Beginning in the first cell, find the answer. Hunt for your answer, mark that cell #2 and find the next answer. Proceed in this manner until you complete the circuit. NO TECHNOLOGY IS ALLOWED!

| | |
|---|---|
| #__1___ Answer: -12<br><br>Find the slope of the tangent line to the equation at the $x$ location specified.<br><br>$y = x^2 - 2x$ at $x = 0$ | #____ Answer: -92<br><br>A particle moves along the $x$-axis so that its position at any time $t \geq 0$ is given by the function $x(t) = t^3 - 10t + 2$, where $x$ is measured in feet and $t$ is measured in seconds. Find the displacement during the first 2 seconds. |
| #____ Answer: 5<br><br>(Refer to Figure 2) At what time does the particle begin to move right? | #____ Answer: -1/2<br><br>(Refer to Figure 2) What is the acceleration of the particle on the interval $4 < t < 7$? |
| #____ Answer: 1<br><br>Find the derivative of the function at the $x$ location specified.<br><br>$y = \frac{x}{3x-1}$ at $x = 0$ | #____ Answer: 3<br><br>(Refer to Figure 2) Find the 2nd point on the graph at which the particle's speed increases in the positive direction. |
| #____ Answer: -15<br><br>(Refer to Figure 2) Find the 1st point on the graph at which the particle's speed is increasing. | #____ Answer: -2<br><br>Find the slope of the tangent line to the equation at the $x$ location specified.<br><br>$y = 3x^3 - 4x^2$ at $x = 1$ |
| #____ Answer: 4<br><br>Find the slope of the tangent line to the equation at the $x$ location specified.<br><br>$y = x^2(3x + \frac{1}{x^3})$ at $x = \frac{1}{3}$ | #____ Answer: -8<br><br>Find the derivative of the function at the $x$ location specified.<br><br>$y = \frac{1}{\sqrt{x}}$ at $x = 1$ |

| | |
|---|---|
| #____ Answer: 0<br><br>(Refer to Figure 3): Find the average acceleration of the rocket over the time interval $0 \leq t \leq 80$ seconds. | #____ Answer: 2<br><br>(Refer to Figure 1) At what value of $t$ does the bug change direction? |
| #____ Answer: 17<br><br>(Refer to Figure 1) At what time does the bug begin to move at a constant rate? | #____ Answer: 7<br><br>(Refer to Figure 3): Find an estimate for the acceleration at $t = 35$ seconds. |
| #____ Answer: $3/5$<br><br>The position of a particle on the x-axis is given by $x(t) = -5t^2$.<br><br>What is the average velocity for $0 \leq t \leq 3$? | #____ Answer: -1<br><br>A particle moves along the $x$-axis so that its position at any time $t \geq 0$ is given by the function $x(t) = t^3 - 10t + 2$, where $x$ is measured in feet and $t$ is measured in seconds. Find the instantaneous velocity at $t = 3$ seconds. |
| #____ Answer: $1/2$<br><br>A particle moves along the $x$-axis so that its position at any time $t \geq 0$ is given by the function $x(t) = \frac{1}{4}t^4 - 64t + 2$, where $x$ is measured in feet and $t$ is measured in seconds. At what value does the particle change direction? | #____ Answer: $-2/3$<br><br>*In a scene from "The Martian" Matt Damon shoots a flare straight up into the sky. The height (in feet) of the flare after t seconds is given by<br><br>$$s(t) = -3t^2 + 100t + 3$$<br><br>What is the velocity of the flare when it is moving toward the ground and its position is equal to 131 feet? |

*I made this up. ☺

Figure 1: A bug begins to crawl up a vertical wire at time $t = 0$. The velocity, $v$, of the bug at time $t, 0 \leq t \leq 8$, is given by the function whose graph is shown below.

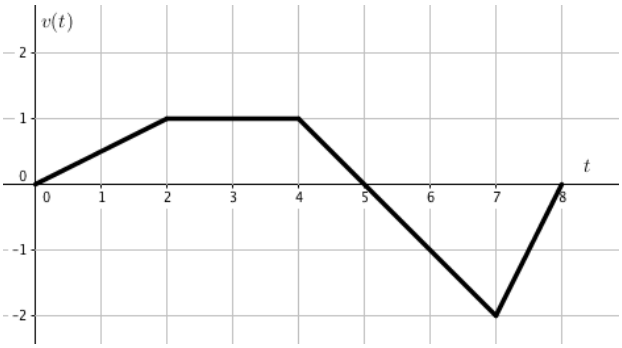


Figure 2: The figure graphed below shows the velocity of a particle moving along a coordinate line.

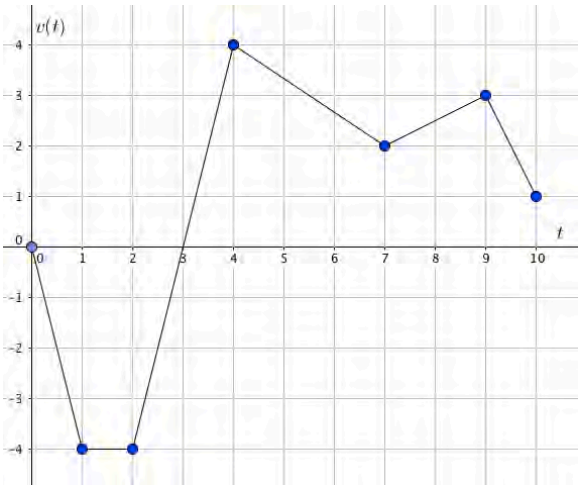


Figure 3: The Saturn VII rocket is launched upward from an initial height of 0 feet at time $t = 0$. The velocity of the rocket is recorded for several selected values of $t$ over the interval $0 \leq t \leq 80$ seconds as shown in the table below.

| $t$ (sec) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 |
|---|---|---|---|---|---|---|---|---|---|
| $v(t)$ (ft/sec) | 9 | 14 | 22 | 29 | 35 | 40 | 44 | 47 | 49 |