2017 Q23

23. Each day for four days, Linda traveled for one hour at a speed that resulted in her traveling one mile in an integer number of minutes. Each day after the first, her speed decreased so that the number of minutes to travel one mile increased by 5 minutes over the preceding day. Each of the four days, her distance traveled was also an integer number of miles. What was the total number of miles for the four trips?

(A) 10 **(B)** 15 **(C)** 25 **(D)** 50 **(E)** 82

23. **Answer (C):** Her time for each trip was 60 minutes. The factors of 60 are 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, and 60. Her daily number of minutes for a mile form a sequence of four numbers where each number is 5 more than the previous number. Also, these numbers must each be a factor of 60 since the number of miles traveled must be an integer. The only such sequence from among the factors of 60 is 5, 10, 15, 20. So her rates in miles per minute for the four days were $\frac{1}{5}$, $\frac{1}{10}$, $\frac{1}{15}$, $\frac{1}{20}$, and multiplying each by 60 minutes gives her distances in miles as 12, 6, 4, and 3, for a total distance of 25 miles.

1995 Q25

25. Buses from Dallas to Houston leave every hour on the hour. Buses from Houston to Dallas leave every hour on the half hour. The trip from one city to the other takes 5 hours. Assuming the buses travel on the same highway, how many Dallas-bound buses does a Houston-bound bus pass on the highway (not in the station)?

(A) 5 **(B)** 6 **(C)** 9 **(D)** 10 **(E)** 11

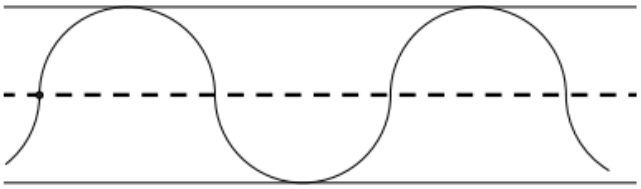
25. (D) A Houston-bound bus leaving Dallas at 6:00 p.m., for example, will arrive in Houston at 11:00 p.m., having passed buses that left Houston at 1:30 p.m., 2:30 p.m., 3:30 p.m., . . ., 10:30 p.m. That is 10 buses.

2014 Q25

25. A straight one-mile stretch of highway, 40 feet wide, is closed. Robert rides his bike on a path composed of semicircles as shown. If he rides at 5 miles per hour, how many hours will it take to cover the one-mile stretch?

Note: 1 mile = 5280 feet

(A) $\frac{\pi}{11}$ **(B)** $\frac{\pi}{10}$ **(C)** $\frac{\pi}{5}$ **(D)** $\frac{2\pi}{5}$ **(E)** $\frac{2\pi}{3}$



25. **Answer (B):** Each semicircle moves Robert 40 feet ahead, so he would have to ride $5280 \div 40 = 132$ semicircles to cover 1 mile. Riding 132 semicircles is equal to the distance of 66 full circles. Each circle has a circumference of 40π, so Robert rides $66 \cdot 40\pi$ feet. Converting to miles, that is $\frac{66 \cdot 40\pi}{5280} = \frac{\pi}{2}$ miles. Since he is riding at 5 miles per hour, it will take him $\frac{\pi}{2} \div 5 = \frac{\pi}{10}$ hours.

OR

Each semi-circular path is $\frac{\pi}{2}$ times as long as the straight path. Since the straight path would take $\frac{1}{5}$ hour to ride, the curved path will take $\frac{1}{5} \cdot \frac{\pi}{2} = \frac{\pi}{10}$ hours to ride.