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2006 Q16

16. Before Chandra and Bob start reading, Alice says she would like to team read with them. If they divide the book into three sections so that each reads for the same length of time, how many seconds will each have to read?

(A) 6400 **(B)** 6600 **(C)** 6800 **(D)** 7000 **(E)** 7200

16. **(E)** The least common multiple of 20, 45 and 30 is $2^2 \cdot 3^2 \cdot 5 = 180$. Using the LCM, in 180 seconds Alice reads $\frac{180}{20} = 9$ pages, Chandra reads $\frac{180}{30} = 6$ pages and Bob reads $\frac{180}{45} = 4$ pages. Together they read a total of 19 pages in 180 seconds. The total number of seconds each reads is $\frac{760}{19} \cdot 180 = 7200$.

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1994 Q17

17. Pauline Bunyan can shovel snow at the rate of 20 cubic yards for the first hour, 19 cubic yards for the second, 18 for the third, etc., always shoveling one cubic yard less per hour than the previous hour. If her driveway is 4 yards wide, 10 yards long, and covered with snow 3 yards deep, then the number of hours it will take her to shovel it clean is closest to

(A) 4 **(B)** 5 **(C)** 6 **(D)** 7 **(E)** 12

17. **(D)** The volume of the snow on the driveway is $4 \times 10 \times 3 = 120$ cubic yards. Adding the rates for 7 consecutive hours yields $20+19+18+17+16+15+14 = 119$, while 8 consecutive hours yields $20+19+18+17+16+15+14+13 = 132$. The 7-hour solution is closest to 120 cubic yards.

OR

The volume of the snow on the driveway is $4 \times 10 \times 3 = 120$ cubic yards. Computing the amount left after each hour, we have:

$$120 - 20 = 100, \quad 100 - 19 = 81, \quad 81 - 18 = 63, \quad 63 - 17 = 46,$$
$$46 - 16 = 30, \quad 30 - 15 = 15, \quad 15 - 14 = 1, \quad 1 - 13 = -12.$$

Since 1 is closer to zero than is -12, the 7-hour solution is closest to 120 cubic yards.

2016 Q16

16. Annie and Bonnie are running laps around a 400-meter oval track. They started together, but Annie has pulled ahead, because she runs 25% faster than Bonnie. How many laps will Annie have run when she first passes Bonnie?

(A) $1\frac{1}{4}$ **(B)** $3\frac{1}{3}$ **(C)** 4 **(D)** 5 **(E)** 25

16. Answer (D):

Let N be the number of laps run by Annie when she passes Bonnie for the first time. The number of laps run by Bonnie is $N-1$. Then $\frac{N}{N-1} = 1.25 = \frac{5}{4}$. So $N = 5$.

OR

For each lap Bonnie completes, Annie runs $1\frac{1}{4}$ laps, thus gaining $\frac{1}{4}$ of a lap on Bonnie during that time. Annie will pass Bonnie when Bonnie has run 4 laps, at which point Annie will have run 5.

2014 Q17

17. George walks 1 mile to school. He leaves home at the same time each day, walks at a steady speed of 3 miles per hour, and arrives just as school begins. Today he was distracted by the pleasant weather and walked the first $\frac{1}{2}$ mile at a speed of only 2 miles per hour. At how many miles per hour must George run the last $\frac{1}{2}$ mile in order to arrive just as school begins today?

(A) 4 **(B)** 6 **(C)** 8 **(D)** 10 **(E)** 12

17. **Answer (B):** To walk 1 mile at 3 miles per hour requires $\frac{1}{3}$ of an hour, or 20 minutes. This is the amount of time George allows himself to get to school. To walk $\frac{1}{2}$ mile at 2 miles per hour requires $\frac{\frac{1}{2}}{2} = \frac{1}{4}$ of an hour, or 15 minutes, so George has only 5 minutes to cover the remaining $\frac{1}{2}$ mile. Because 5 minutes is $\frac{5}{60} = \frac{1}{12}$ of an hour, George needs to run at a speed of $\frac{1/2}{1/12} = 6$ miles per hour.

2015 Q17

17. Jeremy's father drives him to school in rush hour traffic in 20 minutes. One day there is no traffic, so his father can drive him 18 miles per hour faster and gets him to school in 12 minutes. How far in miles is it to school?

(A) 4 **(B)** 6 **(C)** 8 **(D)** 9 **(E)** 12

17. **Answer (D):** Because the new time is $\frac{12}{20} = \frac{3}{5}$ of the original time, the new speed must be $\frac{5}{3} = 1\frac{2}{3}$ of the original speed. Then the additional 18 miles per hour must be $\frac{2}{3}$ of the original speed, which is then 27 mph. In 20 minutes, Jeremy's father travels $\frac{1}{3} \cdot 27 = 9$ miles.

OR

Let r be Jeremy's original speed in miles per hour. Twenty minutes is $\frac{20}{60} = \frac{1}{3}$ of an hour and twelve minutes is $\frac{12}{60} = \frac{1}{5}$ of an hour. Then $\frac{1}{3}r = \frac{1}{5}(r + 18)$, so $5r = 3r + 54$, and $r = 27$. Thus the distance to the school is $\frac{1}{3}r = 9$ miles.

1992 Q18

18. On a trip, a car traveled 80 miles in an hour and a half, then was stopped in traffic for 30 minutes, then traveled 100 miles during the next 2 hours. What was the car's average speed in miles per hour for the 4-hour trip?

(A) 45 **(B)** 50 **(C)** 60 **(D)** 75 **(E)** 90

18. **(A)** During the 4 hours, the car traveled a total of $80 + 0 + 100 = 180$ miles for an average speed of $180/4 = 45$ miles per hour.

1986 Q19

19. At the beginning of a trip, the mileage odometer read 56,200 miles. The driver filled the gas tank with 6 gallons of gasoline. During the trip, the driver filled his tank again with 12 gallons of gasoline when the odometer read 56,560. At the end of the trip, the driver filled the tank again with 20 gallons of gasoline. The odometer read 57,060. To the nearest tenth, what was the car's average miles-per-gallon for the entire trip?

A) 22.5 B) 22.6 C) 24.0 D) 26.9 E) 27.5

19. (D) The trip was 57,060 - 56,200 = 860 miles long and 12 + 20 = 32 gallons of gasoline were used during the trip. Thus the average number of miles per gallon was $\frac{860}{32}$ = 26.9. Note that the 6 gallons needed to fill the tank at the start of the trip had no effect on the answer. No matter how many gallons were needed to fill the tank at the start, the average miles per gallon for the trip would be 26.9.