The graph below is of speed vs. time of three cars (Car $F$, Car $G$, and Car $H$) that are traveling along a highway. The horizontal axis is $t$ (time in hours) and the vertical axis is speed $v$ in miles per hour.

Assume that all three cars are next to each other at time $t = 0$. Let $F(t)$, $G(t)$ and $H(t)$ be the distances traveled by each of the three cars at time $t$.

1. What are the values of $F(0)$, $G(0)$, and $H(0)$?

2. Translation question:

(a) Using ordinary English, explain the meaning of the expression $\int_{3}^{5} g(t) \, dt$.

(b) In terms of $F(t)$, what is $\int_{3}^{5} f(t) \, dt$.

(c) Write the distance traveled by Car H between time $t = 3$ hours and $t = 6$ hours as a definite integral.

(d) Write the distance traveled by Car H between time $t = 3$ hours and $t = 6$ hours in terms of $H(t)$.
3. Using the methods of Worksheet 20, find the approximate numerical value for each of the following:

(a) \( \int_0^5 h(t) \, dt \).  
(b) \( G(5) - G(0) \).  
(c) The distance traveled by Car F between \( t = 6 \) hours and \( t = 8 \) hours.

4. How far apart are cars \( G \) and \( H \) at time \( t = 5 \) hours?

5. (a) Use the facts that \( F(0) = 0 \) and \( f(t) \) is constant to find the formula for \( F(t) \). (b) Graph \( F(t) \) on the blank grid below.

6. (a) Find the formula for \( g(t) \). (b) Then use that formula and the fact that \( g(t) \) is linear to find a formula for \( G(t) \). (c) Graph \( G(t) \) on the blank grid below.

7. (a) Obtain a rough graph of \( H(t) \) as follows: First recall that \( H(0) = 0 \). Now estimate areas to compute \( H(5) - H(0) \), \( H(10) - H(5) \), \( H(15) - H(10) \) and \( H(20) - H(15) \). This gives several points on the graph of \( H(t) \).

(b) The speed of Car \( H \) is given by the formula \( h(t) = \frac{t^2}{2} - 10t + 60 \). Use this formula, to guess the formula for \( H(t) \).

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\begin{align*}
\text{(i)} \quad &\quad 261 = (0)H - (0)H \quad \text{and} \quad 0L = (0)H - (0)H \quad \text{for } (0)H - (0)H = (0)H - (0)H \\
\text{(ii)} \quad &\quad 0L = (0)H - (0)H \quad \text{and} \quad 261 = (0)H - (0)H \quad \text{for } (0)H - (0)H = (0)H - (0)H \\
\text{(iii)} \quad &\quad 18 \times (0)H = (0)H - (0)H \quad \text{for } (0)H - (0)H = (0)H - (0)H \\
\text{(iv)} \quad &\quad 9 \times (0)H = (0)H - (0)H \quad \text{for } (0)H - (0)H = (0)H - (0)H \\
\text{(v)} \quad &\quad 9 \times (0)H = (0)H - (0)H \quad \text{for } (0)H - (0)H = (0)H - (0)H \\
\text{(vi)} \quad &\quad 100 \times (0)H = (0)H - (0)H \quad \text{for } (0)H - (0)H = (0)H - (0)H \\
\text{(vii)} \quad &\quad 100 \times (0)H = (0)H - (0)H \quad \text{for } (0)H - (0)H = (0)H - (0)H \\
\text{(viii)} \quad &\quad 100 \times (0)H = (0)H - (0)H \quad \text{for } (0)H - (0)H = (0)H - (0)H \\
\text{(ix)} \quad &\quad 100 \times (0)H = (0)H - (0)H \quad \text{for } (0)H - (0)H = (0)H - (0)H \\
\text{(x)} \quad &\quad 100 \times (0)H = (0)H - (0)H \quad \text{for } (0)H - (0)H = (0)H - (0)H \\
\text{(xi)} \quad &\quad 100 \times (0)H = (0)H - (0)H \quad \text{for } (0)H - (0)H = (0)H - (0)H \\
\end{align*}
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