

AP[®] Calculus AB/BC

Differential Equations



2.

Shown below is the slope field for which differential equation?

[A] $y' = x - y$

[B] $y' = 1 - x$

[C] $y' = x + y$

[D] $y' = 1 - y$

A slope field on a Cartesian coordinate system. The slopes are constant for any given x-value, indicating a differential equation of the form y' = f(x). The slopes are positive for x < 1 and negative for x > 1, with a horizontal line of zero slopes at x = 1.

6.

The slope field for the differential equation $\frac{dy}{dx} = \frac{x^2y - y^2x}{4x + y}$ will have horizontal segments when

[A] $x = 0, y = 0$, or $y = x$

[B] $x = 0$ or $y = 0$ only

[C] $y = x$ only

[D] $y = -4x$ only

A slope field on a Cartesian coordinate system. The slopes are zero along the line y = x, indicating a differential equation where the numerator of the slope function is zero when y = x.

3.

A population grows according to the equation $P = 5000 - 3200e^{-0.145t}$ for $t \geq 0$, where t is measured in years. As time goes forward, the population will approach a limiting value. During how many years will the population reach half of this limiting value?

[A] second

[B] third

[C] fourth

[D] seventh

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Digital and Printable Practice

Digital & Printable Differential Equations

This set of **12 DIGITAL TASK CARDS** is designed for students in AP CALCULUS AB, BC, or College Calculus. Students can interact with the activity on their one-to-one devices in a variety of ways. This 12-question activity is in multiple choice format with large task cards presented on **Google Forms** for a self-grading set.

About The Product

Differential Equations for Google Classroom™

Students will answer prompts for differential equations that include:

- ✓ Growth and Decay
- ✓ Half-life
- ✓ Separation of Variables
- ✓ Solving differential equations for particular solutions
- ✓ Find characteristics of functions given a differential equation
- ✓ Identify a slope field given a differential equation
- ✓ Identify a differential equation given a slope field

There is also a set of blackline master mini-task cards to create a paper and pencil lesson if you are in need of this feature, along with a student recording sheet if you want to collect student work, and an answer key.



1.

Which of the following is the solution to $y' = 3y$ with initial condition $y(0) = 7$?

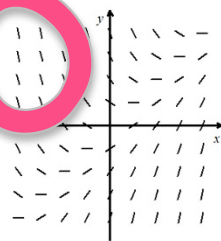
- [A] $y = x^2 + 7$ [B] $y = 3e^x + 7$
 [C] $y = 7e^{3x}$ [D] $y = 3e^{3x} + 7$

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2.

Shown below is the slope field for which differential equation?

- [A] $y' = x$
 [B] $y' = 1 - x$
 [C] $y' = x + y$
 [D] $y' = 1 - y$



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3.

A population grows according to the equation $P(t) = 5000 - 3200e^{-0.145t}$ for $t \geq 0$, where t is measured in years. As time goes forward, the population will approach a limiting value. During which year will the population reach half of this limiting value?

- [A] second [B] third
 [C] fourth [D] seventh

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4.

If $\frac{dy}{dx} = \frac{x}{y}$ and $y(2) = 4$, then

- [A] $x^2 + y^2 = 6^2$ [B] $y^2 - x^2 = 10$
 [C] $x^2 - y^2 = -12$ [D] $y^2 - x^2 = 12$

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5.

The amount of a radioactive material decays according to the equation $\frac{dy}{dt} = ky$ where k is a constant and time t , is measured in years. If half the amount present will decay in 28 years, what is the value of k ?

- [A] -0.208 [B] -0.025
 [C] -2.639 [D] -19.408

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6.

The slope field for the differential equation $\frac{dy}{dx} = \frac{x}{y}$ have horizontal segments when

- [A] $x = 0$, $y = 0$, or $y = x$
 [B] $x = 0$ or $y = 0$ only
 [C] $y = x$ only
 [D] $y = -4x$ only

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7.

Which of the following is a slope field for the differential equation $\frac{dy}{dx} = 2x + y$

[A]

[B]

[C]

[D]

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8.

If $\frac{dy}{dx} = y \sin x$, then $y = 2$ when $x = 0$, then $y =$

[A] $y = e^{-\cos x} - 2e$

[B] $y = 2 - e^{-\cos x}$

[C] $y = -1 - e^{-\cos x}$

[D] $y = 2e^{\cos x - 1}$

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9.

The amount of bacteria in a culture at any time increases at a ratio proportional to the amount of bacteria present. There are 500 bacteria after the first day and 800 bacteria after the third day. Approximately how many bacteria were present initially?

[A] 382

[B] 395

[C] 1,195

[D] 2,127

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10.

The population of a country is growing at a rate proportional to its population. If the growth rate per year is 2.3% of the current population, how long will it take for the population to double?

[A] 382

[B] 395

[C] 1,195

[D] 2,127

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11.

If $e^y \frac{dy}{dx} = 3x^2$ and $y(1) = 3$, then the particular solution $y(x)$ is

[A] $y = \ln(x^3 + e^3 - 1)$

[B] $y = \ln(x^3) + 3$

[C] $y = x^3 + e^3 - 1$

[D] $y = 3e^{x^3-1}$

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12.

Rainwater runs from a storm flow continuously from a large reservoir at a rate proportional to the amount of water remaining that is $\frac{dw}{dt} = ky$. Initially, there was 10,000 cubic feet of water in the reservoir. At time $t = 4$ hours, 8000 cubic feet of water remained. How much water remained in the tank at time $t = 8$ hours?

[A] 5,778

[B] 6,000

[C] 6,400

[D] 6,458

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Your students can
record answers on a
Google Form for
easy grading.

← Digital Differential Equations ☆

QUESTIONS RESPONSES Total points: 12

3.

A population grows according to the equation $P(t) = 5000 - 3200e^{-0.145t}$ for $t \geq 0$, where t is measured in years. As time goes forward, the population will approach a limiting value. During which year will the population reach half of this limiting value?

[A] second [B] third

[C] fourth [D] seventh

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Question #3 *

☐ A

☐ B

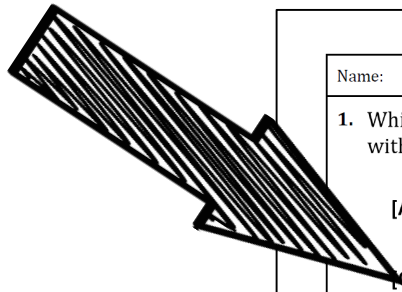
☐ C

☐ D

12 Multiple Choice Task Cards



Blackline Masters, too!



Name: _____	Date: _____
Score: _____	
1. Which of the following is the solution to $y' = 3y$ with initial condition $y(0) = 7$? [A] $y = x^2 + 7$ [B] $y = 3e^x + 7$ [C] $y = 7e^{3x}$ [D] $y = e^{3x} + 7$	2. Shown below is the slope field for which differential equation? [A] $y' = x - y$ [B] $y' = 1 - x$ [C] $y' = x + y$ [D] $y' = 1 - y$
3. A population grows according to the equation $P(t) = 5000 - 3200e^{-0.145t}$ for $t \geq 0$, where t is measured in years. As time goes forward, the population will approach a limiting value. During which year will the population reach half of this limiting value? [A] second [B] third [C] fourth [D] seventh	4. If $\frac{dy}{dx} = \frac{x}{y}$ and $y(2) = 4$, then [A] $x^2 + y^2 = 6^2$ [B] $y^2 - x^2 = 10$ [C] $x^2 - y^2 = -12$ [D] $y^2 - x^2 = 12$

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Differential Equations	
1.	
3.	4.
5.	6.

Student Recording Sheet

