

2. A train departs from its initial city at 12:00 noon ($t=0$). Sarai is interested in how the overall speed of the train changes during its journey. (For example, during a five-minute stop-over at a station, the train's overall speed for the journey would slowly decrease.)

Determine the domain of the function s , which represents the overall speed from noon until t minutes into the trip.

Scoring Instructions:

The domain is the set of positive real numbers.

OR

$\{t|t \geq 0\}$

6. If $P(A) = 0.34$, $P(B) = 0.65$, and $P(A \text{ and } B) = 0.3$ what is $P(A \text{ or } B)$?

Scoring Instructions:

0.69

8. Philip has two bags. One bag contains 3 white balls and 5 black balls, and the other bag contains 4 red balls and 6 green balls. Philip picks one ball, without looking, from each bag.

Part A. What is the probability that Philip picks a white ball from the first bag and then a red ball from the second bag?

Part B. Are these two events dependent or independent? Use the probability found in Part A to validate your answer.

Use words and/or numbers to show your work.

Scoring Instructions:

Rubric:

- 2 Work demonstrates a **clear and complete** understanding of the mathematical concepts and/or procedures required by the task. Appropriate strategy is shown with clear and complete explanations and interpretations.
- 1 Response demonstrates a **partial** understanding of the mathematical concepts and/or procedures. Appropriate strategy is shown, but explanation or interpretation has minor flaws.
- OR
- Response is incorrect because of calculation errors. Work and strategy indicate a **clear** understanding of the mathematical concepts and/or procedures required by the task.
- 0 Response is irrelevant, inappropriate, or not provided.

SCORING EXEMPLAR

Maximum Points—2

Part A – [1 point]

- Probability that Philip picks a white ball from the first bag $= \frac{3}{8}$
Probability that Philip picks a red ball from the second bag $= \frac{4}{10} = \frac{2}{5}$
Probability that Philip picks a white and a red ball $= \frac{3}{8} \times \frac{2}{5} = \frac{3}{20}$, or equivalent

Part B – [1 point]

- Answers may vary. A sample answer is given below.

The probability of the two events happening together in this case is equal to the product of their individual probabilities. This indicates that the two events are independent. It can be further validated by noting that the outcome for the first bag does not affect the outcome for the second bag.

14. There are 2,545 students in Hassan's school. He surveys a group of 125 randomly selected students to find out whether they are right-handed or left-handed. The results of his survey show that only 10 of the sample population is left-handed. Assuming a 99% confidence level (z – score = 2.58), what is the margin of error for this survey? Round your answer to the nearest tenth percent.

Scoring Instructions:

6.3%

20. The Centers for Disease Control and Prevention (CDC) studied the research that correlated students' physical activity to their academic performance in school.

Part A. Forty-three articles detailing 50 different studies from school districts across the United States were used for the CDC report. Why would the research not be as significant if it included students from only one school district? Explain your answer.

Part B. The table below shows the percentage of high school students who participated in physical activity and physical education in 2011.

PERCENTAGE OF HIGH SCHOOL STUDENTS PARTICIPATING IN PHYSICAL ACTIVITY AND PHYSICAL EDUCATION, BY GENDER, 2011

Type of Activity	Females	Males
At least 60 minutes/day of physical activity ^a	18.5%	38.3%
Attended physical education class daily ^b	27.2%	34.6%

^a Any kind of physical activity that increased heart rate and made them breathe hard some of the time for at least 60 minutes per day on each of the 7 days before the survey

^b Attended physical education classes 5 days in an average week when they were in school

What are two observations, related to the information in the table, that can be made according to the data?

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Rubric:

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- 3 Work demonstrates a **clear** understanding of the mathematical concepts and/or procedures but is not complete. Appropriate strategy is shown, but explanation or interpretation has minor flaws.
OR
Response is incorrect because of calculation errors. Work and strategy indicate a **clear** demonstration of the problem.
- 2 Response demonstrates a **partial** understanding of the mathematical concepts and/or procedures. Appropriate strategy is shown, but explanation or interpretation has minor flaws.
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SCORING EXEMPLAR

Work indicates a clear and complete understanding of how to evaluate reports based on data and how to recognize whether the data support conclusions. All observations about the information presented are supported by the data.

Part A – [2 points]

1 point for a correct answer and 1 point for a correct justification.

Example: For a study to be valid and to apply broadly, it has to include a large number of subjects from a wide range of situations. A study that included students from only one district might not apply to students across the country. The characteristics of that district and those students might have some unique factors influencing the outcome.

Part B – [2 points]

1 point for each correct observation for a total of 2 points. Answers will vary. Some sample observations are provided.

Boys tend to get more exercise than girls. (About 38% of boys get daily physical activity, compared with 19% of girls; 35% of boys attend daily physical education classes, compared with 27% of girls.)

The difference between boys and girls is not as great with respect to daily physical education classes compared with daily physical activity outside physical education classes.

Girls are more likely to get exercise if they have to go to daily gym classes (27% of girls go to daily physical education classes, compared with only 19% of girls who get daily physical activity outside physical education classes).

22. A store offers a 25% discount on a brand of cell phones. The final price of the phone includes a sales tax of 7% on the purchase price.

Part A. If the original price of a phone before the discount was x , write functions d representing the price of the phone after the discount, and s , representing the sales tax.

Part B. Using your answers from part A, write a function, f , to represent the final price of the phone.

Part C. What are the values of $d(x)$, $s(x)$, and $f(x)$ if the original price of the phone before the discount is \$150?

Part D. If the store gives an extra discount of 10%, after the first discount is taken, for every 100th customer, write a function, c , to represent the final price of the phone to a 100th customer. Show your work.

Use words and/or numbers to show your work.

Scoring Instructions:

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SCORING EXEMPLAR

Part A – [1 point]

Original price of a phone before the discount was x ,

Discount = 25%

Discount amount = 25% of $x = 0.25x$

The price of the phone after discount $d(x) = x - 0.25x = 0.75x$

The sales tax = 7%

$s(x) = 7\% \text{ of } 0.75x = 0.07(0.75x) = 0.0525x$

or equivalent work

Part B – [1 point]

The final price of the phone = $f(x) = (d + s)$

$(x) = 0.75x + 0.0525x$

$f(x) = 0.8025x$

or equivalent work

Part C – [1 point]

The original price of the cell phone = \$150

The extra discount is 25%, so the customer is paying 75%

$d(x) = 0.75x = 0.75(150) = \112.50

$$s(x) = (0.07)0.75x = 0.0525x$$

$$s(x) = 0.0525(150)\$7.88$$

$$f(x) = (d + s)(x) = 0.75x + 0.0525x = \$112.50 + \$7.88 = 120.38$$

or equivalent work

Part D – [1 point]

Price of a phone after the initial discount is $= 0.75x$

The extra discount is 10%, so the customer is paying 90%

$$= 90\% \text{ of } 0.75x = 0.90(0.75x) = 0.67x$$

Discount amount

The price of the phone after the discount:

$$d_2(x) = 0.675x$$

Sales tax for new discounted amount

$$s_2(x) = (0.07)0.675x = 0.04725x$$

Final price of the phone to a 100th customer (after second discount)

$$c(x) = (d_2 + s_2)(x) = 0.675x + 0.04725x = 0.72225x$$

or equivalent explanation