

Tennessee Comprehensive Assessment Program / Mathematics

TCAP/CRA PILOT 2012



Task 2 : Comparing Cars Scoring Guide

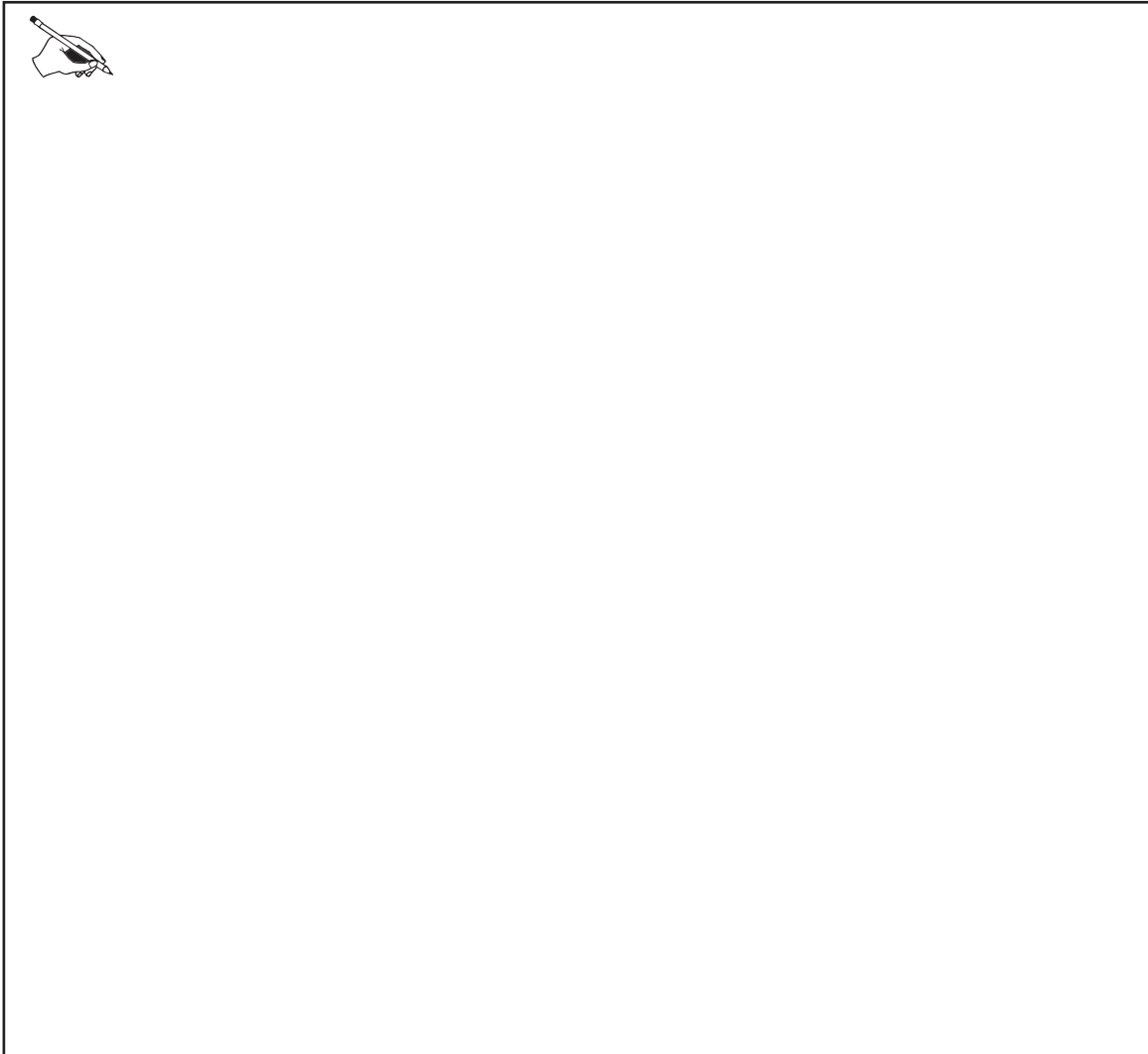
Task 2. Comparing Cars Task

The table below lists the number of gallons of gas required to drive the given number of miles for three different cars.

Car	Miles Driven	Number of Gallons Used
A	495	15
B	640	20
C	750	25

Javier uses unit rates to decide which car uses the least amount of gas.

Show Javier's way to decide which car uses the least amount of gas.



2. Comparing Cars Task Scoring Guide

The CCSS for Mathematical Content (2 points)

6.RP.2 The student correctly determines three unit rates associated with the problem. _____

6.RP.3 The student uses ratio and rate reasoning to solve the problem in any of the following ways: _____

- Drawing diagrams partitioning the 495 miles into 15 groups, the 640 miles into 20 groups and the 750 miles into 25 groups;

- Scaling, e.g., $\frac{495 \text{ miles}}{15 \text{ gallons}}$, $\frac{640 \text{ miles}}{20 \text{ gallons}}$, $\frac{750 \text{ miles}}{25 \text{ gallons}}$ down to unit rates;

- Dividing, e.g., $495/15$, $640/20$ and $750/25$ to determine miles per gallon;

- Using any of the techniques noted above, determining one (possibly two) unit rate and testing the other two against it

- Using a proportion or proportional reasoning (e.g., $\frac{495 \text{ miles}}{15 \text{ gallons}} = \frac{640 \text{ miles}}{x \text{ gallons}}$ or

$\frac{25 \text{ gallons}}{750 \text{ miles}} = \frac{15 \text{ gallons}}{x \text{ miles}}$) for comparison purposes;

- Scaling $\frac{495 \text{ miles}}{15 \text{ gallons}}$, $\frac{640 \text{ miles}}{20 \text{ gallons}}$, $\frac{750 \text{ miles}}{25 \text{ gallons}}$ up to a common gallon value for comparison purposes, e.g., to 300 gallons.

Total Content Points _____

The CCSS for Mathematical Practices (4 points)

MP1 The student recognizes that the car goes the farthest with the same amount of gas uses the least amount of gas, and determines a testing process to solve the problem. _____

(MP1: Make sense of problems and persevere in solving them.)

MP2 The student abstracts the values from the table, and uses an appropriate testing process on those numbers to solve the problem. The student re-contextualizes the results of the testing correctly. _____

(MP2: Reason abstractly and quantitatively.)

MP6 The student accurately refers to the diagram, writes correct equations, and labels quantities correctly. _____

(MP6: Attend to precision.)

MP8 The student uses the same strategy to compare the three situations, e.g., unit rate, _____
division, etc.

(MP8: Look for and express regularity in repeated reasoning.)

Total Practice Points _____

Total Awarded Points _____

The CCSS for Mathematical Content Addressed in This Task

Understand ratio concepts and use ratio reasoning to solve problems.

- 6.RP.2 Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the context of a ratio relationship. *For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is $3/4$ cup of flour for each cup of sugar." "We paid \$75 for 15 hamburgers, which is a rate of \$5 per hamburger."*
- 6.RP.3 Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

The CCSS for Mathematical Practices*

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

*Gray text indicates Mathematical Practices not addressed in this task.

Students' responses to a mathematical task provide evidence of what they understand and are able to do in relation to the standards and practices. Across tasks, this cumulative evidence shows students' understanding and abilities within a domain. When students do not respond completely to all parts of a task, they provide insufficient evidence of their mathematical understanding and abilities and therefore do not fully demonstrate the expectations of the standards and practices aligned with that task.

Task 2. Comparing Cars Task

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A	495	15
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C	750	25

Javier uses unit rates to decide which car uses the least amount of gas.

Show Javier's way to decide which car uses the least amount of gas.

$A = \frac{33}{15} = \frac{495}{15 \times 33} = \frac{495}{495} = 1$ $B = \frac{32}{20} = \frac{640}{20 \times 32} = \frac{640}{640} = 1$ $C = \frac{30}{25} = \frac{750}{25 \times 30} = \frac{750}{750} = 1$	<p>Car A uses the least amount of gas because it gets more miles per gallon.</p>
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Guide 1

Litho 60016

Total Content Points: 2 (6.RP.2, 6.RP.3)

Total Practice Points: 4 (MP1, MP2, MP6, MP8)

The student correctly determines the three unit rates associated with the problem (6.RP.2). The student uses appropriate ratio/rate reasoning to solve the problem (6.RP.3). The student makes sense of the task. The student describes an appropriate testing process to solve the problem and recognizes that Car A drives the farthest with the least amount of gas (MP1). The student abstracts values from the table, uses an appropriate testing process, and re-contextualizes the results (MP2). The student writes correct expressions and labels quantities correctly (MP6). The student utilizes the same strategy to compare the three situations (MP8).

Total Awarded Points: 6 out of 6


Task 2. Comparing Cars Task

The table below lists the number of gallons of gas required to drive the given number of miles for three different cars.

Car	Miles Driven	Number of Gallons Used
A	495	15
B	640	20
C	750	25

Javier uses unit rates to decide which car uses the least amount of gas.

Show Javier's way to decide which car uses the least amount of gas.

 Car A = $495 \div 15 = 33$ mpg
Car B = $640 \div 20 = 32$ mpg
Car C = $750 \div 25 = 30$ mpg
Car A uses the least amount of gas.



Guide 2

Litho 60202

Total Content Points: 2 (6.RP.2, 6.RP.3)

Total Practice Points: 4 (MP1, MP2, MP6, MP8)

The student correctly determines the three unit rates associated with the problem (6.RP.2). The student uses appropriate ratio/rate reasoning to solve the problem (6.RP.3). The student makes sense of the task. The student describes an appropriate testing process to solve the problem and recognizes that Car A drives the farthest with the least amount of gas (MP1). The student abstracts values from the table, uses an appropriate testing process, and re-contextualizes the results (MP2). The student writes correct equations and labels quantities correctly (MP6). The student utilizes the same strategy to compare the three situations (MP8).

Total Awarded Points: 6 out of 6


Task 2. Comparing Cars Task

The table below lists the number of gallons of gas required to drive the given number of miles for three different cars.

Car	Miles Driven	Number of Gallons Used
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C	750	25

Javier uses unit rates to decide which car uses the least amount of gas.

Show Javier's way to decide which car uses the least amount of gas.

 You would see how many gallons used in 1 mile.

So you would divide the number of gallons used by the miles driven.

Car	Miles Driven	Number of Gallons
A	1	0.03
B	1	0.03125
C	1	0.03

Car A
 $15 \div 495$

Car B
 $20 \div 640$

Car C
 $25 \div 750$



Guide 3

Litho 60194

Total Content Points: 2 (6.RP.2, 6.RP3)

Total Practice Points: 3 (MP2, MP6, MP8)

The student correctly determines the three unit rates associated with the problem (6.RP.2). The student uses appropriate ratio/rate reasoning to solve the problem (6.RP.3). The student does not make sense of the task. The student describes an appropriate testing process (finding gallons per mile); however, she does not recognize that the car with the lowest number would use the least amount of gas (no credit for MP1). The student abstracts values from the table, uses an appropriate testing process, and re-contextualizes the results (MP2). The student writes correct equations and labels quantities correctly (MP6). The student utilizes the same strategy to compare the three situations (MP8).

Total Awarded Points: 5 out of 6


Task 2. Comparing Cars Task

The table below lists the number of gallons of gas required to drive the given number of miles for three different cars.

Car	Miles Driven	Number of Gallons Used
A	495	15
B	640	20
C	750	25

Javier uses unit rates to decide which car uses the least amount of gas.

Show Javier's way to decide which car uses the least amount of gas.

 Car A: Drive 495 miles and used 15 gallons
 so $495 \div 15 = 33$ miles per gallon for 495 miles
 Car B: drive 640 miles and used 20 gallons
 $640 \div 20 = 32$ miles per gallon for 640 miles
 Car C: drive 750 miles and used 25 gallons
 $750 \div 25 = 30$ miles per gallon for 750 miles
 so Car C used the least amount of gas



Guide 4

Litho 60284

Total Content Points: 2 (6.RP.2, 6.RP.3)

Total Practice Points: 3 (MP2, MP6, MP8)

The student correctly determines the three unit rates associated with the problem (6.RP.2). The student uses appropriate ratio/rate reasoning to solve the problem (6.RP.3). The student does not make sense of the task. The student describes an appropriate testing process; however, he does not recognize that the car with the highest number uses the least amount of gas (no credit for MP1). The student abstracts values from the table, uses an appropriate testing process, and re-contextualizes the results (MP2). The student writes correct equations and labels quantities correctly (MP6). The student utilizes the same strategy to compare the three situations (MP8).

Total Awarded Points: 5 out of 6

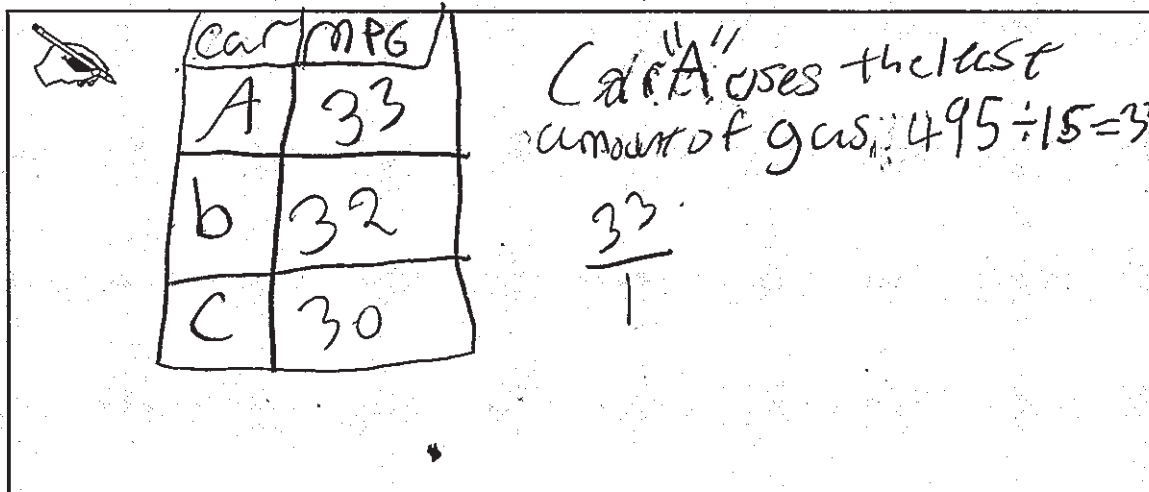
Task 2. Comparing Cars Task

The table below lists the number of gallons of gas required to drive the given number of miles for three different cars.

Car	Miles Driven	Number of Gallons Used
A	495	15
B	640	20
C	750	25

Javier uses unit rates to decide which car uses the least amount of gas.

Show Javier's way to decide which car uses the least amount of gas.



car	MPG
A	33
b	32
C	30

Car "A" uses the least amount of gas: $495 \div 15 = 33$

$$\frac{33}{1}$$



Guide 5

Litho 60054

Total Content Points: 2 (6.RP.2, 6.RP.3)

Total Practice Points: 2 (MP1, MP2)

The student correctly determines the three unit rates associated with the problem (6.RP.2). The student uses appropriate ratio/rate reasoning to solve the problem (6.RP.3). The student makes sense of the problem. The student determines a process for comparing each car by finding the number of miles per gallon and recognizes that the car with the largest number will use the least amount of gas (MP1). The student abstracts values from the table, uses an appropriate testing process and re-contextualizes the results (MP2). The student provides only one equation. The student provides a strategy for solving the problem for Car A, but only provides the number of miles per gallon for Cars B and C. Without providing work or an explanation for how she arrived at the values for cars B and C, the student's response to the task lacks precision (no credit for MP6). Despite the values given, there is not enough evidence that the same strategy the student used to find the miles per gallon for Car A was applied for Cars B and C (no credit for MP8).

Total Awarded Points: 4 out of 6

Task 2. Comparing Cars Task

The table below lists the number of gallons of gas required to drive the given number of miles for three different cars.

Car	Miles Driven	Number of Gallons Used
A	495	15
B	640	20
C	750	25

Javier uses unit rates to decide which car uses the least amount of gas.

Show Javier's way to decide which car uses the least amount of gas.

$A. 495 / 15 = 33$ total: 33
 $B. 640 / 20 = 32$ total: 32
 $C. 750 / 25 = 30$ total: 30



Guide 6

Litho 60071

Total Content Points: 2 (6.RP.2, 6.RP.3)

Total Practice Points: 1 (MP8)

The student correctly determines the three unit rates associated with the problem (6.RP.2). The student uses appropriate ratio/rate reasoning to solve the problem, despite the incorrect form of the expressions (6.RP.3). The student does not make sense of the task. The student describes an appropriate testing process; however, he does not identify which car would use the least amount of gas (no credit for MP1). The student abstracts the numbers from the table and uses an appropriate testing process to solve the problem; however, the results are not labeled, and he does not re-contextualize the results of the testing (no credit for MP2). The division expressions are formatted incorrectly, and the results of the operations are not labeled (no credit for MP6). The student utilizes the same strategy to compare the three situations (MP8).

Total Awarded Points: 3 out of 6

Task 2. Comparing Cars Task

The table below lists the number of gallons of gas required to drive the given number of miles for three different cars.

Car	Miles Driven	Number of Gallons Used
A	495	15
B	640	20
C	750	25


-33

-32

-30

Javier uses unit rates to decide which car uses the least amount of gas.

Show Javier's way to decide which car uses the least amount of gas.

 Car A uses the least amount of gas. After driving and recording, he got these results. If you divide the miles driven by the gallons of gas, you will get how many miles one gallon of gas is.



Guide 7

Litho 60350

Total Content Points: 2 (6.RP.2, 6.RP.3)

Total Practice Points: 1 (MP1)

The student correctly determines three unit rates associated with the problem (6.RP.2). The student describes an appropriate ratio/rate reasoning used for solving the problem (6.RP.3). The student makes sense of the problem. The student determines a process for comparing each car by finding the number of gallons per mile and recognizes that the car with the smallest number will use the least amount of gas (MP1). The student describes an appropriate testing process, but does not abstract the numbers from the table (no credit for MP2). Equations are not given (no credit for MP6). The student provides a generalized strategy for solving the problem; however, we cannot be sure the same strategy was applied to all three cars (no credit for MP8).

Total Awarded Points: 3 out of 6


Task 2. Comparing Cars Task

The table below lists the number of gallons of gas required to drive the given number of miles for three different cars.

Car	Miles Driven	Number of Gallons Used
A	495	15
B	640	20
C	750	25

Javier uses unit rates to decide which car uses the least amount of gas.

Show Javier's way to decide which car uses the least amount of gas.

 You should divide the number of gallons used by the miles driven, and whatever car gets the least number used the least amount of gas.



Guide 8

Litho 60199

Total Content Points: 1 (6.RP.3)

Total Practice Points: 1 (MP1)

The student does not provide the unit rates associated with the problem, and therefore does not receive credit for 6.RP.2. The student describes an appropriate ratio/rate reasoning used for solving the problem (6.RP.3). The student makes sense of the problem and determines a process for comparing each car by finding the number of gallons per mile, and also recognizes that the car with the smallest number will use the least amount of gas (MP1). The student describes an appropriate testing process, but does not abstract the numbers from the table (no credit for MP2). Equations are not given, which means the student has not demonstrated an appropriate level of precision (no credit for MP6). The student provides a generalized strategy for solving the problem; however, there is no indication that the strategy was applied (no credit for MP8).

Total Awarded Points: 2 out of 6


Task 2. Comparing Cars Task

The table below lists the number of gallons of gas required to drive the given number of miles for three different cars.

Car	Miles Driven	Number of Gallons Used
A	495	15
B	640	20
C	750	25

Javier uses unit rates to decide which car uses the least amount of gas.

Show Javier's way to decide which car uses the least amount of gas.

 Car A = 33 Car C, uses the least amount of gas.
Car B = 32
Car C = 30 Javier uses the miles driven and divides it by the gallons used.



Guide 9

Litho 60143

Total Content Points: 2 (6.RP.2, 6.RP.3)

Total Practice Points: 0

The student correctly determines three unit rates associated with the problem (6.RP.2). The student describes an appropriate ratio/rate reasoning used for solving the problem (6.RP.3). The student does not make sense of the task. The student describes an appropriate testing process; however, he fails to recognize that the car with the higher number would use the least amount of gas (no credit for MP1). The student describes an appropriate testing process, but does not abstract the numbers from the table or re-contextualize the results (no credit for MP2). Equations are not given and unit rates are not labeled, so precision is not sufficiently demonstrated (no credit for MP6). The student provides a generalized strategy for solving the problem; however, it cannot be determined that the same strategy was applied to all three cars (no credit for MP8).

Total Awarded Points: 2 out of 6

Task 2. Comparing Cars Task

The table below lists the number of gallons of gas required to drive the given number of miles for three different cars.

Car	Miles Driven	Number of Gallons Used
A	495	15
B	640	20
C	750	25

Javier uses unit rates to decide which car uses the least amount of gas.

Show Javier's way to decide which car uses the least amount of gas.

$5 = 33 = A$
 $5 = 42 = B$
 $5 = 50 = C$

$15 \overline{) 495}$ $15 \overline{) 640}$ $15 \overline{) 750}$
 A B C

Car C $50 \times 15 = 750$
 5 gallons = 50 miles = C



Total Content Points: 0

Total Practice Points: 1 (MP1)

The student provides only one correct unit rate associated with the problem. This shows a lack of understanding of rate reasoning (no credit for 6.RP.2 or 6.RP.3). The student divides appropriately to find a means of comparison of the gas mileage of the cars; however, she mistakenly divides by 15 each time, thus arriving at incorrect unit rates for cars B and C. The student makes sense of the problem and determines a process for comparing each car. “Car C” is the appropriate choice based on the incorrect process used (MP1). While the student abstracts the numbers from the table, the testing process is flawed because the student divides by 15 each time (no credit for MP2). The student does not provide accurate expressions, the response lacks labeling, and the last line shows confusion (no credit for MP6). Although the student uses the same strategy for each car (division), the student demonstrates a misunderstanding by failing to recognize that each car uses a different amount of gas (no credit for MP8).

Total Awarded Points: 1 out of 6

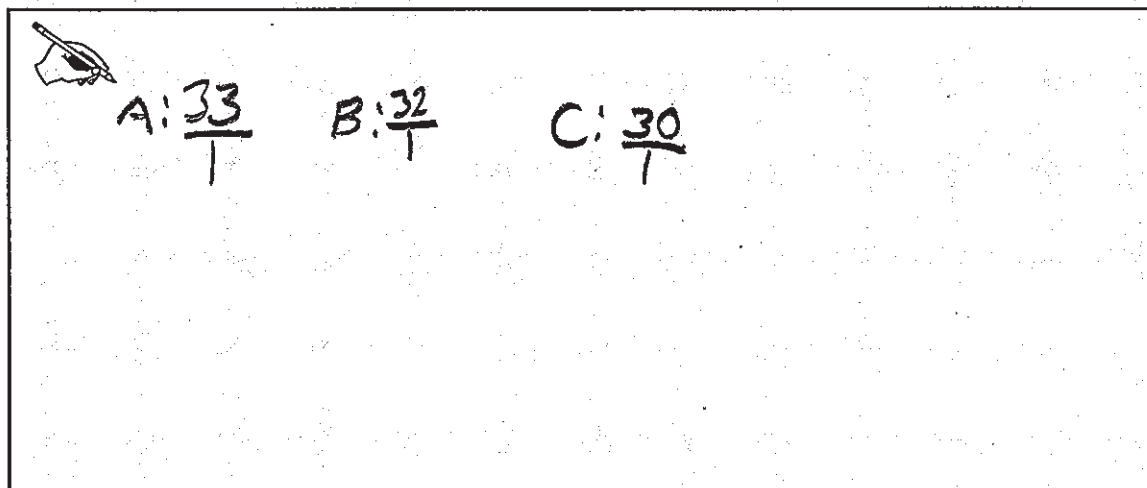
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C	750	25

Javier uses unit rates to decide which car uses the least amount of gas.

Show Javier's way to decide which car uses the least amount of gas.



A hand-drawn box containing calculations for unit rates. On the left, there is a small drawing of a hand holding a pen. To its right, the calculations are written as follows: Car A: $\frac{33}{1}$, Car B: $\frac{32}{1}$, and Car C: $\frac{30}{1}$. Each fraction has a horizontal line under the numerator and a vertical line under the denominator.



Guide 11

Litho 60020

Total Content Points: 1 (6.RP.2)

Total Practice Points: 0

The student correctly determines three unit rates associated with the problem (6.RP.2). Although the student has given three correct unit rates, there is no work or explanation provided, so there is no evidence of ratio or rate reasoning (no credit for 6.RP.3). The student does not make sense of the task. There is no evidence of the testing process used to solve the problem and the student does not indicate which car uses the least amount of gas (no credit for MP1). The student does not abstract the values from the table, demonstrate the testing process used, or re-contextualize the results (no credit for MP2). The student does not provide equations and the unit rates given are not labeled (no credit for MP6). Without evidence of the process used to arrive at the given unit rates, we cannot be sure the same strategy was applied to all three cars (no credit for MP8).

Total Awarded Points: 1 out of 6


Task 2. Comparing Cars Task

The table below lists the number of gallons of gas required to drive the given number of miles for three different cars.

Car	Miles Driven	Number of Gallons Used
A	495	15
B	640	20
C	750	25

Javier uses unit rates to decide which car uses the least amount of gas.

Show Javier's way to decide which car uses the least amount of gas.

 The "A" car uses the least amount of gas because 495 is the miles driven and 495 is the least on the chart. And (for car "A") the number of gallons used is 15 gallons, 15 gallons is the least on the chart.



Total Content Points: 0

Total Practice Points: 0

The student does not use ratio and rate reasoning to solve the problem (no credit for 6.RP.3). The student, using flawed reasoning, simply compares the given table values and chooses the smaller numbers. The student does not provide any unit rates associated with the problem (no credit for 6.RP.2). Although the student has correctly selected the car that uses the least amount of gas, the process used is incorrect (no credit for MP1). The student does not abstract numbers from the table or use an appropriate testing process (no credit for MP2). The student does not provide accurate equations (no credit for MP6). The student's strategy is incorrect and applied to only one car (no credit for MP8).

Total Awarded Points: 0 out of 6