

2022 MCAS Sample Student Work and Scoring Guide

Grade 10 Mathematics

Question 27: Constructed-Response

Reporting Category: Statistics and Probability

Standards: [GEO.S-CP.B.6](#) - Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model.

[MII.S-CP.B.6](#) - Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model.

Item Description: Calculate compound and conditional probabilities from data displayed in a graph and interpret the graph in terms of the probabilities.

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.

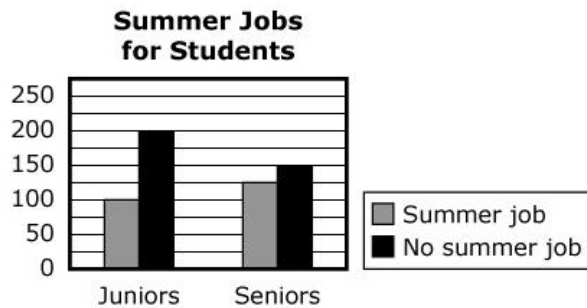
Score*	Description
4A	The student response demonstrates an exemplary understanding of the Statistics and Probability concepts involved in finding the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpreting the answer in terms of the model. The student calculates conditional probabilities based on data in a graph and solves a problem based on these probabilities.
4B	
3	The student response demonstrates a good understanding of the Statistics and Probability concepts involved in finding the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpreting the answer in terms of the model. 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 finding the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpreting the answer in terms of the model. While some aspects of the task are completed correctly, others are not. The mixed evidence provided by the student merits 2 points.
1	The student response demonstrates a minimal understanding of the Statistics and Probability concepts involved in finding the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpreting the answer in terms of the model.
0	The student response contains insufficient evidence of an understanding of the Statistics and Probability concepts involved in finding the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpreting the answer in terms of the model. 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.

All juniors and seniors at a high school were surveyed about whether they had ever had a summer job. This graph shows the data from the survey.



Part A

Based on the graph, what is the total number of students who were surveyed?

Enter your answer in the space provided. Enter **only** your answer.

575

Part B

Based on the graph, what is the probability that a randomly selected student had a summer job **and** is a junior? Show or explain how you got your answer.

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

$\frac{100}{575}$ or $\frac{4}{23}$ because 100 juniors have had summer jobs and 575 people were surveyed

Part C

Based on the graph, what is the probability that a randomly selected student had a summer job given that the student is a junior? Show or explain how you got your answer.

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

$\frac{100}{300}$ or $\frac{1}{3}$ because 100 juniors had summer jobs and 300 were surveyed

Part D

Based on the graph, are juniors or seniors more likely to have had a summer job? Explain your answer using conditional probabilities.

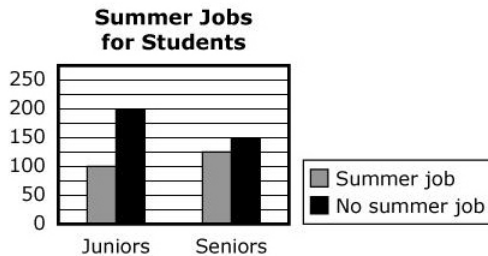
Enter your answer and your explanation in the space provided.

Seniors because $\frac{125}{275}$ or $\frac{5}{11}$ have jobs but only $\frac{100}{300}$ or $\frac{1}{3}$ juniors have jobs and $\frac{5}{11} > \frac{1}{3}$

Score Point 4B

This question has four parts.

All juniors and seniors at a high school were surveyed about whether they had ever had a summer job. This graph shows the data from the survey.



Part A

Based on the graph, what is the total number of students who were surveyed?

Enter your answer in the space provided. Enter **only** your answer.

575

Part B

Based on the graph, what is the probability that a randomly selected student had a summer job **and** is a junior? Show or explain how you got your answer.

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

$\frac{100}{575}$ or 17%

There are 100 students with summer jobs that are juniors, and 575 students in total, so you divide and get the percentage.

Part C

Based on the graph, what is the probability that a randomly selected student had a summer job given that the student is a junior? Show or explain how you got your answer.

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

$\frac{100}{300}$ or 33%

There are 100 students that have jobs in the summer and 300 total juniors, so you divide and get the percentage of 33%.

Part D

Based on the graph, are juniors or seniors more likely to have had a summer job? Explain your answer using conditional probabilities.

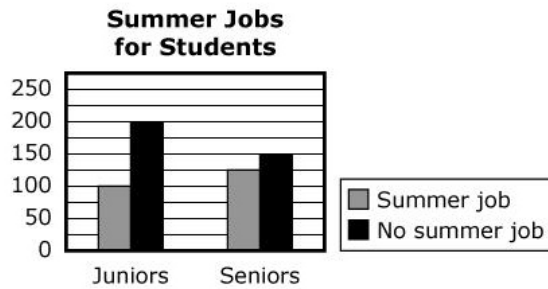
Enter your answer and your explanation in the space provided.

Seniors are more likely to have had a summer job because their chances are $\frac{125}{275}$, about 45%, and juniors have a $\frac{100}{300}$ probability, about 33%. 45 is greater than 33, so seniors will have a greater chance.

Score Point 3

This question has four parts.

All juniors and seniors at a high school were surveyed about whether they had ever had a summer job. This graph shows the data from the survey.

**Part A**

Based on the graph, what is the total number of students who were surveyed?

Enter your answer in the space provided. Enter **only** your answer.

575

Part B

Based on the graph, what is the probability that a randomly selected student had a summer job **and** is a junior? Show or explain how you got your answer.

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

$$\frac{100}{575}$$

There are 575 students in total and are 100 Juniors who had a summer job. The chances of randomly selecting a student that had a summer job and is a junior is $\frac{100}{575}$.

Part C

Based on the graph, what is the probability that a randomly selected student had a summer job given that the student is a junior? Show or explain how you got your answer.

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

$\frac{1}{3}$ is the probability that a student had a summer job given that he or she is a junior. The reason for this is the fact that there is 300 Juniors in total and 100 of them had a summer job. This would give you $\frac{100}{300}$ which you could then simplify that fraction to $\frac{1}{3}$.

Part D

Based on the graph, are juniors or seniors more likely to have had a summer job? Explain your answer using conditional probabilities.

Enter your answer and your explanation in the space provided.

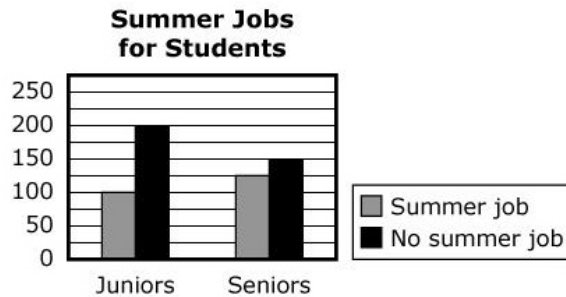
Juniors are more likely to have a summer job. There are more seniors that indeed have summer jobs but you need to take into account that there are 275 Seniors and 125 of them had summer jobs while there are 300 Juniors and 100 of them had summer jobs. Juniors have a higher number in who would be more likely.

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Score Point 2

This question has four parts.

All juniors and seniors at a high school were surveyed about whether they had ever had a summer job. This graph shows the data from the survey.

**Part A**

Based on the graph, what is the total number of students who were surveyed?

Enter your answer in the space provided. Enter **only** your answer.

Part B

Based on the graph, what is the probability that a randomly selected student had a summer job **and** is a junior? Show or explain how you got your answer.

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

Part C

Based on the graph, what is the probability that a randomly selected student had a summer job given that the student is a junior? Show or explain how you got your answer.

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

Part D

Based on the graph, are juniors or seniors more likely to have had a summer job? Explain your answer using conditional probabilities.

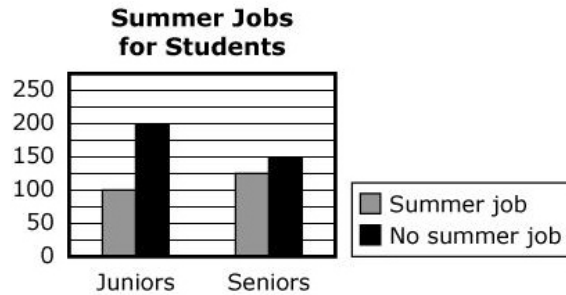
Enter your answer and your explanation in the space provided.

seniors because out of the 275 seniors interviewed 125 said they had a summer job which is a little less than 50% of the population while the juniors 300 were interviewed and only 100 said they had a summer job this is about a third of the population

Score Point 1

This question has four parts.

All juniors and seniors at a high school were surveyed about whether they had ever had a summer job. This graph shows the data from the survey.



Part A

Based on the graph, what is the total number of students who were surveyed?

Enter your answer in the space provided. Enter **only** your answer.

575

Part B

Based on the graph, what is the probability that a randomly selected student had a summer job **and** is a junior? Show or explain how you got your answer.

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

$$\frac{125}{100} = 1.25\% \text{ of students.}$$

Part C

Based on the graph, what is the probability that a randomly selected student had a summer job given that the student is a junior? Show or explain how you got your answer.

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

$$\frac{100}{200} = \frac{1}{2}. \text{ So therefore } \frac{1}{2} \text{ of the students would have a summer job.}$$

Part D

Based on the graph, are juniors or seniors more likely to have had a summer job? Explain your answer using conditional probabilities.

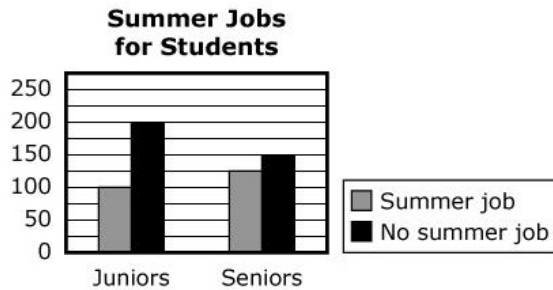
Enter your answer and your explanation in the space provided.

Juniors because they have more people in their grade and half of them have summer jobs.

Score Point 0

This question has four parts.

All juniors and seniors at a high school were surveyed about whether they had ever had a summer job. This graph shows the data from the survey.

**Part A**

Based on the graph, what is the total number of students who were surveyed?

Enter your answer in the space provided. Enter **only** your answer.

250 students

Part B

Based on the graph, what is the probability that a randomly selected student had a summer job **and** is a junior? Show or explain how you got your answer.

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

$\frac{1}{100}$ because there were 100 juniors that had a summer jobs so the probability is $\frac{1}{100}$.

Part C

Based on the graph, what is the probability that a randomly selected student had a summer job given that the student is a junior? Show or explain how you got your answer.

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

$\frac{1}{200}$ because there were 200 juniors that could of taken the job but they decided not too so the probability is $\frac{1}{200}$.

Part D

Based on the graph, are juniors or seniors more likely to have had a summer job? Explain your answer using conditional probabilities.

Enter your answer and your explanation in the space provided.

More juniors and seniors had summer jobs then the students that didnt have summer jobs so the answer is yes.