5

speed time distance word problems

2008A

6. **Answer (D):** Let x be the length of one segment, in kilometers. To complete the race, the triathlete takes

$$\frac{x}{3} + \frac{x}{20} + \frac{x}{10} = \frac{29}{60}x$$

hours to cover the distance of $3x$ kilometers. The average speed is therefore

$$\frac{3x}{\frac{29}{60}x} \approx 6 \text{ kilometers per hour.}$$

2014A

6. **Answer (A):** One cow gives $\frac{b}{a}$ gallons in c days, so one cow gives $\frac{b}{ac}$ gallons in 1 day. Thus d cows will give $\frac{bd}{ac}$ gallons in 1 day. In e days d cows will give $\frac{bde}{ac}$ gallons of milk.

2005A

7. **(B)** Because (rate)(time) = (distance), the distance Josh rode was $(4/5)(2) = 8/5$ of the distance that Mike rode. Let m be the number of miles that Mike had ridden when they met. Then the number of miles between their houses is

$$13 = m + \frac{8}{5}m = \frac{13}{5}m.$$

Thus $m = 5$.

1

2010A

7. **Answer (C):** When Crystal travels one mile northeast she travels $\frac{\sqrt{2}}{2}$ miles north and $\frac{\sqrt{2}}{2}$ miles east. Similarly, when she travels southeast for one mile she travels $\frac{\sqrt{2}}{2}$ miles south and $\frac{\sqrt{2}}{2}$ miles east. Just before the last portion of her run she has traveled a net of $1 + \frac{\sqrt{2}}{2} - \frac{\sqrt{2}}{2} = 1$ miles north, and $\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2} = \sqrt{2}$ miles east. By the Pythagorean Theorem, the last portion of her run is

$$\sqrt{1^2 + (\sqrt{2})^2} = \sqrt{1+2} = \sqrt{3} \quad \text{miles.}$$

2017A

7. **Answer (A):** If the square had side length x, then Jerry's path had length $2x$, and Silvia's path along the diagonal, by the Pythagorean Theorem, had length $\sqrt{2}x$. Therefore Silvia's trip was shorter by $2x - \sqrt{2}x$, and the required percentage is

$$\frac{2x - \sqrt{2}x}{2x} = 1 - \frac{\sqrt{2}}{2} \approx 1 - 0.707 = 0.293 = 29.3\%.$$

The closest of the answer choices is 30%.

2017B

7. **Answer (C):** Let $2d$ be the distance in kilometers to the friend's house. Then Samia bicycled distance d at rate 17 and walked distance d at rate 5, for a total time of

$$\frac{d}{17} + \frac{d}{5} = \frac{44}{60}$$

hours. Solving this equation yields $d = \frac{17}{6} = 2.833\ldots$. Therefore Samia walked about 2.8 kilometers.

2013B

8. **Answer (B):** Let D equal the distance traveled by each car. Then Ray's car uses $\frac{D}{40}$ gallons of gasoline and Tom's car uses $\frac{D}{10}$ gallons of gasoline. The cars combined miles per gallon of gasoline is

$$\frac{2D}{\left(\frac{D}{40} + \frac{D}{10}\right)} = 16.$$

2014B

8. **Answer (E):** The truck travels for $3 \cdot 60 = 180$ seconds, at a rate of $\frac{b}{6t} \cdot \frac{1}{3}$ yards per second. Hence the truck travels $180 \cdot \frac{b}{6t} \cdot \frac{1}{3} = \frac{10b}{t}$ yards.

2006B

9. **(B)** Francesca's 600 grams of lemonade contains $25 + 386 = 411$ calories, so 200 grams of her lemonade contains $411/3 = 137$ calories.

2017A

9. **Answer (C):** Note that Penny is going downhill on the segment on which Minnie is going uphill, and vice versa. Minnie needs $\frac{10}{5}$ hours to go from A to B, $\frac{15}{30}$ hours to go from B to C, and $\frac{20}{20}$ hours to go from C to A, a total of $3\frac{1}{2}$ hours. Penny's time is $\frac{20}{30} + \frac{15}{10} + \frac{10}{40} = 2\frac{5}{12}$ hours. It takes Minnie $3\frac{1}{2} - 2\frac{5}{12} = 1\frac{1}{12}$ hours, which is 65 minutes, longer.

2010B

10. **Answer (C):** Let t be the number of minutes Shelby spent driving in the rain. Then she traveled $20\frac{t}{60}$ miles in the rain, and $30\frac{40-t}{60}$ miles in the sun. Solving $20\frac{t}{60} + 30\frac{40-t}{60} = 16$ results in $t = 24$ minutes.