

AP[®] Calculus

Particle Motion and More



Self-Grading!

Particle Motion, Mean Value
& Average Value Circuit
© Flamingo Math

Particle Motion, Mean Value & Average
Value Digital Circuit

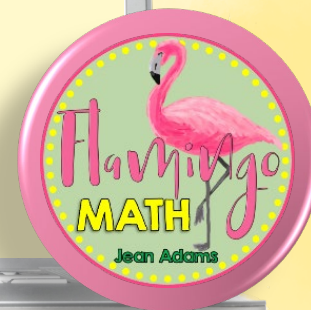
* Required

Name *

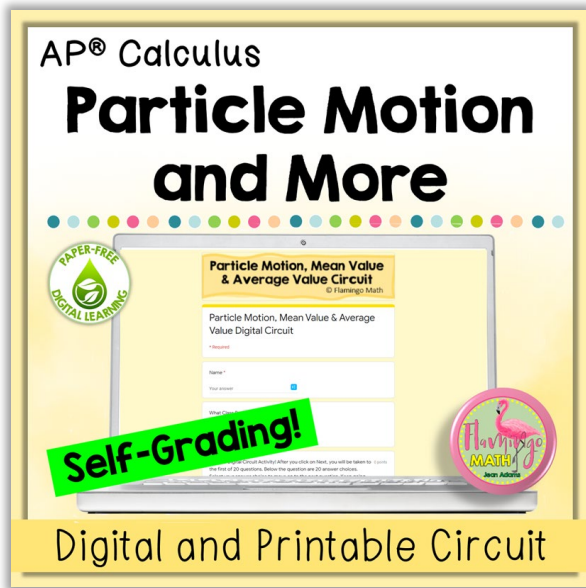
Your answer 

What Class Do You Take?

Digital Circuit Activity! After you click on Next, you will be taken to the first of 20 questions. Below the question are 20 answer choices. Select your answer choice to move on to the next question. Keep going!



Digital and Printable Circuit



Particle Motion, Mean Value & Average Value Digital Circuit-Training with Google Forms™

Your AP Calculus students will have 20 self-grading questions related to on topics covering Particle Motion, Mean Value Theorem and Average Value of a Function.

Students will answer prompts for particle motion, mean value and average value that include:

- Topic 4.1 Interpreting the Meaning of the Derivative in Context
- Topic 4.2 Straight-Line Motion: Connecting Position, Velocity, and Acceleration
- Topic 4.3 Rates of Change in Applied Contexts Other Than Motion
- Topic 5.1 Using the Mean Value Theorem
- Topic 5.2 Extreme Value Theorem, Global Versus Local Extrema, and Critical Points
- Topic 5.9 Connecting a Function, Its First Derivative , and its Second Derivative
- Topic 8.1 Finding the Average Value of a Function on an Interval
- Topic 8.2 Connecting Position, Velocity, and Acceleration of Functions Using Integrals

**NOTE: You and your students must have a free Google account in order to access and interact with the activity.
It is not necessary to use Google Classroom to use this resource.**

GOOGLE FORMS™ are editable. This offers you flexibility to add, delete, or edit questions. You can also adjust the point value for each question to meet your needs.



Particle Motion, Mean Value & Average Value Circuit

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Particle Motion, Mean Value & Average Value Digital Circuit

* Required

Name *

Your answer

What Class Period? *

Choose

This is a Digital Circuit Activity! After you complete the first of 20 questions, you will be able to see your score. Select your answer choice to continue until you end on the "Congratulations" screen.

☐ Ok, Let's GO!

Question #1

Question #1 *

Let g be the function given by $g(x) = 2x^3 - 3x^2 + 4x - 1$. For what value of x is the slope of the tangent line to the graph of g at $(x, g(x))$ equal to 0?

$$-1$$

☐ U

☐ K

$$0.261302$$

☐ M

☐ T

Question #14

Question #14 *

1 point

The position of an object is given by $x(t) = 3t^4 - 8t^3 - 6t + 2$ for $t > 0$. Find the velocity where acceleration is zero.

$$\frac{1}{-1}$$

$$2.52025$$

☐ U

☐ Q

$$1.29763$$

$$\frac{92}{3}$$

☐ U

☐ Q

$$\frac{92}{3}$$

☐ M

☐ T

Name: _____ Date: _____ Period: _____

Circuit Training - Particle Motion, Mean Value & Average Value

Directions: Begin in Cell #1, evaluate the following problem. Search for your answer and mark that cell #2. Continue in this manner until you finish the circuit.

Answer: $\frac{7}{2}$

#1

Let g be the function given by $g(x) = x^3 \ln x$. For what value of x is the slope of the line tangent to the graph of g at $(x, g(x))$ equal to 3?

Answer: $\frac{1}{e-1}$

The velocity of a particle moving along the y -axis is given by $v(t) = 6t^2 - 6t + 6$, $t \geq 0$. The position of the particle at time $t = 0$ is 0. Find the position of the particle at time $t = 2$.

Answer: 14

The polynomial $g(x) = x^3 + 2x^2 - 2x - 3$ is differentiable everywhere. Find the value(s) on the interval $[-3, 1]$ guaranteed by the Mean Value Theorem.

Answer: 5.18557

The velocity $v(t)$ of a particle moving along the x -axis for time $t > 0$ is given by $v(t) = 3t^3 - t^2 + 5$. Find the average velocity from $t = 1$ to $t = 3$.

Answer: 50

Find the average value of $g(x) = \frac{1}{2}x + \cos x$ on the interval $[\pi, 2\pi]$

Answer: 2.35619

The position of a particle is given by $s(t) = 3t^4 - 8t^3 - 6t + 2$, $t \geq 0$. Find the velocity when the acceleration is zero.

Answer: 520

Find the average value of the function $h(x) = \frac{1}{2}x^2$ from $x = 1$ to $x = e$.

Answer: -

If $f(1) = 5$ and $f'(x) \geq 1$ for $1 \leq x \leq 4$. What is the least value of $f(4)$?

Answer: 0.5207

Find the average value of the function $h(x) = \frac{1}{2}x^2$ from $x = 1$ to $x = e$.

Answer: $\frac{1}{3}$

Answer: 0.261302

A particle moves along the x -axis so that its position at any time $t \geq 0$ is given by $x(t) = 4t^2 - 28t^2 + 48t$. At what time(s) t is its average velocity zero?

The table for the acceleration of a particle from $0 \leq t \leq 12$ seconds is below. If at $t = 0$ is 6 ft per second, find the approximate velocity, in feet, at $t = 12$ seconds using a midpoint Riemann sum with 3 subdivision of equal length.

t (sec)	0	2	4	6	8	10	12
$a(t)$ ($\frac{\text{ft}}{\text{sec}^2}$)	1	2	3	4	5	5	3

Answer: $-\frac{182}{9}$

Find the average rate of change on $[a, b]$ for the function $y = x^3$.

Answer: $\{-1.8685, 0.5351\}$

The position of a particle moving along the x -axis at time $t > 0$ is given by $x(t) = \ln t$. Find the average velocity of the particle for $1 \leq t \leq e$

Answer: 4.0465

What is the average value of the function $g(x) = e^x \sin x$ on the closed interval $[1, \pi]$?

Answer: 0.5207

Find the average rate of change of $f(x)$ from $x = 1$ to $x = 9$ if $f'(x) = \frac{3}{x^2}$

Answer: 1.4549

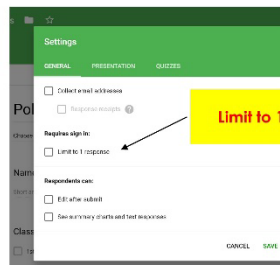
Find the x value on the interval $[-6, 0]$ for which Rolle's Theorem applies to $g(x) = x\sqrt{x+6}$

SELF-GRADING

First, The Basics:

- 1.) Have access to the Internet.
- 2.) Have a Google account – this is FREE and easy to create.
- 3.) Every student who uses the activity needs their own Google Account and the Google Forms App.
- 4.) Students can submit their finished school is one-to-one. Using Google is not a requirement.
- 5.) If you want to make a hard copy

Click the Gear and Check S



Changing Point Values:

Every question is set at a value of 1 point each.

16 questions show total points: Total points: 16

To alter the point values:

- 1.) Click on any question.
- 2.) Click ANSWER KEY (located at the bottom of the question).
- 3.) Click on arrow up/down to change the point value.

Self-Grading

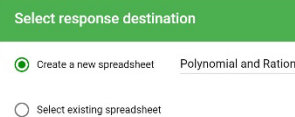
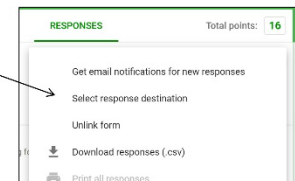
From your teacher copy you can see the GOOGLE SHEET to track student data.

On the **RESPONSES** TAB:

Click the three vertical dots (snowman) to begin the set-up for creating a spreadsheet.

Self-Grading Set-Up & Spreadsheet:

Click **SELECT RESPONSE DESTINATION**. Then create a new spreadsheet. This will create the spreadsheet and will save by default to your GOOGLE DRIVE Folder

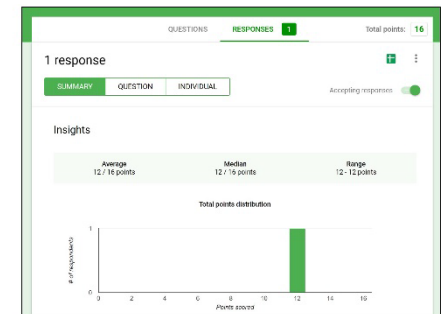


To view the student responses on the spreadsheet click here:

Viewing Student Responses:

Teachers can check responses through the **RESPONSE** Tab using a bar graph **SUMMARY**, a **QUESTION** report or an **INDIVIDUAL** student report.

If you choose to create a GOOGLE SHEET, the data will also be collected for students in the **SPREADSHEET**, which will allow sorting and an overview of all responses as shown below.



Timestamp	Score	Name	Class Period	1) Which of the following
10/28/2019 7:54:10	11 / 16	Jean Adams	1st period	D

Low Prep



Step-by-Step Instructions