



# Differential Equations

Chapter: Applied Mathematics • Level ★★★ • Time: 30 min

SCORE

\_\_\_ / 20

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

## AFTER THIS WORKSHEET YOU CAN

- ✓ Solve  $dy/dt = ky$  (exponential growth/decay).
- ✓ Apply an initial condition.
- ✓ Identify the order of an equation.
- ✓ Interpret growth versus decay from  $k$ .



## Section A • Concept Check

• BEGINNER

$4 \times 1 = 4$

- $dy/dt = 4y$  with  $y(0) = 2$  has solution:
  - ☐ A.  $y = 2e^{4t}$
  - ☐ B.  $y = 4e^{2t}$
  - ☐ C.  $y = 2 + 4t$
  - ☐ D.  $y = 8t$
- $dy/dt = -0.1y$ ,  $y(0) = 50$ , at  $t = 10$  gives about:
  - ☐ A. 18.4
  - ☐ B. 45
  - ☐ C. 5
  - ☐ D. 50
- The order of  $dy/dx = x^2 + 3$  is:
  - ☐ A. first
  - ☐ B. second
  - ☐ C. third
  - ☐ D. zero
- The order of  $d^3y/dx^3 + dy/dx = 2$  is:
  - ☐ A. third
  - ☐ B. first
  - ☐ C. second
  - ☐ D. fourth



## Section B • Problem Solving

• INTERMEDIATE

$2 + 3 \times 3 = 11$

- $dy/dt = ky$  has solution  $y = y_0 e^{_____}$ .
- Negative  $k$  gives \_\_\_\_\_.
- Solve  $dy/dt = 4y$  with  $y(0) = 2$ .  
\_\_\_\_\_
- Solve  $dy/dt = -0.1y$  with  $y(0) = 50$ , and evaluate at  $t = 10$ .  
\_\_\_\_\_
- What is the order of  $dy/dx = x^2 + 3$ ?  
\_\_\_\_\_



## Section C • Challenge

• CHALLENGE

$5$

- What is the order of  $d^3y/dx^3 + dy/dx = 2$ ?  
\_\_\_\_\_

Reflection — the most useful thing I learned: \_\_\_\_\_

A \_\_\_/4   B \_\_\_/11   C \_\_\_/5   Total \_\_\_/20

Teacher's Signature \_\_\_\_\_

Parent's Signature \_\_\_\_\_

ANSWER KEY — FOLD OR CUT BEFORE HANDING OUT

1-A   2-A   3-A   4-A   |   5  $kt$    6 decay   7 =  $y = 2e^{4t}$    8 =  $y = 50e^{-1} \approx 18.4$    9 = First-order   |  
 10 = Third-order