SOAR: Intervention Checklist

GRADES 6 and Up

Ratios and Proportional Reasoning
### 1. Write a Ratio Described in a Context Problems

#### Category I

<table>
<thead>
<tr>
<th></th>
<th>1a. Simple Ratio</th>
<th>1b. Rate</th>
<th>1c. Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>There are 4 elephants at the zoo. What is the ratio of the elephants’ ears to the elephants’ eyes?</td>
<td>After 10 minutes, you notice that you have walked 7 laps. What is the rate at which you are walking?</td>
<td>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?</td>
</tr>
</tbody>
</table>

#### Makes Sense
- Restates the problem accurately
- Recognizes information given in the problem
- Identifies what is to be determined

#### Creates Representations
- Makes a drawing
- Creates a table

#### 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”
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.

---

**Category I**

<table>
<thead>
<tr>
<th>Makes Sense</th>
<th>Creates Representations</th>
<th>Uses a Reliable Strategy</th>
<th>Provides Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>___________</td>
<td>___________</td>
<td>___________</td>
<td>___________</td>
</tr>
</tbody>
</table>

**To look across all 8 items of Category I, affix page 3 of the Category I checklist here.**
### 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?

### Category I: 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?

### Category I: 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?
### 8. Recognizing Ratios in Models Problems

<table>
<thead>
<tr>
<th>Category</th>
<th>8a. Parts Represented in Picture Form</th>
<th>8b. Parts Represented in Tape Diagram</th>
<th>8c. Parts Represented in Double-Number Line</th>
<th>8d. Part and Whole Represented in Table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connects Ratios to Visual Models</td>
<td>What ratio is modeled in the diagram below? Explain in words how you made your decision.</td>
<td>What ratio is modeled in the diagram below? Explain in words how you made your decision.</td>
<td>What ratio is modeled in the diagram below? Explain in words how you made your decision.</td>
<td>What ratio is modeled in the diagram below? Explain in words how you made your decision.</td>
</tr>
<tr>
<td>Identifies Meaning of Ratio</td>
<td>States the following: (Note whether student chooses part:part or part:whole ratio.)</td>
<td>States the following:</td>
<td>States the following:</td>
<td>States the following: (Note whether student chooses part:part or part:whole ratio.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connects Ratios to Visual Models</td>
<td>States that s/he needs to find the ratio</td>
<td>States that s/he needs to find the ratio</td>
<td>States that s/he needs to find the ratio</td>
<td>States that s/he needs to find the ratio</td>
</tr>
<tr>
<td></td>
<td>Recognizes information given in the problem</td>
<td>Recognizes information given in the problem</td>
<td>Recognizes information given in the problem</td>
<td>Recognizes information given in the problem</td>
</tr>
<tr>
<td></td>
<td>Writes 3:5, 5:3, 3:8, 5:8, May invert ratios</td>
<td>May use “to” or fraction notation</td>
<td>Write 7:5, May invert ratios</td>
<td>Write 3:10 or 6:20, May invert ratios</td>
</tr>
<tr>
<td></td>
<td>May use “to” or fraction notation</td>
<td></td>
<td>May use “to” or fraction notation; may orally use “for each,” “for every,” etc.</td>
<td>May use “to” or fraction notation; may orally use “for each,” “for every,” etc.</td>
</tr>
<tr>
<td>Connects Ratios to Visual Models</td>
<td>States the following: (Note whether student chooses part:part or part:whole ratio.)</td>
<td>States the following:</td>
<td>States the following:</td>
<td>States the following: (Note whether student chooses part:part or part:whole ratio.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connects Ratios to Visual Models</td>
<td>States that s/he needs to find the ratio</td>
<td>States that s/he needs to find the ratio</td>
<td>States that s/he needs to find the ratio</td>
<td>States that s/he needs to find the ratio</td>
</tr>
<tr>
<td></td>
<td>Recognizes information given in the problem</td>
<td>Recognizes information given in the problem</td>
<td>Recognizes information given in the problem</td>
<td>Recognizes information given in the problem</td>
</tr>
<tr>
<td></td>
<td>Writes 3:5, 5:3, 3:8, 5:8, May invert ratios</td>
<td>May use “to” or fraction notation</td>
<td>Write 7:5, May invert ratios</td>
<td>Write 3:10 or 6:20, May invert ratios</td>
</tr>
<tr>
<td></td>
<td>May use “to” or fraction notation</td>
<td></td>
<td>May use “to” or fraction notation; may orally use “for each,” “for every,” etc.</td>
<td>May use “to” or fraction notation; may orally use “for each,” “for every,” etc.</td>
</tr>
<tr>
<td>Connects Ratios to Visual Models</td>
<td>States the following:</td>
<td>States the following:</td>
<td>States the following:</td>
<td>States the following: (Note whether student chooses part:part or part:whole ratio.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connects Ratios to Visual Models</td>
<td>States that s/he needs to find the ratio</td>
<td>States that s/he needs to find the ratio</td>
<td>States that s/he needs to find the ratio</td>
<td>States that s/he needs to find the ratio</td>
</tr>
<tr>
<td></td>
<td>Recognizes information given in the problem</td>
<td>Recognizes information given in the problem</td>
<td>Recognizes information given in the problem</td>
<td>Recognizes information given in the problem</td>
</tr>
<tr>
<td></td>
<td>Writes 3:5, 5:3, 3:8, 5:8, May invert ratios</td>
<td>May use “to” or fraction notation</td>
<td>Write 7:5, May invert ratios</td>
<td>Write 3:10 or 6:20, May invert ratios</td>
</tr>
<tr>
<td></td>
<td>May use “to” or fraction notation</td>
<td></td>
<td>May use “to” or fraction notation; may orally use “for each,” “for every,” etc.</td>
<td>May use “to” or fraction notation; may orally use “for each,” “for every,” etc.</td>
</tr>
</tbody>
</table>

**States the following:**
- 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.
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.

<table>
<thead>
<tr>
<th>Class</th>
<th>Students who Purchased Tickets</th>
<th>Total Number of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>18</td>
<td>24</td>
</tr>
<tr>
<td>B</td>
<td>24</td>
<td>32</td>
</tr>
<tr>
<td>C</td>
<td>15</td>
<td>20</td>
</tr>
</tbody>
</table>

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.

- Makes Sense
  - 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

- Uses a Reliable Strategy
  - Makes use of the unit rate; the total number of students to the students who purchased tickets is \( \frac{3}{2} : 1 \) for all classes or students who purchased tickets to the total number of students is \( \frac{2}{3} : 1 \) 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 \( \frac{2}{3} \) 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; \( y = \frac{3}{2} x \)
  - Writes an equation that describes the relationship between \( y \), the students who purchased tickets and \( x \), the total number of students for each class; \( y = \frac{2}{3} x \)

- 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

- 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 \( \frac{6}{9.36} = \frac{21}{x} \)
### 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.

![Graph of toys collected by class](image)

### 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?

- **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?

### 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?