14

FRACTIONS

2008B 6. **Answer (C):** Because $AB + BD = AD$ and $AB = 4BD$, it follows that $BD = \frac{1}{5} \cdot AD$. By similar reasoning, $CD = \frac{1}{10} \cdot AD$. Thus

$$BC = BD - CD = \frac{1}{5} \cdot AD - \frac{1}{10} \cdot AD = \frac{1}{10} \cdot AD.$$

2011B 6. **Answer (A):** Let $x$ be Casper's original number of candies. After the first day he was left with $x - (\frac{1}{3}x + 2) = \frac{2}{3}x - 2$ candies. On the second day he ate $\frac{1}{3}(\frac{2}{3}x - 2)$ candies, gave away 4 candies, and was left with 8 candies. Therefore

$$\frac{2}{3}x - 2 - \left(\frac{1}{3}\left(\frac{2}{3}x - 2\right) + 4\right) = 8.$$

Solving for $x$ results in $x = 30$.

OR

Before giving 4 candies to his sister, Casper had 12. This was $\frac{2}{3}$ of the number he had after the first day, so he had 18 after the first day. Before giving 2 candies to his brother, he had 20, and this was $\frac{2}{3}$ of the number he had originally. Therefore he had 30 candies at the beginning.

2014B

6. **Answer (C):** The special allows Orvin to purchase balloons at $\frac{1+\frac{2}{3}}{2} = \frac{5}{6}$ times the regular price. Because Orvin had just enough money to purchase 30 balloons at the regular price, he may now purchase $30 \cdot \frac{6}{5} = 36$ balloons.

2002B

7. **(E)** The number $\frac{1}{2}+\frac{1}{3}+\frac{1}{7}+\frac{1}{n}$ is greater than 0 and less than $\frac{1}{2}+\frac{1}{3}+\frac{1}{7}+\frac{1}{1} < 2$. Hence,

$$\frac{1}{2}+\frac{1}{3}+\frac{1}{7}+\frac{1}{n} = \frac{41}{42}+\frac{1}{n}$$

is an integer precisely when it is equal to 1. This implies that $n = 42$, so the answer is (E).

2012A

7. **Answer (C):** The ratio of blue marbles to red marbles is 3 : 2. If the number of red marbles is doubled, the ratio will be 3 : 4, and the fraction of marbles that are red will be $\frac{4}{3+4} = \frac{4}{7}$.

2014B

9. **Answer (A):** Note that

$$2014 = \frac{\frac{1}{w}+\frac{1}{z}}{\frac{1}{w}-\frac{1}{z}} = \frac{\frac{w+z}{wz}}{\frac{z-w}{wz}} = \frac{w+z}{z-w}.$$

Because $\frac{w+z}{z-w} = -\frac{w+z}{w-z}$, the requested value is $-2014$.