

Directions: Work in groups of 2-3. You may need extra paper.

1 .

Here, we continue with the analysis of the distance $d(t) = 8(t^3 - 6t^2 + 12t)$ of a car, where d is in miles and t is in hours.

1. Draw a graph of $d(t)$ from $t = 0$ to $t = 3$.

2. Does the car ever stop?

3. What is the average velocity over $[1, 3]$? over $[1.5, 2.5]$? over $[1.9, 2.1]$?

4. Estimate the instantaneous velocity at $t = 2$. Give a physical interpretation of your answer.

2 Ned runs a peculiar gas station where he gives the customers a break for buying more gasoline. He charges according to the formula $P = f(x) = 10\sqrt{x}$, where P is the price in dollars for x gallons of gasoline.

(a) Calculate $f'(a)$. Write a sentence that describes the meaning of $f'(a)$.

(b) How much does the next gallon of gasoline cost after you've already bought 2 gallons?

(c) How much does the next 1/10 gallon of gasoline cost after you've already bought 2 gallons?

(d) What is $f'(2)$? (Give a number.) What is the relationship between $f'(2)$ and your answers to (b) and (c)?

(e) What are the units associated with the number $f(4)$? What are the units associated with $f'(4)$?

3 The graph of $y = g(x)$ is shown.

Place a \bullet on the x -axis at each location where the derivative is zero.

Place an \times on the x -axis at the location where the derivative is largest.

Place an \uparrow on the x -axis at each location where the derivative is undefined.

