1 Rates, Ratios, Percents, and Data Analysis

- 1. One unit used to measure atmospheric pressure is called a Pascal. If one pound per square inch is equivalent to 6,895 Pascals, how many pounds per square inch are equivalent to 38,612 Pascals?
- 2. The ratio of red to blue to orange fish in a tank is 7:5:8, respectively. If there are 100 fish in this tank, how many of the fish are red?
- **3.** Last week, the local food pantry had 40 volunteers. This week, the local food pantry had 48 volunteers. What is the percent change in the number of volunteers at the local food pantry from last week to this week?
 - (A) 15% (B) 16.7% (C) 20% (D) 22.5%
- **4.** Of the juvenile and adult fish in a tank, forty-four percent are male. Twenty-five percent of the male fish and 50 percent of the female fish are juvenile. What percentage of all the fish are juvenile males?

(A) 11% (B) 28% (C) 33% (D) 39%

- **5.** The average number of 12 numbers is 7. When a number is added, the new average is 8. What is the value of the number that was added?
- **6.** Quinn wants to purchase a sound system that retails at \$*p*. She has waited patiently for the store to reduce all items by 20%. She also has a coupon for an additional 10% off the sale price. The store is required to add a 5% tax by the state. If Quinn buys the sound system during this sale, what will be her final cost, in dollars, in terms of *p*?
 - (A) 0.74p (B) 0.744p (C) 0.75p (D) 0.756p
- 7. A cyclist is training to ride in the "Tour de France." He rides at an average speed of 14 miles per hour for 3 hours. If he consumes half a liter of water for every 15 miles he rides, approximately how many liters of water does he consume on this ride?
- **8.** If a great white shark swims 9 miles in 28 minutes, what is its average speed, to the nearest tenth of a mile per hour?
- **9.** At Freddie's Fish Store the ratio of tetras to danios is 3:4. Of the tetras the ratio of male to female is 1:4, and of the danios the ratio of male to female is 2:3. What fraction of the female fish are danios?

10. Length, in cm

1.5	1.5	1.6	1.8	1.8
2.3	2.4	2.4	2.5	2.5
2.5	2.5	2.6	2.6	2.6
2.7	2.9	2.9	3	3

The table above shows the length, in cm, of each of Andrew's guppies. Which of the following gives the correct order of the mean, median, and range of the lengths of Andrew's guppies?

(A) mean < range < median
(B) median < mean < range
(C) range < median < mean
(D) range < mean < median

- **11.** To determine the percent of people in a neighborhood who prefer reading to working out, Sanjay surveyed 50 people at the neighborhood library. Of the 50 people surveyed, 58% said they preferred reading to working out. Which of the following statements is true?
 - (A) The results of the survey may be biased because the sampling method is flawed.
 - (B) The results of the survey are unbiased because the sampling method is not flawed.
 - (C) An accurate result cannot be determined because the sample size is too small.
 - (D) In this neighborhood, 58% of the people prefer reading to working out.
- 12. The administration of the local school district wanted to know if there was an association betweeen participation in extracurricular activities and grade point average (GPA). They used a sample of 1000 students from grades 8-12 in the district. They found there was a significant relationship in which students who participated in an extracurricular activity also had higher GPAs. Which of the following conclusions is best supported by this data?

(A) Participating in extracurricular activities causes students in grades 8-12 to have higher GPAs in this school district.

(B) Participating in extracurricular activities causes all students to have higher GPAs in the U.S.

(C) There is a positive association between participating in extracurricular activities and GPA for all students in grades 8-12 in the U.S.

(D) There is a positive association between participating in extracurricular activities and GPA for students in grades 8-12 in this school district.

- **13.** Researchers sampled 500 people between the ages of 20 and 30 years. They found that there was strong evidence to suggest a link between blood pressure and average weekly exercise. The results showed that people who exercised regularly had lower blood pressure than those who did not. Which of these statements is best supported by this study?
 - (A) There is a negative correlation between regular exercise and blood pressure for all people.
 - (B) There is a negative correlation between regular exercise and blood pressure for 20-30 year-olds.
 - (C) There is a positive correlation between regular exercise and blood pressure for all people.
 - (D) There is a positive correlation between regular exercise and blood pressure for 20-30 year-olds.
- **14.** The mean of a and b is 36, and the mean of b and c is 20. What is the value of a c?
- **15.** Kevin buys stock in Company X for x per share. After a better than expected earnings report for Company X, the value of the stock increases by 20% per share. Then, an SEC investigation into Company X is announced and the value of the stock decreases by 25% per share. In terms of x, what is the current value per share of the Company X stock that Kevin has?

(A) 0.85x (B) 0.88x (C) 0.9x (D) 0.95x

16. In a group of seven friends, the youngest friend is 24 years old and the oldest friend is 33 years old. The only two friends in the group who are the same age are both 26 years old. If the median age of the seven friends is 28, which of the following could be the age, in years, of one of the other friends in the group?

I. 27 **II.** 29 **III.** 31

- (A) I only (B) III only (C) I and II only (D) II and III only
- 17. Last week James purchased a pair of gloves for 32.75 prior to his trip to Europe. He saw the same pair of gloves in Germany selling for 25 Euros. How much money would he have saved, in dollars, if he bought the gloves in Germany rather than the US? (1 = 0.8 Euros)

A \$1.50 **(B)** \$1.25 **(C)** \$1.00 **(D)** \$0.75

- **18.** On her drive to work yesterday, Linda went an average of 40 miles per hour for 30 minutes then hit some traffic and went an average of 20 miles per hour for 15 minutes. What was the distance Linda drove to get to work yesterday?
 - (A) 12.5 miles (B) 22.5 miles (C) 25 miles (D) 45 miles
- **19.** An oceanographer measures the salinity of the ocean water at 25 locations. He later discovers that the greatest of the measurements was actually higher than he originally calculated. Which of the following measurements did not change when the data point was corrected?
 - (A) Mean (B) Median (C) Range (D) Standard Deviation
- **20.** Mandy is making 26 gift bags for a party. Her budget is \$300, which includes an 8% sales tax. Which of the following is closest to the maximum she can spend per gift bag before sales tax?

(A) \$10.68 (B) \$11.54 (C) \$12.46 D. \$13.02

21. A random sample of students at a high school was selected and asked if they would prefer to change from a semester system to a trimester system. Of the sample, 38% of the students said yes, with a 5% margin of error. Based on this data, which of the following is the most appropriate conclusion?

(A) At least 33% of the students at this school would prefer a trimester system.

(B) It is plausible that between 33% and 43% of the students at this school would prefer a trimester system.

- (C) An average of 38% of all high school students would favor a trimester system.
- (D) Between 33% and 43% of the students at this school will vote yes to change to a trimester system.

22. Length of crabs in cm

18	18	19	21	22	22
22	23	23	23	23	25

What is the median length, in cm, of the crabs measured for the table above?

- 23. If an ant lays 150 eggs in one hour, how many eggs does she lay in one day?
- 24. The number of students attending workshops last week started with 40 students on Monday, then increased to 80 students on Tuesday, but dropped to 20 students on Wednesday. What is the positive difference between the percent increase from Monday to Tuesday and the percent decrease from Tuesday to Wednesday?
 - (A) 20% (B) 25% (C) 50% (D) 55%
- **25.** The ratio of red to blue to orange fish in a tank is 6:5:11, respectively. If there are 20 blue fish in this tank, how many fish are there in this tank?
- **26.** Visitors at a local aquarium were asked to vote for their favorite of 2 exhibits (A or B). They could vote via text message or by filling out a ballot, and the winning exhibit would be the one that received more than half the votes. Fifty percent of aquarium visitors voted and of those votes, 75% were cast via text message. Exhibit A won 30% of the text message votes and 80% of the ballot votes. Based on this information, which of the following is the most reasonable conclusion?
 - (A) If all visitors who voted had voted by ballot instead of text message, Exhibit A would have won.
 - (B) Visitors who filled out a ballot were probably older than those who voted via text message.

(C) Visitors who voted by text message were less likely to have voted for Exhibit A than were visitors voting by ballot.

- (D) If all visitors had voted, Exhibit B would have won.
- 27. A set of numbers contains 9 positive integers less than 50. Eight of those integers are shown below.

35, 43, 43, 36, 27, 42, 30, 32

The mean of these 8 numbers is 36 and the mean of the set of 9 numbers is an integer more than 36. What is the value of the greatest integer in the set of 9 numbers?

Solutions

- **1.** 5.6
- **2.** 35
- **3.** C
- **4.** A
- **5.** 20
- **6.** D
- **7.** 1.4
- **8.** 19.3
- **9.** 1/2
- 10. D
- **11.** A
- 12. D
- **13.** B
- **14.** 32
- 15. C
- 16. D
- 17. A
- 18. C
- **19.** B
- **20.** A
- **21.** B
- **22.** 22
- **23.** 3600
- **24.** B
- **25.** 88
- **26.** C
- **27.** 45