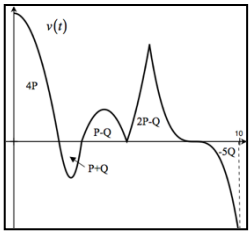
DIGITLE – AB CALCULUS
Puzzle 125 – Motion Revisited

Directions: The first 5 problems have single digit answers. The 6th problem has a 5-digit answer (counting leading zeros if present). You have a choice: solve the easier single-digit answer problems or tackle the more difficult 5-digit answer. Once you have done that, attempt to solve the puzzle by entering the following url on your computer, tablet, or phone: https://mastermathmentor.com/mmm/digitle.ashx.
The correct puzzle answer will be the digits of your answer(s) scrambled. Use the following interpretation. You get 6 tries.

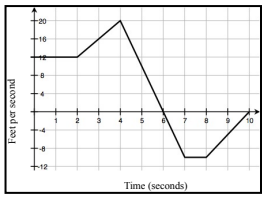
Green : the digit is in the answer and is in the correct spot.
Yellow: the digit is in the answer but is not in the correct spot.
Grey : the digit is not in the answer.

Single Digit Answers:

1) A particle moves along the x- axis with velocity $v(t)$ for $0 \le t \le 10$. The graph of $v(t)$ is shown to the right with the positive areas as functions of P and Q. At $t = 0$, the particle is at position $Q - P$ which is equal to 5. If the particle is at position 65 after 10 seconds, what is the value of P?



2) An office building has elevators that start at the ground floor, goes up to the first floor, the second floor, and so on. One of the elevators at time t measured in feet per second has a velocity as shown in the figure to the right. At time $t = 0$, it is passing the first floor. If there are 10 feet to a floor, at what floor will it be passing at $t = 10$ seconds?

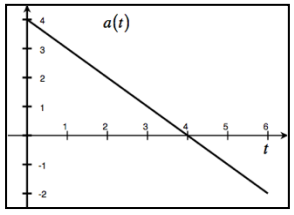


3) A particle moves along the x-axis so that its velocity at any time $t \ge 0$ is given by $v(t) = 8\sin(t/3)\cos(t/3)$. If the initial position of the particle is –9, find the position of the particle at $t = \pi$.

4) Training for space travels means being able to endure constant and dramatic changes in velocity. Astronauts train on a device to simulate that. They sit on a car on a track which moves forwards and backwards and changes direction very quickly. The table to the right shows their velocity in meters/sec over 60 seconds. To the nearest *kilometer*, how far do they travel in that time if the result is computed by the trapezoid rule?

t sec	0	5	10	15	20	25	30	35	40	45	50	55	60
$v(t)$ m/sec	0	30	65	40	0	–60	–45	35	–30	–30	25	–30	–20

5) A particle is moving along a straight line. The graph of the acceleration of the particle, $a(t)$, is shown by the figure to the right for $0 \le t \le 6$. If $v(0) = -11$, what is the speed of the particle at $t = 6$?



5-Digit Answer:

6) A particle moves along the x-axis so that its velocity at any time $t \ge 0$ is given by $v(t) = 468t - 468t^3$. What is the difference between the distance the particle travels and its displacement for $0 \le t \le 4$?