

*Task Specific Rubric*

*The Great Kayak Expedition*

*Grade 6*

## A Few Notes about Rubrics, Benchmark Papers and Scoring...

- Proficiency levels are determined by the content and performance standards, teachers should always compare the student's performance to the standards to assess proficiency levels.
- It is helpful for teachers to discuss the proficiency levels before scoring student work.
- The benchmark papers and task specific rubric are designed to help the teacher analyze student thinking and understanding at each of the four performance levels: Novice, Apprentice, Proficient/Practitioner, and Expert (NAPE).
- It is recommended that teachers use the task specific rubric given for the assessment to identify the specific math skills that make up each section of the four performance levels for the task.
- Teachers should also review the benchmark papers provided to get a sense of the mathematics that students will use to solve the task.
- Teachers should scan their students' papers to get a sense of the mathematical thinking their students are using to solve the task before they begin scoring student work.
- The benchmark papers and task specific rubric are generalizations of what student work could look like.  
**It is not possible to anticipate every answer a student can give, so in scoring student work the teacher must use these generalizations to come to their own conclusions as to where a student is performing on the assessment.**
- Teachers should use the three analytic criteria of Understanding, Strategies and Communication to determine a student's holistic performance on a task. The holistic score reflects the overall student's performance on the task and indicates the student's understanding of the mathematical concepts being assessed in the task.



# Rubric: The Great Kayak Expedition

## Target APS Mathematics Performance Standards

### Strand I: Global Mathematical Processes

- ✓ **Communicates** mathematical thinking coherently and clearly to others.

### Strand III: Geometry, Spatial Sense, and Measurement – Grade 6

- ✓ **Converts** accurately from one unit to another accurately within the same system (e.g., 36 inches = 3 feet or 2 kilometers = 2000 meters).

### Strand V: Patterns, Functions, and Algebraic Concepts – Grade 6

- ✓ **Predicts** sequences and patterns involving varying rates of change (e.g., growth over time).

Level	Understanding	Strategies, Reasoning, & Procedures	Communication
<b>Unscorable</b>	<ul style="list-style-type: none"> <li>✓ The student demonstrates no understanding of the mathematics in the problem.</li> </ul>	<ul style="list-style-type: none"> <li>✓ The student does not attempt to implement a strategy or procedure for solving the problem.</li> <li>✓ The student makes random attempts to solve the task that clearly do not relate to the task.</li> </ul>	<ul style="list-style-type: none"> <li>✓ The student does not attempt to use mathematical representations, language or symbols to communicate a solution to the problem.</li> </ul>

Level	Understanding	Strategies, Reasoning, & Procedures	Communication
<b>Novice</b>	<p><b>The student understands that:</b></p> <ul style="list-style-type: none"> <li>The task is a multi-step problem, but does not have the mathematical knowledge to complete the task; and will only attempt to solve one or two aspects of the problem.</li> </ul>	<ul style="list-style-type: none"> <li>✓ The student does not use an effective strategy to solve the problem.</li> <li>✓ The student starts the problem but has difficulty applying the mathematics needed to complete the calculations to solve the problem.</li> </ul> <p><b>For example:</b></p> <ul style="list-style-type: none"> <li>The student may not be able to apply rate of travel to any of the stages of the expedition.</li> <li>The student may attempt to determine the rate of travel through stage 1, but will not be able to accurately calculate Ethan’s speed (40 minutes), and will not be able to apply the rate to stage 2 or 3 of the expedition.</li> <li>The student may be able to calculate the time it takes to complete each section of the expedition.</li> </ul> <p><b>Sample Strategies:</b></p> <ul style="list-style-type: none"> <li>✓ The student starts by attempting to find the time of each stage of the expedition, but does not total the time and calculate the arrival time at the landing dock.</li> <li>✓ The student does not apply the rates of travel.</li> </ul> <p>Stage 1: 2:30 to 3:10 is 40 minutes  Stage 2: ? minutes  Stage 3: 40 minutes</p>	<ul style="list-style-type: none"> <li>✓ The student cannot represent their work in a clear, organized manner.</li> <li>✓ The student does not label the work or state a final answer.</li> <li>✓ The student cannot explain the steps needed to solve the problem using appropriate mathematical language and symbols.</li> <li>✓ The student does not state their final answer: the varying rates of speed for each stage of the expedition or the arrival time at the landing dock.</li> </ul>

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<b>Apprentice</b>	<p><b>The student understands that:</b></p> <ul style="list-style-type: none"> <li>The task is a multiple step problem, but cannot use the information at each of the steps to solve the problem.</li> <li>Each stage of the expedition is a 2-mile distance.</li> <li>S/he must calculate the time and/or rate it takes Ethan to travel through each stage of the expedition, but makes errors in his/her calculations and cannot move the problem to an accurate conclusion.</li> </ul> <p><b>The student does not understand that:</b></p> <ul style="list-style-type: none"> <li>There is a connection between the distance, rate of travel, and the time it takes to travel through each of the 3 stages of the expedition.</li> </ul>	<p>✓ The student starts the problem but has difficulty applying the mathematics needed to complete the calculations to solve the problem.</p> <p><b>The student may be able to:</b></p> <ul style="list-style-type: none"> <li>Determine the amount of time it takes to complete each stage, but may or may not total the time and calculate the arrival time at the landing dock.</li> <li>Determine the rate of travel (speed) in the first stage of the expedition, but does not accurately use the information to complete the rate for stage 2 and 3.</li> </ul> <p><b>Sample Strategies:</b> The student creates a chart for the 3 stages of the expedition, but makes calculation errors or may not be able to complete the chart.</p> <table border="1"> <thead> <tr> <th></th> <th>Stage 1</th> <th>Stage 2</th> <th>Stage 3</th> </tr> </thead> <tbody> <tr> <td><b>Time</b></td> <td>40 min</td> <td>80 min</td> <td>40 min</td> </tr> <tr> <td><b>Speed</b></td> <td>20 min/ mile</td> <td>40 min/ mile</td> <td>20 min/ mile</td> </tr> <tr> <td><b>Miles</b></td> <td>2</td> <td>2</td> <td>2</td> </tr> </tbody> </table> <p>→ Note the errors in the stage 2 calculations of the chart.</p>		Stage 1	Stage 2	Stage 3	<b>Time</b>	40 min	80 min	40 min	<b>Speed</b>	20 min/ mile	40 min/ mile	20 min/ mile	<b>Miles</b>	2	2	2	<p>✓ The student cannot represent his/her work in a clear, organized manner.</p> <p>✓ The student does not state his/her final answer or states an incorrect answer.</p> <p>✓ The student does not completely explain the steps needed to solve the problem using appropriate mathematical language and symbols.</p> <p>✓ The student may not use accurate mathematical data to support his/her conclusions about when Ethan arrived at landing dock, and/or the speed he traveled at each stage of the expedition.</p>
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<h1 style="writing-mode: vertical-rl; transform: rotate(180deg);">Practitioner/Proficient</h1>	<p><b>The student understands that:</b></p> <ul style="list-style-type: none"> <li>• Each stage of the expedition is a 2-mile distance.</li> <li>• S/he must calculate the travel time for each stage of the expedition and determine Ethan’s arrival time at the landing dock.</li> <li>• S/he must determine the rate of travel for each stage of the expedition and calculate Ethan’s varying rates of speed throughout the expedition.</li> <li>• There is a connection between the distance, rate of travel, and the time it takes to travel through each of the 3 stages of the expedition.</li> </ul>	<ul style="list-style-type: none"> <li>✓ The student uses one accurate and appropriate strategy to correctly solve all the steps of the task.</li> <li>✓ The student must use an organizational system (i.e., chart or table) to record the three stages of the expedition.</li> </ul> <p><b>The student must:</b></p> <ul style="list-style-type: none"> <li>• Calculate the rate of travel (speed) in the first stage of the expedition (i.e., 1 mile in 20 minutes) and apply this rate to determine the travel rates of stages 2 and 3.</li> <li>• Calculate the amount of time it takes to complete the first stage of the expedition (2 miles in 40 minutes) and apply the rate of time to complete stages 2 (20 minutes) and 3 (40 minutes).</li> <li>• Determine the overall time (i.e., 100 minutes) it will take Ethan to complete the expedition and convert the elapsed time of arrival at the landing dock (4:10 pm).</li> </ul> <p><b>Sample Strategies:</b> The student creates a chart to organize the information for the 3 stages of the expedition and uses the information to support his/her thinking.</p> <table border="1"> <thead> <tr> <th></th> <th>Stage 1</th> <th>Stage 2</th> <th>Stage 3</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td><b>Miles</b></td> <td>2</td> <td>2</td> <td>2</td> <td>6</td> </tr> <tr> <td><b>Time</b></td> <td>40 min.</td> <td>20 min.</td> <td>40 min.</td> <td>100 min.</td> </tr> <tr> <td><b>Rate</b></td> <td>20 min. per mile</td> <td>10 min. per mile</td> <td>20 min. per mile</td> <td></td> </tr> </tbody> </table> <p>Ethan starts the expedition at 2:30 and it takes him 100 minutes to travel 6 miles. He arrives at the dock at 4:10 Ethan travels through the three stages of the expedition at varying rates of speed:  Stage 1: 20 minutes per mile; Stage 2: 10 minutes per mile;  Stage 3: 20 minutes per mile</p>		Stage 1	Stage 2	Stage 3	Total	<b>Miles</b>	2	2	2	6	<b>Time</b>	40 min.	20 min.	40 min.	100 min.	<b>Rate</b>	20 min. per mile	10 min. per mile	20 min. per mile		<ul style="list-style-type: none"> <li>✓ The student can represent his/her work in a clear, organized manner.</li> <li>✓ The student states the final answer.</li> <li>✓ The student explains the steps needed to solve the problem using appropriate mathematical language and symbols.</li> <li>✓ The student uses the mathematical data in the problem to support his/her conclusions about the time Ethan arrives at the landing dock and his speed at each stage of the expedition.</li> </ul>
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<b>Expert</b>	<p>The student’s understanding will demonstrate all of the ‘proficient’ criteria.</p> <p><b>Task Extension:</b> The expert in some way will demonstrate an exemplary understanding of the task and the mathematical concepts of applying or comparing rates.</p> <p><b>Here are some examples of an expert extension:</b></p> <ul style="list-style-type: none"> <li>• Equations with variables</li> <li>• Use of <math>RT = D</math> formula</li> <li>• A statement on the connection regarding rate, time and distance</li> </ul>	<p>The student’s solution will demonstrate all of the ‘proficient’ criteria.</p> <p><b>Task Extension:</b> The expert in some way will demonstrate an exemplary strategy of the task and the mathematical concepts.</p> <p><b>Here are some examples of an expert extension:</b> The student may answer questions using miles per hour (unit rate).</p> <table border="1"> <thead> <tr> <th></th> <th>Stage 1</th> <th>Stage 2</th> <th>Stage 3</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td><b>Miles</b></td> <td>2</td> <td>2</td> <td>2</td> <td>6</td> </tr> <tr> <td><b>Time</b></td> <td>40 min.</td> <td>20 min.</td> <td>40 min.</td> <td>100 min.</td> </tr> <tr> <td><b>Travel</b></td> <td>20 min. per mile</td> <td>10 min. per mile</td> <td>20 min. per mile</td> <td></td> </tr> <tr> <td><b>Rate</b></td> <td>3 miles per hour</td> <td>6 miles per hour</td> <td>3 miles per hour</td> <td>4 miles per hour</td> </tr> </tbody> </table> <p>Ethan starts the expedition at 2:30 and arrives at the dock at 4:10. Ethan travels through the three stages of the expedition at varying rates of speed:            Stage 1: 3 mph            Stage 2: 6 mph            Stage 3: 3 mph            Ethan’s average rate of speed is 4 mph.</p>		Stage 1	Stage 2	Stage 3	Total	<b>Miles</b>	2	2	2	6	<b>Time</b>	40 min.	20 min.	40 min.	100 min.	<b>Travel</b>	20 min. per mile	10 min. per mile	20 min. per mile		<b>Rate</b>	3 miles per hour	6 miles per hour	3 miles per hour	4 miles per hour	<p>The student’s communication will demonstrate all of the ‘proficient’ criteria.</p> <p><b>Task Extension:</b> The expert in some way will demonstrate an exemplary strategy of the task and the mathematical concepts.</p> <p><b>Here is an example of an expert extension:</b></p> <ul style="list-style-type: none"> <li>• Including a written rule, equation, generalization, and/or observation about his/her mathematical insights on the connection between rate, time, and distance.</li> </ul>
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