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2003 Q11

11. Business is a little slow at Lou's Fine Shoes, so Lou decides to have a sale. On Friday, Lou increases all of Thursday's prices by 10%. Over the weekend, Lou advertises the sale: "Ten percent off the listed price. Sale starts Monday." How much does a pair of shoes cost on Monday that cost \$40 on Thursday?

(A) \$36 **(B)** \$39.60 **(C)** \$40 **(D)** \$40.40 **(E)** \$44

11. **(B)** Thursday's price of \$40 is increased 10% or \$4, so on Friday the shoes are marked \$44. Then 10% of \$44 or \$4.40 is taken off, so the price on Monday is $\$44 - \$4.40 = \$39.60$.

OR

Marking a price 10% higher multiplies the original price by 1.1, and reducing a price by 10% multiplies the price by 0.9. So the price of a pair of shoes that was originally \$40 will be $\$40 \times 1.1 \times 0.9 = \$39.60$.

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2005 Q11

11. The sales tax rate in Bergville is 6%. During a sale at the Bergville Coat Closet, the price of a coat is discounted 20% from its \$90.00 price. Two clerks, Jack and Jill, calculate the bill independently. Jack rings up \$90.00 and adds 6% sales tax, then subtracts 20% from this total. Jill rings up \$90.00, subtracts 20% of the price, then adds 6% of the discounted price for sales tax. What is Jack's total minus Jill's total?

(A) −\$1.06 **(B)** −\$0.53 **(C)** \$0 **(D)** \$0.53 **(E)** \$1.06

11. **(C)** To add 6% sales tax to an item, multiply the price by 1.06. To calculate a 20% discount, multiply the price by 0.8. Because both actions require only multiplication, and because multiplication is commutative, the order of operations doesn't matter. Jack and Jill will get the same total.

    Note: Jack's final computation is $0.80(1.06 \times \$90.00)$ and Jill's is $1.06(0.80 \times \$90.00)$. Both yield the same product, \$76.32.

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2006 Q12

12. Antonette gets 70% on a 10-problem test, 80% on a 20-problem test and 90% on a 30-problem test. If the three tests are combined into one 60-problem test, which percent is closest to her overall score?

    (A) 40 **(B)** 77 **(C)** 80 **(D)** 83 **(E)** 87

12. **(D)** Note that 70% of 10 is 7, 80% of 20 is 16 and 90% of 30 is 27. Antonette answers $7 + 16 + 27 = 50$ problems correctly out of 60 problems in all. Her overall score is $\frac{50}{60}$ or $83.\overline{3}\%$.

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2010 Q12

12. Of the 500 balls in a large bag, 80% are red and the rest are blue. How many of the red balls must be removed from the bag so that 75% of the remaining balls are red?

    (A) 25 **(B)** 50 **(C)** 75 **(D)** 100 **(E)** 150

12. **Answer (D):** The number of blue balls in the bag is 20% of 500, which is $(0.20)(500) = 100$. After some red balls are removed, the 100 blue balls must be 25%, or $\frac{1}{4}$, of the number in the bag. There must be $(4)(100) = 400$ balls in the bag, so $500 - 400 = 100$ red balls must be removed.

OR

Let x represent the number of red balls removed. Remember that $0.80(500) = 400$ is the number of red balls that were originally in the bag. Setup and solve the proportion:

$$75\% = \frac{3}{4} = \frac{400 - x}{500 - x}$$
$$3(500 - x) = 4(400 - x)$$
$$1500 - 3x = 1600 - 4x$$

The number of red balls removed is $x = 100$.

2013 Q12

12. At the 2013 Winnebago County Fair a vendor is offering a "fair special" on sandals. If you buy one pair of sandals at the regular price of \$50, you get a second pair at a 40% discount, and a third pair at half the regular price. Javier took advantage of the "fair special" to buy three pairs of sandals. What percentage of the \$150 regular price did he save?

(A) 25 **(B)** 30 **(C)** 33 **(D)** 40 **(E)** 45

12. **Answer (B):** Javier spent \$50 on the first pair, \$30 on the second pair, and \$25 on the third pair, for a total of \$105. This is a savings of \$45 off the \$150 list price, which is 30% off.

1996 Q13

13. In the fall of 1996, a total of 800 students participated in an annual school clean-up day. The organizers of the event expect that in each of the years 1997, 1998, and 1999, participation will increase by 50% over the previous year. The number of participants the organizers expect in the fall of 1999 is

(A) 1200 **(B)** 1500 **(C)** 2000 **(D)** 2400 **(E)** 2700

13. **(E)** Since 50% of 800 is 400,
the organizers expect $800 + 400 = 1200$ participants in 1997.
Since 50% of 1200 is 600, $1200 + 600 = 1800$ are expected in 1998.
Since 50% of 1800 is 900, $1800 + 900 = 2700$ are expected in 1999.

OR

Make a table.

YEAR	NUMBER OF PARTICIPANTS
1996	800
1997	$800 + (0.5 \times 800) = 1200$
1998	$1200 + (0.5 \times 1200) = 1800$
1999	$1800 + (0.5 \times 1800) = 2700$

OR

An increase of 50% means there will be $100\% + 50\%$ or 1.5 times as many participants in each successive year. Thus in 1999, three years from 1996, there will be $800 \times 1.5^3 = 2700$ participants.

1997 Q13

13. Three bags of jelly beans contain 26, 28, and 30 beans. The ratios of yellow beans to all beans in each of these bags are 50%, 25%, and 20%, respectively. All three bags of candy are dumped into one bowl. Which of the following is closest to the ratio of yellow jelly beans to all beans in the bowl?

(A) 31% **(B)** 32% **(C)** 33% **(D)** 35% **(E)** 95%

13. **(A)** There is a total of $26 + 28 + 30 = 84$ jelly beans:

$$\begin{aligned} 50\% \text{ of } 26 &= 13 \\ 25\% \text{ of } 28 &= 7 \\ 20\% \text{ of } 30 &= \underline{6} \\ &\quad 26 \end{aligned}$$

$$\frac{26}{84} = 0.3095 \approx 31\%$$

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1985 Q14

14. The difference between a 6.5% sales tax and a 6% sales tax on an item priced at $20 before tax is

A) $.01 B) $.10 C) $.50 D) $1 E) $10

14. (B) The difference is .5% of $20 = .005 × $20 = $.10.

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1995 Q14

14. A team won 40 of its first 50 games. How many of the remaining 40 games must this team win so it will have won exactly 70% of its games for the season?

(A) 20 (B) 23 (C) 28 (D) 30 (E) 35

14. (B) The total number of games for the season is $50+40=90$ games. Since 70% of 90 games is 63, it follows that $63-40=23$ more wins are needed.

2002 Q14

14. A merchant offers a large group of items at 30% off. Later, the merchant takes 20% off these sale prices and claims that the final price of these items is 50% off the original price. The total discount is

(A) 35% (B) 44% (C) 50% (D) 56% (E) 60%

14. (B) The first discount means that the customer will pay 70% of the original price. The second discount means a selling price of 80% of the discounted price. Because $0.80(0.70) = 0.56 = 56\%$, the customer pays 56% of the original price and thus receives a 44% discount.

2017 Q14

14. Chloe and Zoe are both students in Ms. Demeanor's math class. Last night they each solved half of the problems in their homework assignment alone and then solved the other half together. Chloe had correct answers to only 80% of the problems she solved alone, but overall 88% of her answers were correct. Zoe had correct answers to 90% of the problems she solved alone. What was Zoe's overall percentage of correct answers?

(A) 89 **(B)** 92 **(C)** 93 **(D)** 96 **(E)** 98

14. **Answer (C):** For simplicity, suppose that the assignment contained 100 problems. Chloe correctly solved 80% of the 50 problems she worked on alone, which was 40 problems. She had a total of 88 correct answers, so $88-40=48$ of the 50 problems that she and Zoe worked on together had correct answers. In addition Zoe correctly solved 90% of the 50 problems that she worked on alone, which was 45 problems. Her overall percentage of correct answers was $45+48=93$.

OR

Chloe's percentage of success on the half that she solved alone was 80, which is 8 points less than 88. So her percentage of success on the other half was 8 points above 88, or 96. Zoe's percentage of success was 90 on half of the problems and 96 on the other half, so her overall percentage was the average of 90 and 96, which is 93.

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1986 Q15

15. Sale prices at the Ajax Outlet Store are 50% below original prices. On Saturdays an additional discount of 20% off the sale price is given. What is the Saturday price of a coat whose original price is $180?

A) $54 B) $72 C) $90 D) $108 E) $110

15. (B) The sale price of the coat is 50% of $180 or $90. The additional discount is 20% of $90 or $18, so the Saturday price is $90 - $18 = $72.

OR

The Saturday price is 80% of the sale price and the sale price is 50% of the original price, so the Saturday price is .8(.5($180)) = .8($90) = $72.

2010 Q15

15. A jar contains five different colors of gum drops: 30% are blue, 20% are brown, 15% are red, 10% are yellow, and the other 30 gum drops are green. If half of the blue gum drops are replaced by brown gum drops, how many of the gum drops will be brown?

(A) 35 **(B)** 36 **(C)** 42 **(D)** 48 **(E)** 64

15. **Answer (C):** The 30 green gum drops are $100\% - (30+20+15+10)\% = 25\%$ of the total gum drops, so there are 120 gum drops in the jar. The number of blue gum drops is 30% of 120, which is 36, and the number of brown gum drops is 20% of 120, which is 24. After half the blue gum drops are replaced by brown ones, the number of brown gum drops is $24 + \frac{1}{2}(36) = 42$.