Problem Solving, Statistics, Probability, Proportions, Percents Notes

1. Calculator

A student is doing a scale drawing of a woolly mammoth on a piece of poster board for her presentation on the last ice age. She was surprised to find that the woolly mammoth, reaching a height of only about 10 feet, 6 inches, was actually smaller than today's African elephant. Even more surprising is the fact that the woolly mammoth's tusks averaged 11.5 feet in length. If the student draws the mammoth 14 inches tall on her poster, approximately how many inches long should she make the tusks?
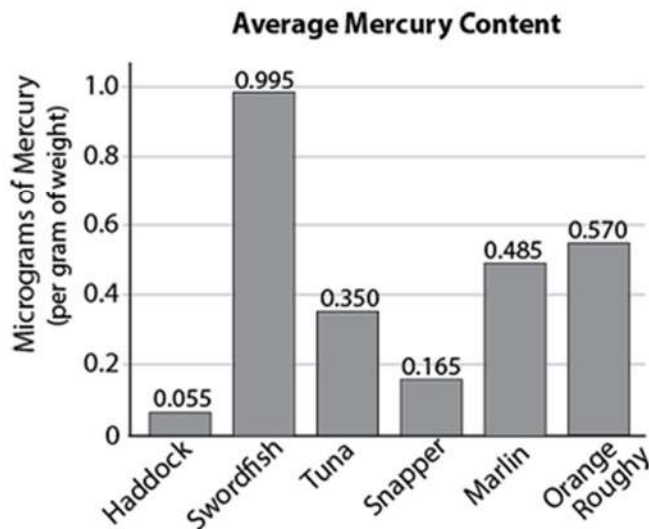
Ⓐ 12.78
Ⓑ 15.0
Ⓒ 15.33
Ⓓ 16.1

2. Calculator

In an effort to decrease reliance on fossil fuels, some energy producers have started to utilize renewable resources. One such power plant uses solar panels to create solar energy during the day and then shifts to natural gas at night or when there is cloud cover. One particularly bright morning, the company increases the amount of its power typically generated by solar panels by 60%. During a cloudy spell, it decreases the amount by 30%, and then when the sun comes back out, it increases the amount again by 75% before shutting the panels down for the night. What is the net percent increase of this company's reliance on solar panels during that day?
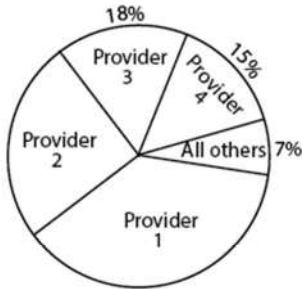
Ⓐ 75%
Ⓑ 96%
Ⓒ 105%
Ⓓ 165%

3. Calculator

Mercury is a naturally occurring metal that can be harmful to humans. The current recommendation is for humans to take in no more than 0.1 microgram for every kilogram of their weight per day. Fish generally carry high levels of mercury, although certain fish have higher mercury content than others. Fish, however, are healthy sources of many other nutrients, so nutritionists recommend keeping them in the human diet. The figure below shows the average mercury content of several types of fish.

Average Mercury Content

Microgram of Mercury (per gram of weight)

Fish	Value
Haddock	0.055
Swordfish	0.995
Tuna	0.350
Snapper	0.165
Marlin	0.485
Orange Roughy	0.570

If a person weighs 82 kilograms, how many grams of snapper can he safely consume per day? Round your answer to the nearest gram.

4. Calculator

18%
Provider 3
15% Provider 4
Provider 2
All others 7%
Provider 1

A company's market share is the percent of consumers who utilize the services or buy the products of that company. The pie chart above shows the different market shares of cable providers in a certain region. If the ratio of the market shares of Provider 1 to Provider 2 is 3:2, what is Provider 1's market share?
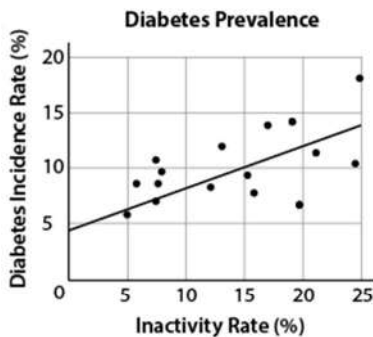
Ⓐ 24%
Ⓑ 30%
Ⓒ 36%
Ⓓ 42%

5. Calculator

Water is vital to human health. An average person should consume approximately 2.5 ounces of water per hour. However, because of the salt in it, seawater actually dehydrates the human body and should not be consumed. This is why boats must carry a supply of fresh water when embarking on long trips. Suppose a sailboat is traveling at an average speed of 4 nautical miles per hour with 3 people on board and the trip is 232 nautical miles. What is the minimum number of ounces of water the boat should stock before leaving?

Ⓐ 69.6
Ⓑ 145
Ⓒ 435
Ⓓ 1,113.6

6.

Diabetes Prevalence
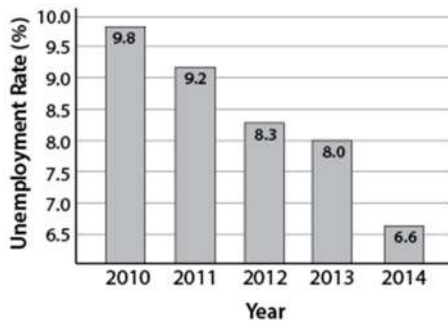
Diabetes Incidence Rate (%)

Inactivity Rate (%)

Increased physical activity has been linked to a lower incidence rate of diabetes. The scatterplot above shows the relationship between the percent of people in a certain country whose daily activity qualifies them as "inactive" and the incidence rate of diabetes in that country. The line of best fit for the data is also shown. Which of the following best represents the meaning of the y-intercept of the line of best fit in the context of this question?

Ⓐ The predicted incidence rate of diabetes when the entire country is considered active
Ⓑ The predicted incidence rate of diabetes when the entire country is considered inactive
Ⓒ The predicted percent of people who will be active when the incidence rate of diabetes is 0%
Ⓓ The predicted percent of people who will be inactive when the incidence rate of diabetes is 0%
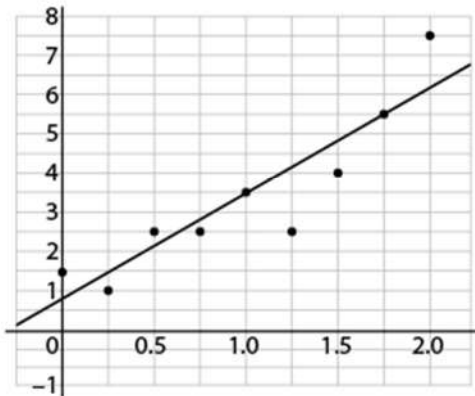
7. Calculator

The bar graph shows the percent of the United States population that was unemployed as of January 1 on each of the years shown. A governmental agency wants to use the 5-year mean of the data to estimate how many people were unemployed in a certain geographic area between 2010 and 2014. If the total adult population of the area was 250,000, approximately how many adults were unemployed in that area during the indicated time period?

Ⓐ 16,950
Ⓑ 20,150
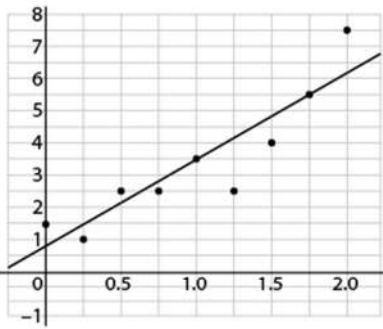Ⓒ 20,950
Ⓓ 104,750

8.

Use the data in the scatterplot and the line of best fit shown to answer the following question

Which of the following values most accurately reflects the average rate of change of the data based on the line of best fit?

Ⓐ $\frac{3}{8}$

Ⓑ $\frac{3}{4}$

Ⓒ $\frac{4}{3}$

Ⓓ $\frac{8}{3}$

9.

According to the graph, the data has been modeled using a line of best fit. Another researcher thinks that an exponential model may be a better fit. The table below shows the researcher's results after using a graphing calculator to perform a linear regression and an exponential regression on the data.

LinReg	ExpReg
$y = ax + b$	$y = a \times b^x$
$a = 2.7$	$a = 1.251327$
$b = .68888889$	$b = 2.299749$
$r^2 = .81876039$	$r^2 = .84304281$
$r = .9048538$	$r = .9181736$

Which of the following best explains which regression model is a better fit and why?

Ⓐ A linear model is a much better fit because its value of a is considerably higher.
Ⓑ A linear model is a slightly better fit because its value of r is slightly smaller.
Ⓒ An exponential model is a much better fit because its value of a is much closer to 1.
Ⓓ An exponential model is a slightly better fit because its value of r is slightly closer to 1.

10. Calculator

The Consumer Price Index (CPI) is a weighted average of the cost of certain categories of goods and services in the United States. It is one of the most widely used measures of inflation. According to the U.S. Census Bureau, the CPI was 130.7 in 1990, and was 218.1 in 2010. If the CPI continues to experience the same percent increase over the next 20 years, approximately what will the CPI be in 2030?

Ⓐ 145.8
Ⓑ 305.5
Ⓒ 363.9
Ⓓ 408.7