1. $\boxed{B}$. Use harmonic mean to calculate the average because the different speeds are over the same distance, we have

$$R = \frac{2}{\frac{1}{R_1} + \frac{1}{R_2}} = \frac{2}{\frac{1}{30} + \frac{1}{40}} = \frac{240}{7} \approx \boxed{34} \text{ mph.}$$

Remark: The distance of 120 miles given are not needed in this calculation unless you forgot about harmonic mean. In which case, you can calculate the total hours of the trip: 4 hours from A to B and 3 hours from B to A. The rate is then $\frac{2\times 120}{3+4} = 34$ mph.

2. $\boxed{B}$. Since all three rates cover the same distance, we have

$$RT = (R + \frac{1}{2}) \cdot \frac{4}{5}T = (R - \frac{1}{2})(T + \frac{5}{2})$$

From $RT = (R + \frac{1}{2})$, we solve for R and get $R = 2$ mph.

Plug $R = 2$ into $RT = (R - \frac{1}{2})(T + \frac{5}{2})$ and solve for T, we have

$$2T = (2 - \frac{1}{2})(T + \frac{5}{2}) \text{ and } T = \frac{15}{2} \text{ h.}$$

Thus, $D = RT = \boxed{15}$ mph.

3. $\boxed{B}$. This is a meeting problem. When the boys meet, they traveled the same amount of time. So, time is the invariant here.

Let R_A be the rate of boy A and R_B be the rate of boy B, we have $R_B = R_A + 4$.

When they meet, boy A traveled $60 - 12 = 48$ miles and boy B traveled $60 + 12 = 72$ miles. Thus,

$$\frac{48}{R_A} = \frac{72}{R_A + 4}, \text{ Solve for } R_A = \boxed{8 \text{ mph}}.$$

4. $\boxed{B}$. The invariant here is the same distance that the stone and sound traveled. Let t be the time of the stone, we have

$$1120(7.7 - t) = 16t^2, \text{ solve the quadratic equation, we have } t = 7 \text{ s.}$$

Thus, $y = 16 \times 7^2 = \boxed{784 \text{ ft.}}$.

$$\frac{48}{R_A} = \frac{72}{R_A + 4}, \text{ Solve for } R_A = \boxed{8 \text{ mph}}.$$

5. $\boxed{B}$. The invariant here is the same distance that the stone and sound traveled. Let t be the time of the stone, we have

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$$\frac{48}{R_A} = \frac{72}{R_A + 4}, \text{ Solve for } R_A = \boxed{8 \text{ mph}}.$$

6. $\boxed{\text{A}}$. $R_1 = \frac{150}{3\frac{1}{2}} = 45$ mph. $R_2 = \frac{150}{4\frac{1}{6}} = 36$ mph.

$$R = \frac{2}{\frac{1}{R_1} + \frac{1}{R_2}} = \frac{2}{\frac{1}{45} + \frac{1}{36}} = 40 \text{ mph.}$$

Thus, $45 - 40 = 5$ mph.

7. $\boxed{\text{B}}$. It takes George and Henry $1\frac{1}{2}$ minutes to cover the length of the pool. When they meet the second time, they cover another 2 times the length of the pool for a total of 3 minutes. Therefore, the time from the beginning is $3 + 1\frac{1}{2} = \boxed{4\frac{1}{2}}$ minutes.

8. $\boxed{\text{B}}$. The distance is the invariant. Thus,

$$d = R_A 40 = (R_A + R_B)15, \text{ which means } R_B = \frac{5}{3} R_A,$$

$$d = R_A 40 = R_B T = \frac{5}{3} R_A T, \text{ solve for } T \text{ we have } T = \boxed{24} \text{ minutes.}$$

9. $\boxed{\text{C}}$. The first time they meet, they cover one length of the pool. The second time they meet, they cover two types the length of the pool. It takes them $(90 \div (2+3) = 18$ seconds to cover one length of the pool. In 12 minutes, they make $\frac{(12)(60)}{18} = 40$ trips. Thus, the number of time they pass each other is $40/2 = \boxed{20}$.