

## The Derivative Function and its Interpretations

- Let  $F(x) = \frac{80}{x^2}$  be the force between two objects separated by a distance  $x$ , where  $x$  is measured in meters and  $F(x)$  is measured in Newtons.
  - Calculate  $F'(x)$  using the power rule.
  - Determine  $F'(10)$ .
  - What is the practical meaning of  $F'(10)$ ?
- Let  $V(t)$  be the volume, in gallons, of the water in the bathtub as a function of time in seconds.
  - What are the units of  $V'(t)$ ?
  - What does  $V'(t)$  indicate in practical terms?
  - What does it mean if  $V'(t)$  is negative?
  - Sketch a possible  $V(t)$  that corresponds to someone filling up the tub, taking a bath, and then draining the tub.
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- Let  $s(t)$  be the height of a sunflower plant, in centimeters, as a function of time. Let  $t$  be measured in days since the seed germinates.
  - What is the meaning of  $s(12) = 7.8$ ?
  - What are the units of  $s'(t)$ ?
  - What is the meaning of  $s'(12) = 1.5$ ?
  - Based on the above, estimate the value of  $s(14)$ . Why is your answer only an estimate?
  - Using your knowledge of sunflowers, sketch a possible graph for  $s(t)$ .
  - Sketch a possible graph for  $s'(t)$ .
- Let  $f(r)$  give the area in  $\text{cm}^2$  of a pizza as a function of its radius  $r$  in cm.
  - Algebraically determine the derivative of  $f(r)$  at  $r = 8$ .
  - Algebraically determine the derivative of  $f(r)$  as a function of  $r$ .
  - What is the meaning of  $f(5)$ ?
  - What is the meaning of  $f'(6)$ ?
  - Why is  $f'(6) > f'(5)$ ?
- Let  $g(v)$  be the fuel efficiency in mpg of a car traveling at  $v$  miles per hour. What is the practical meaning of the statement:

$$g'(55) = -0.54 ?$$