**Straight Line Motion - Revisited - CalcAB**

Given the velocity of an object in ft/sec, find the displacement and distance traveled in the given time interval.

1. \( v(t) = 12 - 3t \) \([0, 5]\)
2. \( v(t) = t^2 - 10t + 16 \) \([0, 6]\)

Given the acceleration of an object in ft/sec\(^2\) and its initial velocity, find the displacement and distance traveled in the given time interval.

3. \( a(t) = 4t, v(0) = -8 \) \([0, 3]\)
4. \( a(t) = 6\sin t, v(0) = -9 \) \([0, \pi]\)

5) When a model rocket is launched, the propellant burns for a few seconds, accelerating the rocket upward. After burnout the rocket coasts upward for awhile and then begins to fall. A small explosive charge pops out a parachute while the rocket is on its way down. The parachute slows the rocket to keep it from smashing when it lands. The velocity function is given below. Using your calculator, sketch it. Questions a through g should be answered by looking at your graph. Question h) and i) need graphing calculators.

\[
f(t) = \begin{cases} 
50t^2, & t \leq 2 \\
260 - 30t, & 2 < t \leq 15 \\
-7.6(t - 20)^2, & t > 15 
\end{cases}
\]

a. For how many seconds did the engine burn? _____
b. How fast was the rocket going when the engine stopped? _____
c. When did the rocket reach its highest point? _____
d. When did the parachute pop out? _____
e. How long did the rocket fall before the parachute opened? _____
f. How fast was the rocket falling when the parachute opened? _____
g. When was the rocket’s acceleration the greatest? _____
h. Assuming the rocket does land how far does it travel? _____
i) At what time after launch did the rocket land? _____