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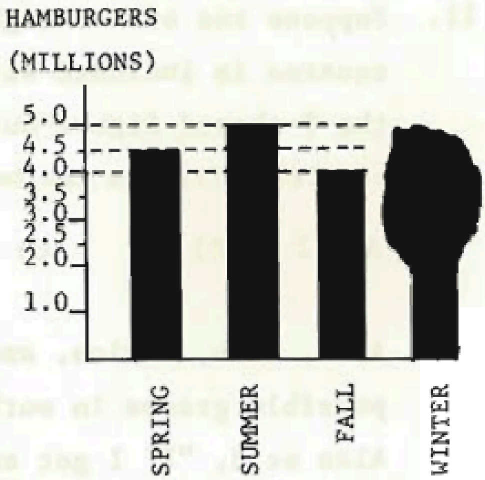
1986 Q16

16. A bar graph shows the number of hamburgers sold by a fast food chain each season. However, the bar indicating the number sold during the winter is covered by a smudge. If exactly 25% of the chain's hamburgers are sold in the fall, how many million hamburgers are sold in the winter?



A) 2.5 B) 3 C) 3.5 D) 4 E) 4.5

16. (A) If the fall sales of 4 million hamburgers are 25% of the yearly sales, then the yearly sales are 16 million hamburgers. Thus the winter sales are $16 - (4.5 + 5 + 4) = 2.5$ million.

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1999 Q16

16. Tori's mathematics test had 75 problems: 10 arithmetic, 30 algebra, and 35 geometry problems. Although she answered 70% of the arithmetic, 40% of the algebra, and 60% of the geometry problems correctly, she did not pass the test because she got less than 60% of the problems right. How many more questions would she have needed to answer correctly to earn a 60% passing grade?

(A) 1 **(B)** 5 **(C)** 7 **(D)** 9 **(E)** 11

16. **Answer (B):** Since $70\%(10) + 40\%(30) + 60\%(35) = 7 + 12 + 21 = 40$, she answered 40 questions correctly. She needed $60\%(75) = 45$ to pass, so she needed 5 more correct answers.

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1997 Q16

16. Penni Precisely buys \$100 worth of stock in each of three companies: Alabama Almonds, Boston Beans, and California Cauliflower. After one year, AA was up 20%, BB was down 25%, and CC was unchanged. For the second year, AA was down 20% from the previous year, BB was up 25% from the previous year, and CC was unchanged. If A, B, and C are the final values of the stock, then

(A) $A = B = C$ **(B)** $A = B < C$ **(C)** $C < B = A$
(D) $A < B < C$ **(E)** $B < A < C$

16. **(E)** At the end of two years, stock values are:
Stock AA: \$100 (1.2) (0.8) = \$96
Stock BB: \$100 (0.75) (1.25) = \$93.75
Stock CC: \$100 (1) (1) = \$100
So, $B < A < C$.

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1995 Q17

17. The table below gives the percent of students in each grade at Annville and Cleona elementary schools:

	K	1	2	3	4	5	6
Annville :	16%	15%	15%	14%	13%	16%	11%
Cleona :	12%	15%	14%	13%	15%	14%	17%

Annville has 100 students and Cleona has 200 students. In the two schools combined, what percent of the students are in grade 6?

(A) 12% (B) 13% (C) 14% (D) 15% (E) 28%

17. (D) In Annville 11% of 100, or 11 students are in the 6^{th} grade. In Cleona 17% of 200, or 34 students are in the 6^{th} grade. Thus in the two schools combined, 45 out of 300 students are in the 6^{th} grade, so $45/300 = 0.15 = 15\%$ of all the students are in the 6^{th} grade.

OR

Since 1/3 of the students are at Annville and 2/3 are at Cleona, using a weighted average yields $\frac{1}{3}(0.11) + \frac{2}{3}(0.17) = 0.15$ or 15%.

2001 Q17

17. For the game show *Who Wants To Be A Millionaire?*, the dollar values of each question are shown in the following table (where K = 1000).

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Value	100	200	300	500	1K	2K	4K	8K	16K	32K	64K	125K	250K	500K	1000K

Between which two questions is the percent increase of the value the smallest?

(A) From 1 to 2 (B) From 2 to 3 (C) From 3 to 4
(D) From 11 to 12 (E) From 14 to 15

17. (B) The percent increase from a to b is given by

$$\frac{b-a}{a}(100\%)$$

For example, the percent increase for the first two questions is

$$\frac{200-100}{100}(100\%) = 100\%$$

Each time the amount doubles there is a 100% increase. The only exceptions in this game are 2 to 3 (50%), 3 to 4 ($66\frac{2}{3}\%$) and 11 to 12 (about 95%). The answer is (B).

OR

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Value	100	200	300	500	1K	2K	4K	8K	16K	32K	64K	125K	250K	500K	1000K
% Increase		100	50	66.7	100	100	100	100	100	100	100	95	100	100	100

2007 Q17

17. A mixture of 30 liters of paint is 25% red tint, 30% yellow tint and 45% water. Five liters of yellow tint are added to the original mixture. What is the percent of yellow tint in the new mixture?

(A) 25 **(B)** 35 **(C)** 40 **(D)** 45 **(E)** 50

17. **(C)** There are $0.30(30) = 9$ liters of yellow tint in the original 30-liter mixture. After adding 5 liters of yellow tint, 14 of the 35 liters of the new mixture are yellow tint. The percent of yellow tint in the new mixture is $100 \times \frac{14}{35} = 100 \times \frac{2}{5}$ or 40% .

1997 Q18

18. At the grocery store last week, small boxes of facial tissue were priced at 4 boxes for \$5. This week they are on sale at 5 boxes for \$4. The percent decrease in the price per box during the sale was closest to

(A) 30% **(B)** 35% **(C)** 40% **(D)** 45% **(E)** 65%

18. **(B)** Last week one box cost \$1.25; this week one box costs \$0.80. The decrease, \$0.45, compared to the original price of \$1.25, is a decrease of $\frac{0.45}{1.25}$ = 0.36 or 36%, so choice (B) is closest.

OR

Last week there was a 4-box offer and this week a 5-box offer. Consider a purchase of 20 boxes (the smallest number divisible by both 4 and 5). Last week 20 boxes would have been \$25 (5 offers). This week it is \$16 (4 offers). The savings, \$9, compared to \$25 is 36%.

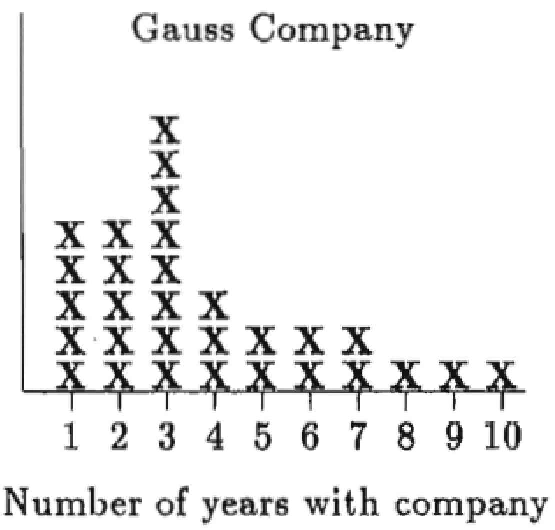
1991 Q18

18. The vertical axis indicates the number of employees, but the scale was accidentally omitted from this graph. What percent of the employees at the Gauss Company have worked there for 5 years or more?

(A) 9% **(B)** $23\frac{1}{3}$%

(C) 30% **(D)** $42\frac{6}{7}$%

(E) 50%



18. **(C)** Regardless of the scale on the vertical axis, 9 **X**'s out of 30 **X**'s represent employees who have worked 5 years or more. This is $\frac{9}{30}$ or 30%.

1996 Q18

18. Ana's monthly salary was \$2000 in May. In June she received a 20% raise. In July she received a 20% pay cut. After the two changes in June and July, Ana's monthly salary was

(A) \$1920 (B) \$1980 (C) \$2000 (D) \$2020 (E) \$2040

18. **(A)** After the first change, Ana's salary was $\$2000 + 0.20(\$2000) = \$2400$. After the second change, Ana's salary was $\$2400 - 0.20(\$2400) = \$1920$.

OR

After the two changes, Ana's salary was 80% of 120% of \$2000, or $0.80(1.20)(\$2000) = \$1920$.

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1985 Q19

19. If the length and width of a rectangle are each increased by 10%, then the perimeter of the rectangle is increased by

A) 1% B) 10% C) 20% D) 21% E) 40%

19. (B) If $2(\ell + w)$ is the original perimeter, then the new perimeter is $2(1.1\ell + 1.1w) = 2.2(\ell + w)$ which is 10% more than $2(\ell + w)$.

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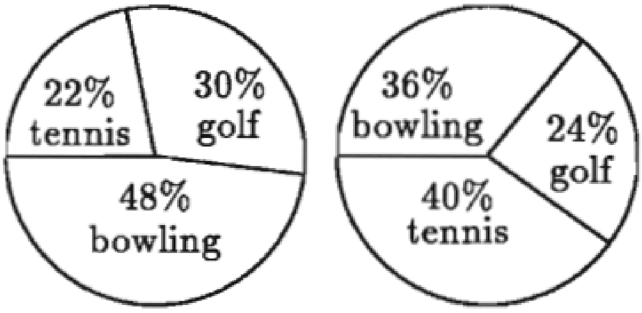
1996 Q19

19. The pie charts at the right indicate the percent of students who prefer golf, bowling, or tennis at East Junior High School and West Middle School. The total number of students at East is 2000 and at West, 2500. In the two schools combined, the percent of students who prefer tennis is



East JHS 2000 students | West MS 2500 students

(A) 30% (B) 31% (C) 32% (D) 33% (E) 34%

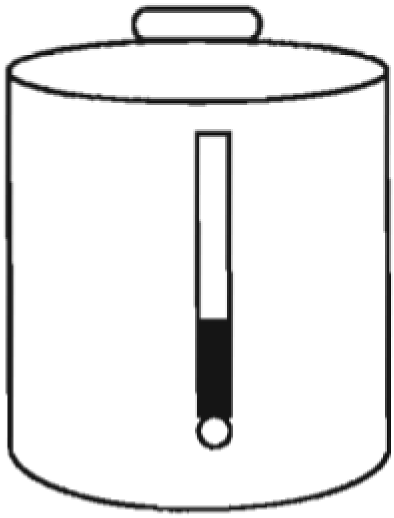
19. (C) The first pie chart shows that 22% of 2000, or 440 students at East prefer tennis. The second chart shows that 40% of 2500, or 1000 students at West prefer tennis. Thus 1440 of the total of 4500 students prefer tennis. This gives $1440/4500 = 0.32$, or 32% that prefer tennis.

OR

East has 2000 of the 4500 students, and West has 2500 of the 4500 students. Using a weighted average yields $\frac{2000}{4500} \cdot 0.22 + \frac{2500}{4500} \cdot 0.40 = 0.32$, or 32%.

1988 Q20

20. The glass gauge on a cylindrical coffee maker shows there are 45 cups left when the coffee maker is 36% full. How many cups of coffee does it hold when it is full?

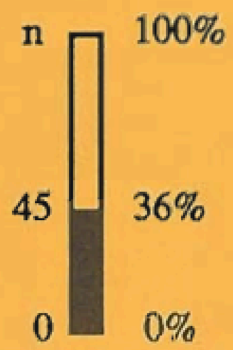


A) 80 B) 100 C) 125

D) 130 E) 262

20. C

If n is the number of cups of coffee the coffeemaker will hold when it is full, then we can label the gauge as shown and write the two equivalent ratios:



$$\frac{45}{n} = \frac{36}{100} \text{ or } n = 125 \text{ cups.}$$

OR

If 36% is 45 cups, then 4% is $\frac{1}{9}(45)$ or 5 cups so that 100% is 25(5) or 125 cups.

2007 Q20

20. Before district play, the Unicorns had won 45% of their basketball games. During district play, they won six more games and lost two, to finish the season having won half their games. How many games did the Unicorns play in all?

(A) 48 **(B)** 50 **(C)** 52 **(D)** 54 **(E)** 60

20. **(A)** Because 45% is the same as the simplified fraction $\frac{9}{20}$, the Unicorns won 9 games for each 20 games they played. This means that the Unicorns must have played some multiple of 20 games before district play. The table shows the possibilities that satisfy the conditions in the problem.

Before District Play			After District Play		
Games Played	Games Won	Games Lost	Games Played	Games Won	Games Lost
20	9	11	28	15	13
40	**18**	**22**	**48**	**24**	**24**
60	27	33	68	33	35
80	36	44	88	42	46
...	...	...	...	...	...

Only when the Unicorns played 40 games before district play do they finish winning half of their games. So the Unicorns played $24 + 24 = 48$ games.

OR

Let n be the number of Unicorn games before district play. Then $0.45n + 6 = 0.5(n + 8)$. Solving for n yields

$$\begin{aligned} 0.45n + 6 &= 0.5n + 4, \\ 2 &= 0.05n, \\ 40 &= n. \end{aligned}$$

So the total number of games is $40 + 8 = 48$.