

Rubric: Riding at the Playground

Key APS Mathematics Performance Standards:

Target Performance Standards – Grade 2:

1. **Decomposes and recombines** numbers in logical ways to solve problems (e.g., $8 + 5 = (3 + 5) + 5 = 3 + (5 + 5) = 3 + 10 = 13$).
2. **Analyzes** relationships of quantities to 20 using part – part - whole (e.g., $1 + 7, 2 + 6, 3 + 5, 4 + 4$: all equal 8.).
3. **Communicates** mathematical thinking coherently and clearly to others.

- If the student does not attempt to solve the task or the work on the problem is completely unrelated to the task, the student’s work for the task is considered “**Unscorable**” and should not be assigned a performance level of Novice, Apprentice, Practitioner, or Expert.

Level	Understanding	Strategies, Reasoning, & Procedures	Communication
Novice	<ul style="list-style-type: none"> ❖ The student understand that the big wheel has 3 wheels and the bicycle has 2 wheels. ❖ The student does not understand that there are 3 bicycles and 3 big wheels at the playground and that s/he must find the total number of wheels. 	<ul style="list-style-type: none"> ❖ The student has started the task using manipulatives or representations, but does not use an effective strategy to determine the total number of wheels, therefore cannot complete the task and/or find a correct solution. <p>Sample Strategy: The student draws a big wheel and a bike, accurately represents the wheels, but does not account for all of the wheels at the playground. Counts 3 wheels for the big wheel and 2 wheels for the bicycle for a total of 5 wheels.</p>	<ul style="list-style-type: none"> ❖ There is little or no communication, the student did not label the work, and/or their thinking is difficult to follow. ❖ Summary: The student cannot write/verbalize his/her final answer, and/or uses little or no math language and symbols to explain (verbally or in writing) how s/he determined the number of bikes and wheels at the playground. ❖ Representations: The student has no system (charts/t-tables/graphs) to track the wheel groupings of the bikes or the total number of wheels at the playground.

<p>Apprentice</p>	<ul style="list-style-type: none"> ❖ The student understands that they must find the total number of wheels for the big wheels and the bicycles. ❖ The student may not realize that there are 3 bicycles and 3 big wheels (John's + 2). 	<ul style="list-style-type: none"> ❖ The student has started the task using manipulatives or representations, has chosen a strategy to solve the task, but does not achieve a correct solution. ❖ The student may achieve a correct solution, but uses a counting or 1-to-1 correspondence strategy to solve the task. <p>Sample Strategy: The student counts 3 bicycles with two wheels each, for a total of 6 bicycle wheels and counts 2 big wheels (forgets John's big wheel) with 3 wheels each for a total of 6 big wheel wheels. Total number of wheels at the playground is 12.</p>	<ul style="list-style-type: none"> ❖ The student has communicated his/her understanding of the task by labeling their work, but the task is not clearly organized and the student's thinking is hard to follow. ❖ Summary: The student states his/her final answer and uses some math language and symbols to explain (verbally or in writing) how s/he determined the number of bikes and wheels at the playground. ❖ Representations: The student can represent their sets of wheels clearly, but has not establish an accurate system (charts/t-tables/graphs) to track the wheel groupings of the bikes or the total number of wheels at the playground.
<p>Practitioner</p>	<p style="text-align: center;">Proficiency</p> <ul style="list-style-type: none"> ❖ The student understands that: <ul style="list-style-type: none"> • S/he is finding the total number of wheels of 3 big wheels and 3 bikes. • The wheels of the big wheel come in sets of 3 and the wheels of the bicycles come in sets of 2. • The wheels come in sets and relates the concepts of 'sets' to addition. 	<p style="text-align: center;">Proficiency</p> <ul style="list-style-type: none"> ❖ The student must have a correct solution and demonstrate one strategy that will determine the total number of wheels at the playground using manipulatives or representations. ❖ The student uses the concept of sets and addition equations to determine the total number of wheels at the playground. <p>Sample Strategy: Big Wheels: $3 + 3 + 3 = 9$ Bicycles: $2 + 2 + 2 = 6$ Total Number of Wheels: $9 + 6 = 15$</p>	<p style="text-align: center;">Proficiency</p> <ul style="list-style-type: none"> ❖ The student can represent his/her work in a clear, organized manner. ❖ Summary: The student states his/her final answer and uses appropriate math language and symbols to explain (verbally or in writing) how s/he determined the number of bikes and wheels at the playground. ❖ Representations: The student can represent the wheels using manipulatives and/or drawings, and has created an efficient system (charts/t-tables/graphs) to track the wheel groupings of the bikes or the total number of wheels at the playground.

<p>Expert</p>	<ul style="list-style-type: none"> ❖ The student understands that: <ul style="list-style-type: none"> • S/he is finding the total number of wheels of 3 big wheels and 3 bikes. • The wheels of the big wheel come in sets of 3 and the wheels of the bicycles come in sets of 2. • The wheels come in sets and relates the concepts of 'sets' to multiplication. ❖ Task Extension: The student includes a rule, equation, generalization, and/or observation (verbal or written) about their understanding of sets and multiplication. 	<ul style="list-style-type: none"> ❖ The student must have a correct solution and demonstrate one or more strategies that will determine the total number of wheels at the playground. ❖ The student uses the concept of sets and multiplicative concepts to determine the total number of wheels at the playground. <p>Sample Strategy: Big Wheels: 3 sets of 3 is 9 ($3 \times 3 = 9$) Bicycles: 3 sets of 2 is 6 ($3 \times 2 = 6$) Total Number of Wheels: $9 + 6 = 15$</p> <ul style="list-style-type: none"> ❖ Task Extension: "Each big wheel has 3 sets of wheels, so multiply 3 by the total number of big wheels ($3 \times$ the # of big wheels = total # of wheels)." 	<ul style="list-style-type: none"> ❖ The student can represent his/her work in a clear, organized manner. ❖ Summary: and uses appropriate math language/symbols in his/her explanation of how they find the total number of wheels at the playground. ❖ Representations: The student can represent his/her answer in a table or chart and can write (or verbalize) how they totaled the number of wheels. ❖ Task Extension: The student includes a rule, equation, generalization, and/or observation (verbal or written) about their understanding of sets and multiplication.
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