# How Much Do You Know: Problem-Solving and Data Analysis

## Directions

Try the questions that follow, using the Method for SAT Math Questions. When you're done, check your answers and read through the explanations in the "Check Your Work" section.

There will be an opportunity for timed practice at the end of the "Problem-Solving and Data Analysis" unit.

**1**

A contractor quotes $5,200 as the cost of materials for an addition to a house. If he budgets 20 percent for materials, 55 percent for labor, 10 percent for equipment rental, and the remainder is his fee, then how much is his fee?

Ⓐ $2,600

Ⓑ $3,900

Ⓒ $5,200

Ⓓ $6,500

**2**

An online movie subscription service charges $a$ dollars for the first month of membership and $b$ dollars per month after that. If a customer has paid $108.60 so far for the service, which of the following expressions represents the number of months this customer has subscribed to the service?

Ⓐ $\frac{108.60}{a+b}$

Ⓑ $\frac{108.60-a}{b}$

Ⓒ $\frac{108.60-a-b}{b}$

Ⓓ $\frac{108.60-a+b}{b}$

**3**

The ratio of angelfish to rainbow fish in Mikal's fish tank at home is 5 to 2. Mikal wants to put a tank in his office with 21 fish total, using the same ratio he has at home. How many rainbow fish does he need for the tank in his office?

Ⓐ 2

Ⓑ 5

Ⓒ 6

Ⓓ 15

**4**

If Jordan ran 11.5 miles, and 1 kilometer equals around 0.62 miles, approximately how many kilometers did Jordan run?

**5**

Approximately 40 percent of 3,000 local high school athletes surveyed said they would purchase the latest athletic shoe design over the old design. Based on the study, the company concludes that 40 percent of shoe customers would purchase the new design. Which of the following is true about the study?

Ⓐ The data from the survey represents the whole population because a large sample was surveyed.

Ⓑ The data from the survey does not represent the whole population because it was not conducted across the whole country.

Ⓒ The data from the survey likely underestimates the number of people interested in the new product because it compared the new product only to athletic shoes, not to all types of shoes.

Ⓓ The data from the survey likely overestimates the number of people interested in the new product because the survey targeted respondents already interested in athletics.

**6**

On a used vehicle lot, 50 percent of the vehicles are cars, $\frac{3}{4}$ of which have automatic transmissions. Of the cars with automatic transmissions, $\frac{1}{3}$ have leather interiors. If a vehicle is chosen from the lot at random, what is the probability that it will be a car with an automatic transmission and a leather interior?

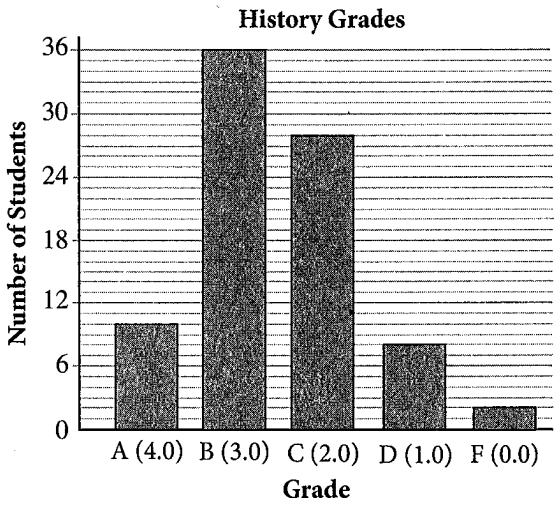
Ⓐ $\frac{1}{8}$

Ⓑ $\frac{1}{6}$

Ⓒ $\frac{1}{4}$

Ⓓ $\frac{1}{3}$

**7**




The figure shows the distribution of grades and corresponding GPA scores among 84 students in a history class. What is the approximate mean history GPA for this class of students?

Ⓐ 2.0

Ⓑ 2.5

Ⓒ 2.7

Ⓓ 3.0

**8**

If a basketball team wants to report that in at least half of the games in the season the team scored more than 50 points, which measure of center should the team use to describe the results?

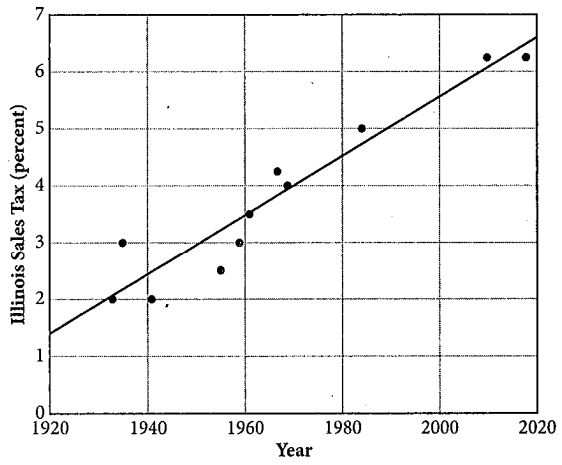
Ⓐ Mean

Ⓑ Range

Ⓒ Median

Ⓓ Standard deviation

**9**




The scatterplot shows the change in Illinois sales tax over the years. According to the line of best fit, which of the following is closest to the estimated yearly increase in sales tax, in percent?

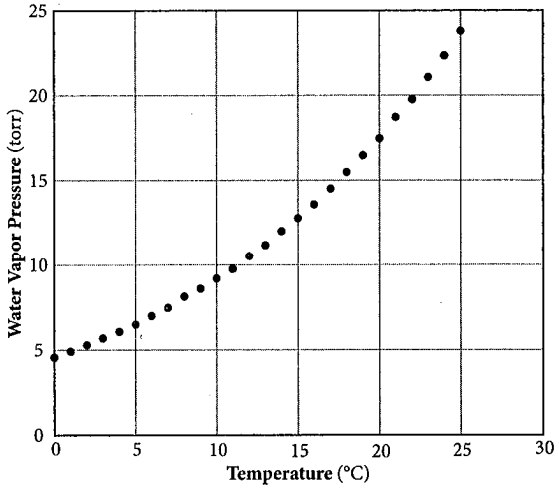
Ⓐ 0.05

Ⓑ 0.5

Ⓒ 5

Ⓓ 50

**10**




The scatterplot shows the water vapor pressure in torr as a function of temperature in degrees Celsius. Which of the following statements is true about the relationship between water vapor pressure and temperature?

Ⓐ The water vapor pressure doubles when the temperature is halved.

Ⓑ The water vapor pressure doubles when the temperature is doubled.

Ⓒ The rate of increase of water vapor pressure every 5°C is greater at lower temperatures than at higher temperatures.

Ⓓ The rate of increase of water vapor pressure every 5°C is greater at higher temperatures than at lower temperatures.

## Try on Your Own

### Directions

Take as much time as you need on these questions. Work carefully and methodically. There will be an opportunity for timed practice later in the book.

**1**

A sprinter can run 29 feet in 1 second. How many seconds will it take the sprinter to run 300 feet?

**2**

Pump A can transfer 3 gallons of water per minute, and pump B can work twice as fast as pump A. How many minutes will it take pump A and pump B, working together, to transfer 279 gallons of water?

Ⓐ 30

Ⓑ 31

Ⓒ 46.5

Ⓓ 93

**3**

An airplane travels 900 miles at 300 miles per hour and then an additional 500 miles at 250 miles per hour. What is the airplane's average speed, in miles per hour, over the entire trip?

Ⓐ 260

Ⓑ 275

Ⓒ 280

Ⓓ 290

**4**

An asteroid travels 30,000 kilometers per hour. It rotates on its axis one time for every 600,000 kilometers it travels. How many hours will it take for the asteroid to rotate on its axis 12 times?

Ⓐ 20

Ⓑ 24

Ⓒ 120

Ⓓ 240

**5**

HINT: For Q5, calculate the distance left to travel in the time remaining.

At noon, a car departs on a 270-mile trip. It travels for the first 1.5 hours at 40 miles per hour. It completes the trip at 5:00 p.m. on the same day. What was the car's average speed, in miles per hour, from 1:30 to 5:00 p.m.?

Ⓐ 35

Ⓑ 40

Ⓒ 60

Ⓓ 70

**6**

Tavish can clean his room in 2 hours. His brother can clean the same room in 4 hours. If they work together, how many hours will it take them to clean their room?

Ⓐ 1

Ⓑ $\frac{4}{3}$

Ⓒ $\frac{3}{2}$

Ⓓ 6

**7**

HINT: For Q7, determine the net rate at which the pond is being filled.

A 2,100 gallon fish pond has a circulation drain at the bottom that drains at a rate of 20 gallons per hour. A pump adds water to the pond at a rate of 55 gallons per hour. If the pond starts out empty, how many hours will it take the pump to completely fill it?

_____

**8**

If cyclist A travels at 6 miles per hour and cyclist B travels at 8 miles per hour, how much longer, in hours, will it take cyclist A than cyclist B to travel 24 miles?

Ⓐ $\frac{3}{8}$

Ⓑ $\frac{3}{4}$

Ⓒ 1

Ⓓ 2

## Try on Your Own

### Directions

Take as much time as you need on these questions. Work carefully and methodically. There will be an opportunity for timed practice later in the book.

**9**

The number of topics teachers at a certain school can cover is directly proportional to the length of time they have to review. If teachers can cover 9 topics in a single 45-minute period, how many topics can they cover in a 60-minute period?

**10**

One pound on Earth is equal to approximately 0.166 pounds on the Moon. If a person weighs 29 pounds on the Moon, approximately how much, in pounds, does the person weigh on Earth?

Ⓐ 21

Ⓑ 48

Ⓒ 175

Ⓓ 196

**11**

A machine produces 6 defective parts out of every 3,500 it makes. How many total parts were made during the time the machine produced 27 defective parts?

Ⓐ 14,000

Ⓑ 15,750

Ⓒ 17,500

Ⓓ 21,000

**12**

HINT: For Q12, designate the unknown starting number of first-year students and second-year students with the ratio $\frac{f}{s} = \frac{3}{10}$.

The ratio of first-year students to second-year students in an auditorium was 3 to 10. After an additional 270 first-year students and 120 second-year students entered the auditorium, the ratio of first-year students to second-year students was 6 to 5. No other students entered or left the auditorium. How many first-year students were in the auditorium before the additional students entered?

13

Riding her bicycle, Reyna can travel 1 mile in 5.5 minutes. If she rides at a constant rate, which of the following is closest to the distance she will travel in 90 minutes?

(A) 9 miles

(B) 11 miles

(C) 13 miles

(D) 16 miles

14

If $\frac{x+y}{x} = \frac{4}{9}$, which of the following proportions is equivalent?

(A) $\frac{y}{x} = -\frac{5}{9}$

(B) $\frac{y}{x} = \frac{13}{9}$

(C) $\frac{y-x}{x} = -\frac{4}{9}$

(D) $\frac{y-x}{x} = -\frac{9}{4}$

15

HINT: For Q15, start with the proportion $\frac{\text{physicists}}{\text{total}} = \frac{2}{5}$, then think about what to substitute for "physicists" and "total."

All of the attendees at a symposium are either physicists or biologists. If there are 123 physicists and 270 biologists, then how many additional physicists must arrive at the symposium in order for the ratio of physicists to total attendees to become 2 to 5?

(A) 25

(B) 50

(C) 57

(D) 114

## Try on Your Own

### Directions

Take as much time as you need on these questions. Work carefully and methodically. There will be an opportunity for timed practice later in the book.

**16**

HINT: For Q16, *cubic feet* means $ft^3$, or ft × ft × ft.

Quinn estimates that she will need 700 cubic feet of storage space, but the dimensions of the storage units are in cubic meters. If 1 meter is approximately 3.28 feet, approximately how many cubic meters of space will Quinn need?

Ⓐ 19.84

Ⓑ 25.93

Ⓒ 65.07

Ⓓ 213.41

**17**

A court reporter types 3.75 words per second. If a trial transcript contains 25 pages with an average of 675 words per page, how much time did the court reporter spend typing?

Ⓐ 1 hour, 15 minutes

Ⓑ 1 hour, 45 minutes

Ⓒ 2 hours, 30 minutes

Ⓓ 3 hours

**18**

HINT: For Q18, "how many more" means you're solving for a difference. Subtract, then convert pounds per hour to ounces per minute.

At 350°F, an oven can cook approximately 3 pounds of turkey per hour. At 450°F, it can cook approximately 4.5 pounds per hour. How many more ounces of turkey can the oven cook at 450°F than at 350°F in 10 minutes? (1 pound = 16 ounces)

Ⓐ 4

Ⓑ 6

Ⓒ 8

Ⓓ 12

**19**

A doctor prescribes 800 milliliters of a medication to be delivered via IV fluid over the course of 8 hours. The IV delivers 1 milliliter of medication over the course of 30 drips. How many drips per minute are needed to deliver the prescribed dosage?

**20**

A tree grew 46 meters in the first 50 years of its life. On average, how many centimeters per day did it grow during this period? Assume that there are 365 days in a year. (1 meter = 100 centimeters)

## Try on Your Own

### Directions

Take as much time as you need on these questions. Work carefully and methodically. There will be an opportunity for timed practice later in the book.

**21**

A college athletics program found that 3 percent of 300 runners were injured during workouts, while 6 percent of 250 weight lifters were injured during workouts. Which of the following is the total number of runners and weight lifters who were injured?

Ⓐ 24

Ⓑ 50

Ⓒ 142

Ⓓ 240

**22**

HINT: For Q22, what percent of the attendees are teachers?

At a high school event, 15 percent of the attendees are sophomores, 30 percent are juniors, 25 percent are seniors, and the remaining 18 attendees are teachers. How many more juniors are there than seniors at the event?

**23**

HINT: For Q23, how many gallons of *pigment* is the painter starting with? How many gallons of *pigment* are needed for the final mix? How many gallons of the final paint will it take to provide the needed pigment?

A painter has 20 gallons of a paint mixture that is 15 percent blue pigment. How many gallons of a mixture that is 40 percent blue pigment would the painter need to add to achieve a mixture that is 20 percent blue pigment?

Ⓐ 4

Ⓑ 5

Ⓒ 8

Ⓓ 12

**24**

The price of one share of a company's stock on August 1 was $75. On September 1, the price of one share was $10 more than it was on August 1 and 80 percent of the price of one share on October 1. To the nearest dollar, what was the price of one share on October 1?

Ⓐ $68

Ⓑ $99

Ⓒ $102

Ⓓ $106

**25**

The sum of $x$, $y$, and $z$ is 63. If $x$ is 60% less than the sum of $y$ and $z$, what is the value of $x$?

## Try on Your Own

### Directions

Take as much time as you need on these questions. Work carefully and methodically. There will be an opportunity for timed practice later in the book.

**26**

The price of a single ticket for admission to an amusement park rose from $35 to $49. To the nearest percent, what was the percent increase in the price per ticket?

Ⓐ 14%

Ⓑ 29%

Ⓒ 40%

Ⓓ 48%

**27**

HINT: For Q27, remember to divide by the *original* value.

A homeowner's annual property tax payment was $1,494. Due to a property value reassessment, the tax payment was increased to $1,572. To the nearest tenth of a percent, by what percent was the homeowner's property tax payment increased?

Ⓐ 0.1%

Ⓑ 5.0%

Ⓒ 5.2%

Ⓓ 7.9%

**28**

HINT: For Q28, how does the wording of the question help you determine which container of coins is the original amount?

The number of coins in jar $X$ is 75. The number of coins in jar $Y$ is 54. By what percent is the number of coins in jar $Y$ less than the number of coins in jar $X$?

Ⓐ 21%

Ⓑ 28%

Ⓒ 39%

Ⓓ 72%

**29**

HINT: For Q29, if you have 75% more seniors than juniors, you have all the juniors (100%) plus 75%, or 175%. Adding the percentages at the start saves a calculation step.

At a school rally, there are 50 sophomores, 80 juniors, and 75 percent more seniors than juniors. By what percent is the number of seniors greater than the number of sophomores?

Ⓐ 80%

Ⓑ 140%

Ⓒ 150%

Ⓓ 180%

**30**

HINT: For Q30, the final 25% discount is applied to an already reduced price. You *cannot* add the percent discounts together.

A smartphone originally priced at $y$ dollars loses 36 percent of its original value after a year. If the phone is sold at a price that is 25 percent less than the depreciated cost, by what percent is the discounted price less than $y$?

Ⓐ 27%

Ⓑ 48%

Ⓒ 52%

Ⓓ 61%

**31**

Season 2 of a TV show opened with 1.8 million total viewers, which was down from its Season 1 average of 2.4 million. The number of viewers for Season 2, Episode 2, is 15 percent lower than that for Episode 1. What percent of the average number of Season 1 viewers is the number of viewers of Season 2, Episode 2?

Ⓐ 15%

Ⓑ 36.25%

Ⓒ 63.75%

Ⓓ 75%

## Try on Your Own

### Directions

Take as much time as you need on these questions. Work carefully and methodically. There will be an opportunity for timed practice later in the book.

**1**

HINT: For Q1, fraction $= \frac{\text{part}}{\text{whole}}$. Which *part* is the question asking for? Out of which *whole*?

| | Bob's Bookshop | Clara's Bookshop | Derek's Bookshop | Evelyn's Bookshop | Total |
|---|---|---|---|---|---|
| **Monday** | 14 | 7 | 15 | 12 | 48 |
| **Tuesday** | 8 | 13 | 15 | 13 | 49 |
| **Wednesday** | 10 | 13 | 12 | 14 | 49 |
| **Thursday** | 8 | 15 | 14 | 10 | 47 |
| **Friday** | 13 | 7 | 10 | 9 | 39 |
| **Total** | 53 | 55 | 66 | 58 | 232 |

Which of the four bookshops made the greatest fraction of its total sales on Tuesday?

Ⓐ Bob's Bookshop

Ⓑ Clara's Bookshop

Ⓒ Derek's Bookshop

Ⓓ Evelyn's Bookshop

**2**

| Group | Proportion |
|---|---|
| A: inert, mild or no side effects | 34.5% |
| B: inert, moderate side effects | 9.2% |
| C: inert, severe side effects | 6.2% |
| D: drug, mild or no side effects | 9.5% |
| E: drug, moderate side effects | 12.8% |
| F: drug, severe side effects | 27.8% |

Dr. Hunter is overseeing a treatment-resistant influenza Phase I trial with 400 healthy participants: half are given the drug and half are given an inert pill. Dr. Hunter records the severity of gastrointestinal side effects.

Of the participants who had severe side effects, approximately what percent were administered the drug?

Ⓐ 28%

Ⓑ 34%

Ⓒ 82%

Ⓓ 95%

3

HINT: For Q3, which group in the study is of interest?

Numerous health studies have found that people who eat breakfast are generally healthier and weigh less than people who skip this meal.

**Breakfast Study Results**

| | Breakfast ≤1 Time per Week | Breakfast 2–4 Times per Week | Breakfast 5–7 Times per Week | Total |
|---|---|---|---|---|
| **Within Healthy Weight Range** | 6 | 15 | 36 | 57 |
| **Outside Healthy Weight Range** | 38 | 27 | 9 | 74 |
| **Total** | 44 | 42 | 45 | 131 |

Approximately what percent of the participants who were outside a healthy weight range ate breakfast one or fewer times per week?

Ⓐ 29%

Ⓑ 51%

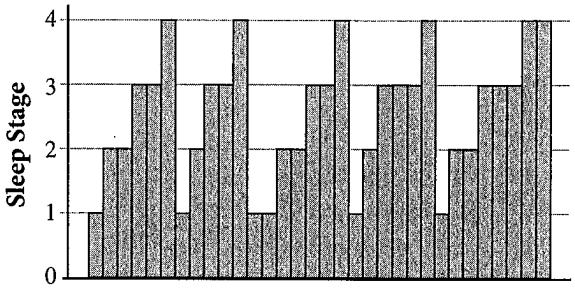
Ⓒ 56%

Ⓓ 86%

4

Scientists have classified a sleeping person's brain activity into four sleep stages: 1 (light sleep), 2 (medium sleep), 3 (deep sleep), and 4 (REM). A technician monitored a person's brainwaves in 15-minute intervals for 8 continuous hours, and categorized them into one of the four stages, as shown in the bar graph.

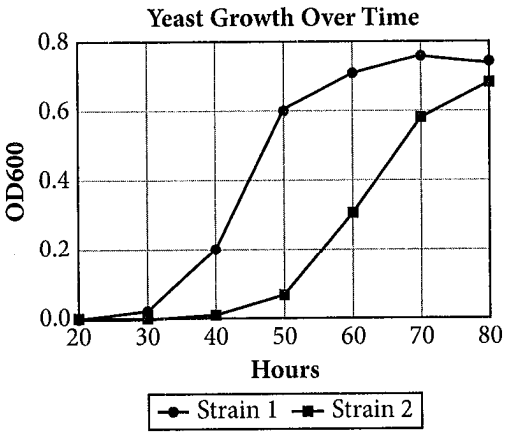
**8-Hour Sleep Study Results**




**Each Bar = 15 Minutes**

Based on the graph, how many minutes did the patient spend in non-deep sleep over the course of the entire night?

5




A microbiologist compares the growth rates of two yeast strains. She indirectly measures the number of yeast cells by recording the optical density (OD600) of each strain every 10 hours. The measurements are presented in the graph shown. Based on the data, which of the following statements is false?

Ⓐ Between hours 30 and 80, Strain 1 had a higher OD600 reading than Strain 2.

Ⓑ The growth rate of Strain 2 was less than the growth rate of Strain 1 until hour 50, at which point Strain 1's growth rate became the lesser one.

Ⓒ Between hours 50 and 70, Strain 2's OD600 reading increased by approximately 0.03 every hour.

Ⓓ The growth rate of Strain 1 was greater than the growth rate of Strain 2 throughout the monitored period.

## Try on Your Own

### Directions

Take as much time as you need on these questions. Work carefully and methodically. There will be an opportunity for timed practice later in the book.

**6**

| Number of Languages | Country A | Country B |
|---|---|---|
| 1 | 55 | 70 |
| 2 | 80 | 50 |
| 3 | 50 | 50 |
| 4 | 40 | 45 |
| 5 | 25 | 35 |

An anthropologist chose 250 citizens at random from each of two European countries and separated them into groups based on how many languages they spoke. The results are shown in the table. What is the median number of languages spoken by the sample of citizens from country B?

Ⓐ 1

Ⓑ 2

Ⓒ 3

Ⓓ 4

**7**

The average of $x$ and 5 is $c$, and the average of $3x$ and 3 is $d$. What is the average of $c$ and $d$ in terms of $x$?

Ⓐ $\frac{1}{2}x + 1$

Ⓑ $x + 2$

Ⓒ $2x - 1$

Ⓓ $2x + 4$

**8**

HINT: For Q8, when you see the word "consistent," think "standard deviation."

| | Charles | Gautam | Brin |
|---|---|---|---|
| **Run 1** | 8.3 | 8.5 | 8.4 |
| **Run 2** | 7.7 | 8.0 | 8.0 |
| **Run 3** | 7.1 | 8.5 | 7.5 |
| **Run 4** | 6.6 | 7.8 | 9.0 |
| **Run 5** | 8.0 | 8.1 | 7.5 |
| **Run 6** | 6.6 | 7.5 | 7.2 |
| **Mean Score** | 7.38 | 8.07 | 7.93 |
| **Standard Deviation** | 0.73 | 0.39 | 0.67 |

Charles, Gautam, and Brin participated in a snowboarding competition. The scores for each of their six qualifying runs are shown in the table. According to the data, which of the following is a valid conclusion?

Ⓐ Charles had the smallest mean score, so his performance was the least consistent.

Ⓑ Gautam had the smallest standard deviation, so his performance was the most consistent.

Ⓒ Charles had the largest standard deviation, so his performance was the most consistent.

Ⓓ Brin had the highest score on any one run, so her performance was the most consistent.

**9**

**Ages of Used Cars in Dealer Inventory**

| Age (Model Years) | Number of Cars |
|---|---|
| 1 | 3 |
| 2 | 5 |
| 3 | 18 |
| 4 | 17 |
| 5 | 11 |
| 6 | 6 |
| 7 | 2 |

The table shows the distribution of the ages (in model years) of the cars in a certain dealer's inventory. Which of the following correctly lists the mean, median, and mode of the ages of the cars in ascending order?

Ⓐ Mean, Median, Mode

Ⓑ Median, Mode, Mean

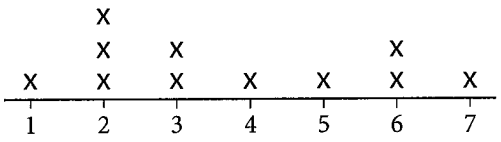
Ⓒ Mode, Mean, Median

Ⓓ Mode, Median, Mean

**10**

HINT: For Q10, start with the most definite information. What do you know about the past 11 days?

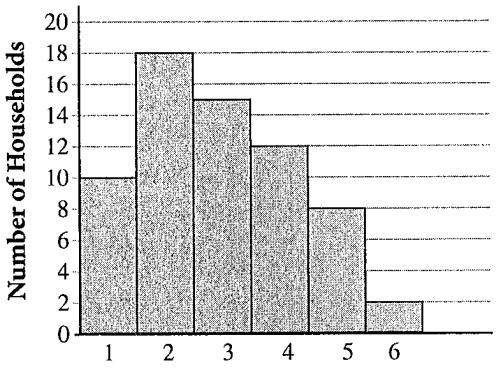
**Credit Card Applicants**




The dot plot shows the number of credit card applicants Amara obtained in the past 11 days. How many applicants must Amara obtain on the 12th day to reach an average of 4 applicants a day?

**11**

**Number of Persons in 65 Households**




Based on the graph, how many households have a number of persons greater than the median number of persons?

Ⓐ 2

Ⓑ 10

Ⓒ 22

Ⓓ 37

12

A random sample of college students was asked how often they eat out. Based on the sample data, a marketing team estimated that 87% of the college students on campus ate out at least once a week. If the margin of error is 5%, which of the following is a valid conclusion?

Ⓐ The marketing team has 95% confidence that most college students eat out at least once a week.

Ⓑ No more than 89.5% of college students eat out at least once a week.

Ⓒ The percentage of college students who eat out at least once a week is between 82% and 92%.

Ⓓ Less than 87% of college students eat out 5% of the time.

## Try on Your Own

### Directions

Take as much time as you need on these questions. Work carefully and methodically. There will be an opportunity for timed practice later in the book.

**13**

HINT: For Q13, who is in the survey group? Who is in the larger population? Are these groups different? If so, the survey is likely biased.

A railroad company is planning to build a new station in a town's downtown area where many commuters work. To assess public opinion, the company surveys a sample of 200 residents who commute to the downtown area for work. Over 80 percent of those surveyed are in favor of building the new station.

Which of the following is true about the survey's reliability?

Ⓐ It is unreliable because the survey sample is not representative of the entire town.

Ⓑ It is unreliable because the survey sample is too small.

Ⓒ It is reliable because nobody in the survey sample works for the railroad company.

Ⓓ It is reliable because the survey sample excludes people who do not ride the train.

**14**

A bottled water company conducts a survey to find out how many bottles of water people consume per day. If a representative and random sample of 500 people is chosen from a population estimated to be 50,000, which of the following accurately describes how the mean of the sample data relates to the estimated mean of the entire population?

Ⓐ The mean of the sample data is equal to the estimated mean of the population.

Ⓑ The mean of the sample data cannot be used to estimate the mean of the much larger population.

Ⓒ The mean of the sample data should be multiplied by 100 to get the estimated mean of the population.

Ⓓ The mean of the sample data should be multiplied by 1,000 to get the estimated mean of the population.

**15**

A store manager surveyed randomly selected customers to determine why they were returning their products. This sample included 70 customers who were returning dinnerware, of whom 80 percent indicated that at least one piece of dinnerware was chipped or broken.

Which of the following conclusions is best supported by the sample data?

Ⓐ Most of the products returned to the store contain chipped or broken pieces.

Ⓑ Dinnerware products are more likely to contain chipped or broken pieces than other products.

Ⓒ Most customers returning dinnerware returned products containing chipped or broken pieces.

Ⓓ At least 80 percent of the products sold at the store contain chipped or broken pieces.

**16**

The owner of a miniature golf course asked 150 randomly surveyed children at the course what color golf ball they prefer. Approximately 60 percent of them said they prefer red, while approximately 30 percent of them said blue.

This data best supports which of the following conclusions?

Ⓐ Most people prefer a red golf ball when playing miniature golf.

Ⓑ Red golf balls are used twice as often for miniature golf as blue golf balls.

Ⓒ Most children at the miniature golf course preferred a red golf ball.

Ⓓ Approximately 10 percent of miniature golf players prefer a white golf ball.

**17**

HINT: For Q17, remember that a valid sample must be unbiased and representative of the larger population.

A state politician appears on a local television show to discuss his response to Issue X. He asks people to text "1" if they support his response and "2" if they do not. 75% of the texts are 1s. He concludes that the majority of the state's residents support his response to Issue X.

Which of the following indicates why the survey results would not allow for a reliable conclusion about the preferences of the entire state?

Ⓐ The politician did not ask people's opinions about Issue Y.

Ⓑ The survey sample is not representative of the state's residents.

Ⓒ The television show is streamed online for free.

Ⓓ The survey sample was only 75% likely to be accurate.

## Try on Your Own

### Directions

Take as much time as you need on these questions. Work carefully and methodically. There will be an opportunity for timed practice later in the book.

**18**

| | Marked Defective | Not Marked Defective | Total |
|---|---|---|---|
| **Defective Bearing** | 392 | 57 | 449 |
| **Non-defective Bearing** | 168 | 49,383 | 49,551 |
| **Total** | 560 | 49,440 | 50,000 |

A factory produces 50,000 bearings per week. A device is installed that is designed to detect defective bearings and mark them. According to the results shown in the table, what is the approximate probability that a part that is marked defective will actually be defective?

Ⓐ 30%

Ⓑ 43%

Ⓒ 70%

Ⓓ 87%

**19**

HINT: For Q19, what percentage of the fish at the hatchery are salmon? How many salmon are there? How many of those were tested?

The table shows the distribution of four species of fish at a hatchery that has approximately 6,000 fish.

| Species | Percent of Total |
|---|---|
| Carp | 50 |
| Salmon | 25 |
| Tilapia | 15 |
| Tuna | 10 |

A biologist randomly tests 5 percent of each species of fish for mercury content. Her findings are shown in the following table.

**Mercury Content Test Results**

| Species | Number of Fish with Dangerous Mercury Levels |
|---|---|
| Carp | 11 |
| Salmon | 6 |
| Tilapia | 5 |
| Tuna | 8 |

Based on the biologist's findings, if a single salmon is randomly selected from those that were tested, what is the probability that this particular fish would have a dangerous mercury level?

Ⓐ 0.001

Ⓑ 0.004

Ⓒ 0.02

Ⓓ 0.08

**20**

| Type of Engineer | Preference | | Total |
|---|---|---|---|
| | Robotics | AV | |
| Mechanical | 198 | 245 | 443 |
| Electrical | 149 | 176 | 325 |
| Total | 347 | 421 | 768 |

In a survey, a group of mechanical and electrical engineers marked their preference between robotics and autonomous vehicles (AV). The results are shown in the table. What is the probability that a randomly selected engineer will be a mechanical engineer who prefers autonomous vehicles?

Ⓐ 0.229

Ⓑ 0.319

Ⓒ 0.553

Ⓓ 0.582

**21**

HINT: For Q21, how many groups have *at least* 8 days vacation?

| | 0–7 | 8–14 | 15–30 | Total |
|---|---|---|---|---|
| **Hourly** | 79 | 183 | 38 | 300 |
| **Salaried** | 8 | 27 | 65 | 100 |
| **Total** | 87 | 210 | 103 | 400 |

A company collected data on the paid vacation days accrued by hourly and salaried employees. The table shows the results of the data collection. If an employee has at least 8 paid vacation days, what is the probability that the person is a salaried employee?

Ⓐ $\frac{92}{313}$

Ⓑ $\frac{221}{300}$

Ⓒ $\frac{313}{400}$

Ⓓ $\frac{92}{100}$

**22**

| Egg production by size and color | | |
|---|---|---|
| **Egg Type** | **Brown** | **White** |
| **Large** | | |
| **Jumbo** | | |
| **Total** | 750 | 3,880 |

A farm's daily egg production is shown in the table. The farm produces six times as many large white eggs as large brown eggs and five times as many jumbo white eggs as jumbo brown eggs. What is the approximate probability that a brown egg selected at random will be large?

Ⓐ 0.173

Ⓑ 0.307

Ⓒ 0.440

Ⓓ 0.827

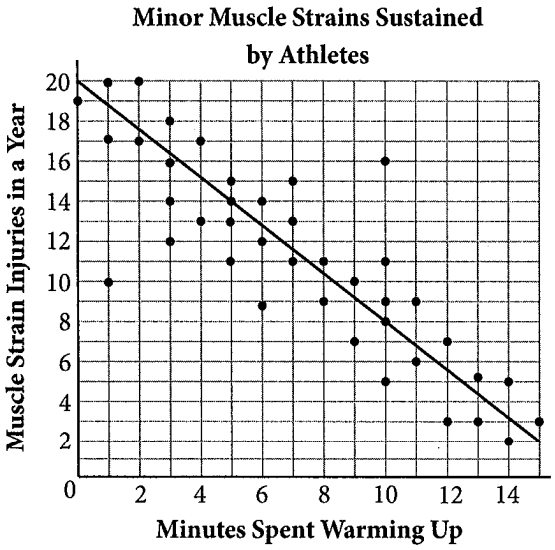
## Try on Your Own

### Directions

Take as much time as you need on these questions. Work carefully and methodically. There will be an opportunity for timed practice later in the book.

**1**

HINT: For Q1, look at the slope. Which two choices can you eliminate immediately?




The scatterplot shows the number of minor muscle strain injuries sustained in a year by athletes plotted against the amount of time warming up before engaging in rigorous physical activity. Which of the following best estimates the average rate of change in the number of injuries compared with the number of minutes spent warming up?

Ⓐ −1.2

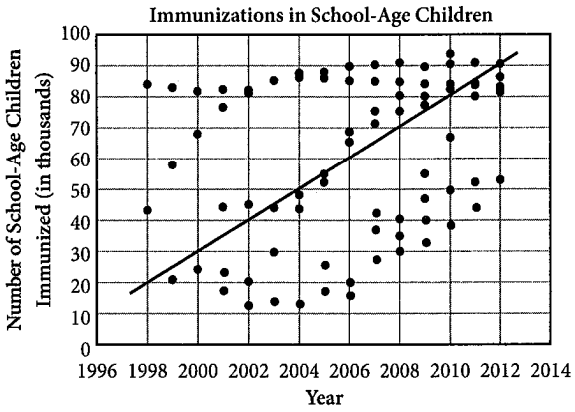
Ⓑ −0.8

Ⓒ 2

Ⓓ 20

**2**

HINT: For Q2, rate of change, increase or decrease, means slope.




The scatterplot shows the number of school-age children in a particular state who received immunizations for various illnesses between 1996 and 2012. What was the average rate of increase in the number of children immunized, in thousands, per year over the given time period?

Ⓐ 5

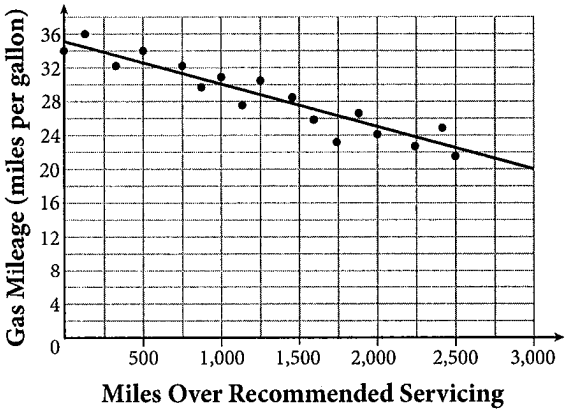
Ⓑ 10

Ⓒ 25

Ⓓ 70

Main

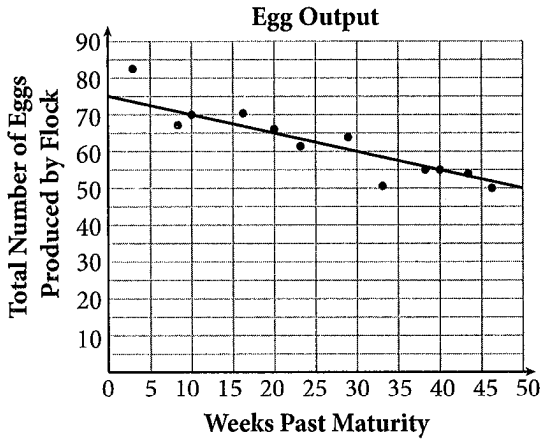
**3**




The scatterplot shows the gas mileage as a function of the number of miles driven over recommended servicing. The equation for the line of best fit shown is $y = -\frac{1}{200}x + 35$. How many miles per gallon could be expected if a car is driven 3,400 miles over the recommended miles between servicing?

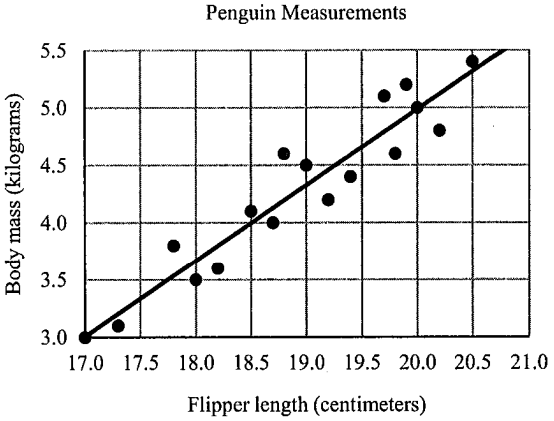
**4**

HINT: For Q4, how many tick marks on the *y*-axis represent 5 eggs?




The scatterplot shows the daily egg output for 100 chickens at random intervals. The line of best fit for the data has been drawn. How many times did the farmer's data differ by more than 5 eggs from the number of eggs predicted by the line of best fit?

**5**




The scatterplot shows the body mass of penguins against penguin flipper length and a line of best fit for the data. Which of the following might be the equation of the line of best fit?

Ⓐ $y = \frac{2}{3}x - \frac{25}{3}$

Ⓑ $y = \frac{2}{3}x + 3$

Ⓒ $y = \frac{3}{2}x - 25$

Ⓓ $y = \frac{3}{2}x + 3$

Math

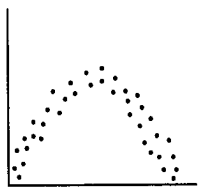
## Try on Your Own

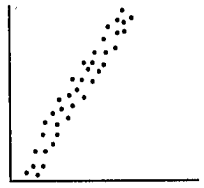
### Directions

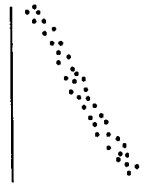
Take as much time as you need on these questions. Work carefully and methodically. There will be an opportunity for timed practice later in the book.

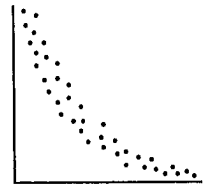
**6**

Which of the following is best modeled using a linear equation, $y = ax + b$, where $a < 0$?

Ⓐ 

Ⓑ 

Ⓒ 

Ⓓ 

**7**

HINT: For Q7, in an exponential equation, you're taking a starting value and multiplying repeatedly by some other value.

In a scatterplot of population data over time, an exponential growth equation of the form $y = x_0(1 + r)^x$ models the relationship between the population in the area where Adriana lives and the number of years, $x$, after she was born. Which of the following does $x_0$ most likely represent in the equation?

Ⓐ The population in the year that she was born

Ⓑ The rate of change of the population over time

Ⓒ The maximum population reached during her lifetime

Ⓓ The number of years after her birth when the population reached its maximum

**8**

Suppose a scatterplot shows a weak negative linear correlation. Which of the following statements is true?

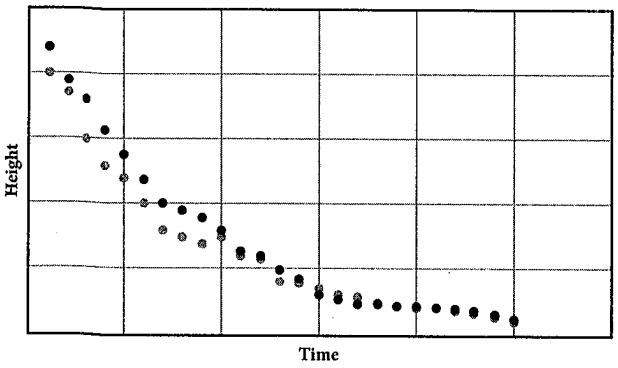
Ⓐ The slope of the line of best fit will be a number less than $-1$.

Ⓑ The slope of the line of best fit will be a number between $-1$ and 0.

Ⓒ The data points will follow, but not closely, the line of best fit.

Ⓓ The data points will be closely gathered around the line of best fit.

9




A drain at the bottom of a cylindrical water tank is opened and the height of the water is measured at regular time intervals. The tank is refilled and the process is then repeated. The scatterplot shows the measured height on the $y$-axis and time on the $x$-axis for the two trials. Which of the following conclusions can be drawn from the observations in the scatterplot?

Ⓐ Water flows out of the drain at a constant rate.

Ⓑ The flow rate from the tank decreases as the height of the water in the tank decreases.

Ⓒ The data in the scatterplot can be represented with a quadratic model.

Ⓓ The is no relationship between the height of the water in the tank and time.

# How Much Have You Learned: Problem-Solving and Data Analysis

## Directions

This "How Much Have You Learned" section will allow you to measure your growth and confidence in Problem-Solving and Data Analysis skills.

For testlike practice, give yourself 15 minutes for this question set. Be sure to use the Method for SAT Math Questions. When you're done, check your answers and read through the explanations, even for the questions you got correct. Don't forget to celebrate your progress!

**1**

Stafford books a venue for $5,950, which is 35% of his budget. Food is 40% of the budget and entertainment is 15% of the budget. If the remainder of the budget covers the cost of decorations, how much are decorations?

Ⓐ 1,700

Ⓑ 2,550

Ⓒ 5,100

Ⓓ 6,800

**2**

Ayesha signs up for an e-book subscription service for which the monthly fee is $e$ dollars. She budgets to spend $100 for the service. If the first two months are half-off, then which of the following expressions represents the number of months Ayesha will subscribe to the service?

Ⓐ $\frac{100 - \frac{1}{2}e}{e}$

Ⓑ $\frac{100 - e}{e}$

Ⓒ $\frac{100 + e}{e}$

Ⓓ $\frac{100 + \frac{3}{2}e}{e}$

**3**

The ratio of washing machines to dryers at a laundromat is 4 to 3. The laundromat opens a second location with a total of 42 washing machines and dryers, using the same ratio as the first location. How many washing machines are at the second location?

Ⓐ 18

Ⓑ 24

Ⓒ 32

Ⓓ 56

**4**

If Simritha consumes 8 cups of water a day, and 1 cup equals approximately 0.24 liters, how many liters did Simritha consume?

**5**

A marketing team was provided data from a survey of 1,000 pet owners with cars. The data indicated that approximately 35% of respondents planned to purchase car seat covers within the next six months. Which of the following conclusions is best supported by the sample data?

Ⓐ The number of car owners who will purchase seat covers is less than 35%.

Ⓑ The number of car owners who will purchase seat covers is 35%.

Ⓒ The number of car owners who will purchase seat covers is greater than 35%.

Ⓓ The number of car owners who will not purchase seat covers is 65%.

**6**

At an ice skating rink, $\frac{3}{5}$ of the skaters were teenagers, $\frac{2}{3}$ of whom were wearing gloves. Of the teenagers wearing gloves, 10 percent also wore hats. If a skater is chosen at random, what is the probability that the skater is a teenager wearing both a hat and gloves?

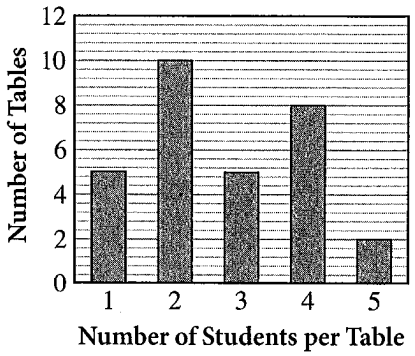
Ⓐ $\frac{1}{25}$

Ⓑ $\frac{1}{15}$

Ⓒ $\frac{1}{10}$

Ⓓ $\frac{2}{5}$

**7**




The number of students at tables in a library is shown in the figure. What is the median number of students at a table in the library?

Ⓐ 2

Ⓑ 2.5

Ⓒ 2.73

Ⓓ 3

**8**

The skill level of a dart player corresponds to the distribution of the player's darts around the bullseye. Which measure should be used to determine a player's skill?

Ⓐ Mean

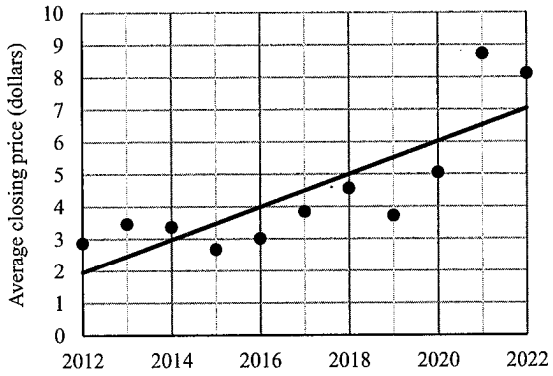
Ⓑ Range

Ⓒ Median

Ⓓ Standard deviation

Math

9




The scatterplot shows the average closing price of lumber over time and the line of best fit. Which of the following is closest to the estimated yearly increase in the average closing price of lumber, in dollars?

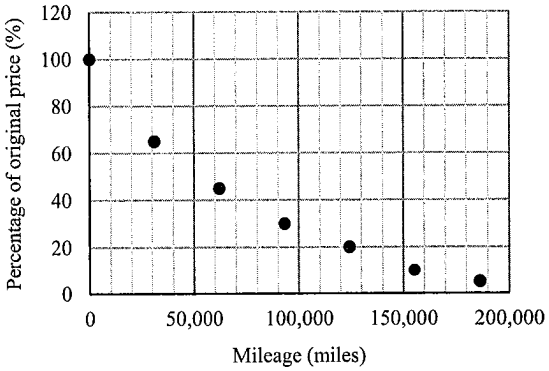
Ⓐ 0.50

Ⓑ 1

Ⓒ 2

Ⓓ 5

10




The scatterplot shows the resale value of a car as a function of miles driven. Which of the following statements is true about the relationship between the reselling cost of a car and its mileage?

Ⓐ The resale value of a car increases every 50,000 miles.

Ⓑ The rate of decrease in the resale value per mile is constant.

Ⓒ The rate of decrease in the resale value of a car every 50,000 miles is greater at lower mileage than at higher mileage.

Ⓓ The rate of decrease in the resale value of a car every 50,000 miles is greater at higher mileage than at lower mileage.