

Task Specific Rubric

The Great Kayak Expedition

Grade 7

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 II: Number Sense and Operations – Grade 7

- ✓ **Explains** the relationship that can be expressed as part-to-part (e.g., 5 red apples, 3 green apples, expressed as $\frac{5}{3}$).

Strand V: Patterns, Functions, and Algebraic Concepts – Grade 7

- ✓ **Develops and tests** strategies for solving two-step equations.

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

Level	Understanding	Strategies, Reasoning, & Procedures	Communication
Novice	<p>The student understands that:</p> <ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> ✓ The student does not use an effective strategy to solve the problem. ✓ The student starts the problem but has difficulty applying the mathematics needed to complete the calculations to solve the problem. <p>For example:</p> <ul style="list-style-type: none"> The student may not be able to apply rate of travel to any of the stages of the expedition. 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. The student may be able to calculate the time it takes to complete each section of the expedition. <p>Sample Strategies: The student starts by finding the time of each stage of the expedition, but does not total the time and calculate the arrival time at the landing dock; and the student does not apply the rates of travel.</p> <p>Stage 1: 2:30 to 3:10 is 40 minutes Stage 2: 20 minutes Stage 3: 40 minutes</p>	<ul style="list-style-type: none"> ✓ The student cannot represent their work in a clear, organized manner. ✓ The student does not label the work or state a final answer. ✓ The student cannot explain the steps needed to solve the problem using appropriate mathematical language and symbols. ✓ The student does not state their final answer: the varying rates of speed in miles per hour for each stage of the expedition or the arrival time at the landing dock.

Apprentice

Level	Understanding	Strategies, Reasoning, & Procedures	Communication																
	<p>The student understands that:</p> <ul style="list-style-type: none"> The task is a multiple step problem, but cannot use the information at each of the steps to solve the problem. Each stage of the expedition is a 2-mile distance. S/he must calculate the time and 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. <p>The student does not understand that:</p> <ul style="list-style-type: none"> 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. 	<p>✓ The student starts the problem but has difficulty applying the mathematics needed to complete the calculations to solve the problem.</p> <p>The student may be able to:</p> <ul style="list-style-type: none"> Determine the rate of travel (speed) for the first stage of the expedition, but does not accurately use the information to complete the rate for stage 2 and 3, and cannot state the rate in miles per hour. Determine the amount of time it takes to complete each stage, but will not total the time and calculate the arrival time at the landing dock. <p>Sample Strategies: The student creates a chart for the 3 stages of the expedition, but makes calculation errors, may not be able to complete the chart, or does not convert the calculations to mph.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>Stage 1</th> <th>Stage 2</th> <th>Stage 3</th> </tr> </thead> <tbody> <tr> <td>Time</td> <td>40 min</td> <td>20 min</td> <td>40 min</td> </tr> <tr> <td>Speed</td> <td>20 min/mile</td> <td>10 min/mile</td> <td>20 min/mile</td> </tr> <tr> <td>Miles</td> <td>2</td> <td>2</td> <td>2</td> </tr> </tbody> </table> <p>Note: In the above chart the student does not convert the speed to miles per hour.</p>		Stage 1	Stage 2	Stage 3	Time	40 min	20 min	40 min	Speed	20 min/mile	10 min/mile	20 min/mile	Miles	2	2	2	<p>✓ The student cannot represent his/her work in a clear, organized manner.</p> <p>✓ The student may state the final 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 (in mph) he traveled at each stage of the expedition.</p>
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Practitioner/Proficient	<p>The student understands that:</p> <ul style="list-style-type: none"> • Each stage of the expedition is a 2-mile distance. • S/he must calculate the travel time for each stage of the expedition and determine Ethan’s arrival time at the landing dock. • S/he must determine the rate of travel in miles per hour for each stage of the expedition and calculate Ethan’s varying rates of speed throughout the expedition. • 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. 	<ul style="list-style-type: none"> ✓ The student uses one accurate and appropriate strategy to correctly solve all the steps of the task. ✓ The student must use an organizational system (i.e., chart or table) to record the three stages of the expedition. <p>The student must:</p> <ul style="list-style-type: none"> • Calculate the rate of travel (speed) in miles per hour for the first stage of the expedition and apply this rate to determine the travel rates of stages 2 and 3. • Calculate the amount of time it takes to complete the first stage of the expedition and apply the rate of time to complete stages 2 and 3. • Determine the overall time it will take Ethan to complete the expedition and convert the elapsed time of arrival at the landing dock. <p>Sample Strategies: The student creates a chart/table 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>Miles</td> <td>2</td> <td>2</td> <td>2</td> <td>6</td> </tr> <tr> <td>Time</td> <td>40 min.</td> <td>20 min.</td> <td>40 min.</td> <td>100 min.</td> </tr> <tr> <td>Travel</td> <td>20 min. per mile</td> <td>10 min. per mile</td> <td>20 min. per mile</td> <td></td> </tr> <tr> <td>Rate</td> <td>3 mph</td> <td>6 mph</td> <td>3 mph</td> <td></td> </tr> </tbody> </table> <ul style="list-style-type: none"> → 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 takes 3 mph; stage 2 takes 6 mph; and stage 3 takes 3 mph. 		Stage 1	Stage 2	Stage 3	Total	Miles	2	2	2	6	Time	40 min.	20 min.	40 min.	100 min.	Travel	20 min. per mile	10 min. per mile	20 min. per mile		Rate	3 mph	6 mph	3 mph		<ul style="list-style-type: none"> ✓ The student can represent his/her work in a clear, organized manner. ✓ The student states the final answer. ✓ The student explains the steps needed to solve the problem using appropriate mathematical language and symbols. ✓ 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 in miles per hour at each stage of the expedition.
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Expert	<p>The student’s understanding will demonstrate all of the ‘proficient’ criteria.</p> <p>Task Extension: The expert in some way will demonstrate an exemplary understanding of the task and the mathematical concepts of applying or comparing rates.</p> <p>Here are some examples of an expert extension:</p> <ul style="list-style-type: none"> The student explains the connection between the rate, time and distance. The student calculates the overall rate for the three stages of the expedition. 	<p>The student’s solution will demonstrate all of the ‘proficient’ criteria.</p> <p>Task Extension: The expert in some way will demonstrate an exemplary strategy of the task and the mathematical concepts.</p> <p>Here are some examples of an expert extension:</p> <ul style="list-style-type: none"> ✓ The student may solve the problem in more than one way and defend, justifies or analyzes their mathematical procedures. ✓ The student may address the varying rates of travel (speed) in terms of average rates of speed in mph. <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>Miles</td> <td>2</td> <td>2</td> <td>2</td> <td>6</td> </tr> <tr> <td>Time</td> <td>40 min.</td> <td>20 min.</td> <td>40 min.</td> <td>100 min.</td> </tr> <tr> <td>Rate</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.</p> <p>→ 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</p> <p>→ Ethan’s average rate of speed is 4 mph or $100 \text{ min}/6 \text{ miles} = 16.67 \text{ minutes per mile}$ or approximately 3.6 mph.</p>		Stage 1	Stage 2	Stage 3	Total	Miles	2	2	2	6	Time	40 min.	20 min.	40 min.	100 min.	Rate	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>Task Extension: The expert in some way will demonstrate an exemplary strategy of the task and the mathematical concepts.</p> <p>Here is an example of an expert extension:</p> <ul style="list-style-type: none"> Including a written rule, equation, generalization, and/or observation about his/her mathematical insights on the connection between rate, time, and distance.
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