2021 MCAS Sample Student Work and Scoring Guide

Grade 10 Mathematics Question 27: Constructed-Response

Reporting Category: Statistics and Probability

Standards: <u>AI.S-ID.B.5</u>, <u>MI.S-ID.B.5</u> - Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. **Item Description:** Calculate relative frequencies based on data displayed in a two-way table. **Calculator:** Allowed

View item in MCAS Digital Item Library

Scoring Guide

Select a score point in the table below to view the sample student response.

Score*	Description
<u>4A</u>	The student response demonstrates an exemplary understanding of the Statistics and Probability concepts involved in summarizing categorical data for two categories in two-
<u>4B</u>	way frequency tables and interpreting relative frequencies in the context of the data. The student calculates relative frequencies based on information in a table.
<u>3</u>	The student response demonstrates a good understanding of the Statistics and Probability concepts involved in summarizing categorical data for two categories in two- way frequency tables and interpreting relative frequencies in the context of the data. Although there is significant evidence that the student was able to recognize and apply the concepts involved, some aspect of the response is flawed. As a result, the response merits 3 points
2	The student response demonstrates a fair understanding of the Statistics and Probability concepts involved in summarizing categorical data for two categories in two-way frequency tables and interpreting relative frequencies in the context of the data. While some aspects of the task are completed correctly, others are not. The mixed evidence provided by the student merits 2 points.
<u>1</u>	The student response demonstrates a minimal understanding of the Statistics and Probability concepts involved in summarizing categorical data for two categories in two- way frequency tables and interpreting relative frequencies in the context of the data.
<u>0</u>	The student response contains insufficient evidence of an understanding of the Statistics and Probability concepts involved in summarizing categorical data for two categories in two-way frequency tables and interpreting relative frequencies in the context of the data. As a result, the response does not merit any points.

*Letters are used to distinguish between sample student responses that earned the same score (e.g., 4A and 4B).

Score Point 4A

This question has four parts.

The types and colors of the vehicles for sale at a dealership are shown in this table.

Vehicles for Sale

	Red	Blue	Green	Total
Vans	53	127	51	231
Trucks	62	78	49	189
Total	115	205	100	420

Part A

Based on the table, what percentage of the vehicles for sale at the dealership are trucks? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

Total trucks=189

Total Vehicles=420 % part divided by whole times 100

$$(189 \div 420) \,\, (100) = x\%$$

$$(0.45) (100) = x\%$$

45 = x%

Part B

What **fraction** of the vans for sale at the dealership are blue? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

Total number of vans=231	
Number of blue vans=127	
127	
231	

Part C

What fraction of the vehicles for sale at the dealership are red or are vans? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

Total number of vehicles=420 Total number of red vehicles=115 Total number of vans=231 Total number of red vans=53 231 + 115 - 53 = 293 $\frac{293}{420}$

Part D

How many of the vehicles for sale at the dealership are vans and are either red or green? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

Total number of red vans=53 Total number of green vans=51 51+53=104Total number of red and green vans=104

Score Point 4B

This question has four parts.

The types and colors of the vehicles for sale at a dealership are shown in this table.

Vehicles for Sale

	Red	Blue	Green	Total
Vans	53	127	51	231
Trucks	62	78	49	189
Total	115	205	100	420

Part A

Based on the table, what percentage of the vehicles for sale at the dealership are trucks? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

45% of the vehicles are trucks. There are 189 trucks and 420 vehicles total, so the decimal would by $\frac{189}{420}$ then multiply by 100 to make it a percent

Part B

What **fraction** of the vans for sale at the dealership are blue? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.



Part C

What fraction of the vehicles for sale at the dealership are red or are vans? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

 $\frac{293}{420}$ of the vehicles are red or are a van. I got this by adding up all the red vehicles and non red vans and got 293. Then dividing that by the total number of vehicles, 420.

Part D

How many of the vehicles for sale at the dealership are vans **and** are either red **or** green? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

104 vehicle are vans and either red or green. I got this by adding up all the red vans and all the green vans.

Score Point 3

This question has four parts.

The types and colors of the vehicles for sale at a dealership are shown in this table.

Vehicles for Sale

	Red	Blue	Green	Total
Vans	53	127	51	231
Trucks	62	78	49	189
Total	115	205	100	420

Part A

Based on the table, what percentage of the vehicles for sale at the dealership are trucks? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

45% because 189 (total trucks) / 420 (total vehicles) = .45 $.45 \cdot 100 = 45\%$

Part B

What **fraction** of the vans for sale at the dealership are blue? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

$\frac{127}{231}$ becasue there are 127 blue vans	
and 231 total vans.	

Part C

What fraction of the vehicles for sale at the dealership are red **or** are vans? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

$$rac{293}{420}$$
 because $62+53+127+51=293$

Part D

How many of the vehicles for sale at the dealership are vans **and** are either red **or** green? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

$${342\over 420}$$
 becasue $62+53+127+51+49=342$

Score Point 2

This question has four parts.

The types and colors of the vehicles for sale at a dealership are shown in this table.

Vehicles for Sale

	Red	Blue	Green	Total
Vans	53	127	51	231
Trucks	62	78	49	189
Total	115	205	100	420

Part A

Based on the table, what percentage of the vehicles for sale at the dealership are trucks? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

45% because,
$$rac{189}{420}=rac{x}{100}$$
with cross multiplying $420x=18900$ $x=45$

Part B

What **fraction** of the vans for sale at the dealership are blue? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.



Part C

What fraction of the vehicles for sale at the dealership are red or are vans? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

 $\frac{240}{420}$ because the question is asking for cars that are red OR vans so you would take the total of both of those, not counting the red vans, and compare it to the total of cars for sale.

Part D

How many of the vehicles for sale at the dealership are vans **and** are either red **or** green? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

 $\frac{174}{420}$ because this question is asking for vans that are either red or green and so then you compare that against the total number of cars for sale.

Score Point 1

This question has four parts.

The types and colors of the vehicles for sale at a dealership are shown in this table.

Vehicles for Sale

	Red	Blue	Green	Total
Vans	53	127	51	231
Trucks	62	78	49	189
Total	115	205	100	420

Part A

Based on the table, what percentage of the vehicles for sale at the dealership are trucks? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

22%
$$420 + 189 + 231 = 840$$

 $189 / 840 = .223$

Part B

What **fraction** of the vans for sale at the dealership are blue? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

<u>127</u> 231
127 vans are blue
total number of vans is 231

Part C

What fraction of the vehicles for sale at the dealership are red or are vans? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

 $rac{461}{840}$ 53+62+115=230231+230=461

Part D

How many of the vehicles for sale at the dealership are vans and are either red or green? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

661 total of red cars = 230 total green = 200 total vans = 231

Score Point 0

This question has four parts.

The types and colors of the vehicles for sale at a dealership are shown in this table.

Vehicles for Sale

	Red	Blue	Green	Total
Vans	53	127	51	231
Trucks	62	78	49	189
Total	115	205	100	420

Part A

Based on the table, what percentage of the vehicles for sale at the dealership are trucks? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

62 + 78 + 49 = 189 trucks

2 percent out of 10 are trucks.

Part B

What **fraction** of the vans for sale at the dealership are blue? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

$$127 + 78 + 205 = 410$$

Part C

What fraction of the vehicles for sale at the dealership are red **or** are vans? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

$$53 + 62 = 115$$

115 over 420

Part D

How many of the vehicles for sale at the dealership are vans and are either red or green? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

their are 131 vans and 100 of them are green and115 of them are red.their are 215 red and green vans.