proportional, write an equation that shows the relationship between the number of students in the class and the number of toys collected. If the relationship is not proportional, explain how you know.* 	**12. Constant Rate Problem** *It takes Lola 20 minutes to walk her dog $\frac{1}{2}$ mile. What is her walking rate in miles per hour?*	**13. Percent Problem** *Michael needs to buy a new pair of sneakers and his favorite style of sneakers normally cost $75.00. There is a 20% discount on sneakers at the mall.* *a. If he buys his favorite sneakers at the mall, how much money will he save?* *b. How much will his sneakers cost at the discount price?*
Makes Sense	___ Restates the problem accurately ___ Recognizes information given in the problem ___ Identifies that the goal is to find out if the ratios are equivalent	___ Restates the problem accurately ___ Recognizes information given in the problem ___ Identifies what is to be determined	___ Restates the problem accurately ___ Recognizes information given in the problem ___ Identifies what is to be determined
Creates Representations	___ Creates individual ratios using "to" or "/" notation ___ Makes a graph ___ Makes a ratio table of values with appropriate labels ___ Writes a proportion	___ Shows/draws a diagram a diagram (track) representing $\frac{1}{2}$ mile in 20 minutes and iterates it to get $\frac{3}{2}$ mile in 60 minutes ___ Makes a double number line ___ Creates individual ratios "to" or "/" notation ___ Makes a ratio table of values with appropriate labels ___ Writes a proportion	___ Makes a double number line; partitions 100% into 5 equal parts; partitions $75 into 5 equal parts to determine that $15 is the savings ___ Creates individual ratios "to" or "/" notation ___ Makes a ratio table of values with appropriate labels ___ Writes a proportion
Uses a Reliable Strategy	___ Identifies simplifies the ratio ___ Scales the ratio up or down ___ Represents the points in the graph as ratios and finds their decimal equivalence to determine whether the ratios are constant ___ Draws a line that passes through all points and recognizes that the data points are not collinear, thus the data is not proportional ___ Creates a table of values and determines there is not a constant multiplicative relationship between the two columns ___ Tests for proportionality by determining the cross-products of pairs of ratios and finds that some cross-products are not equal (not evidence of proportional reasoning)	___ Scales the ratio up or down; Uses $\frac{1}{2}$ mile:20 min and scales up to get $\frac{3}{2}$ mile:60 min ___ Converts 20 minutes to $\frac{1}{3}$ hr and multiplies $\frac{1}{2}$ mile by 3 (three 20 minute segments in 1 hour) to find $\frac{3}{2}$ mph, Notes that 20(3) = 60 $\rightarrow \frac{1}{2}(3) = \frac{3}{2}$ ___ Creates a table; may extend the table beyond 60 minutes ___ Uses cross-multiplication to solve proportion $\frac{\frac{1}{2}}{\frac{1}{3}} = \frac{x}{1}$ or $\frac{\frac{1}{2}}{20} = \frac{x}{60}$	___ Uses cross-multiplication to solve the proportion $\frac{20}{100} = \frac{x}{75}$ ___ Uses a known fact 20% = $\frac{20}{100} = \frac{1}{5}$ or .20 and multiplies $75 by .20 or $\frac{1}{5}$ ___ Uses a grid
Provides Explanation	___ The ratios represent the points on the graph, the class size, and the number of toys collected ___ The ratios are not equivalent; therefore, the relationship is not proportional ___ The point (20,7) did not fall on the same line as the other points so therefore it is not a proportional relationship	___ The 20 is the number of minutes Lola walks her dog. The $\frac{1}{2}$ mile is the distance they travel ___ It takes three 20-minutes to make an hour, so 20 minutes is $\frac{1}{3}$ miles an hour ___ The *x* represents number of miles Lola and her dog can walk in 1 hour/60 minutes ___ Since $\frac{1}{2}$ mile takes 20 minutes, 1 mile takes 40 minutes and $1\frac{1}{2}$ miles will take 60 minutes	___ $75 is the original price of a pair of sneakers. ___ Names the discount of 20% and states that $20 is saved for every $100 ___ The *x* represents the amount of discount out of the $75 original cost ___ $\frac{20}{100}$ says that out of every 100 dollars cost, 20 will be taken off or discounted. But the sneakers only cost $75, so I have to find the ratio out of 75 that will be equivalent to $\frac{20}{100}$. So I solve $\frac{20}{100} = \frac{x}{75}$, which says the ratios are equivalent ___ States an equivalent ratio; since the original price of sneakers is $75, $15:$75 is equivalent to 20:100