More derivatives and applications Worksheet

AP and College Calculus

Name _____ Date _____

Warm-up

1. For $x^2 + y^2 = 81$, what's $\frac{dy}{dx}$?
   (A) $-\frac{y}{x}$ (B) $2x + 2y$ (C) $\frac{x}{y}$ (D) $-\frac{x}{y}$

2. $y = 7x$ and $\frac{dx}{dt} = 2$. Find $\frac{dy}{dt}$.

3. Find x where $f(x) = -x^2 + 12x$ has its maximum.

4. Find the area under $y = 3$ from $x = 0$ to $x = 7$.

5. What's $\frac{d}{dx}(y^6)$?
   (A) y^5 (B) $6y^5\frac{dy}{dx}$ (C) $\frac{dy}{dx}$ (D) $6y^5$

Practice

6. For $y^2 = 4x$, find $\frac{dy}{dx}$ at $y = 1$.

7. $x^2 + y^2 = 25$. At $(3, 4)$, $\frac{dx}{dt} = 4$. Find $\frac{dy}{dt}$.

8. Find the minimum value of $x^2 - 8x + 16$.

© No Limit Math. Free for personal and classroom use.

9. Find the area between $y = x$ and $y = 0$ from 0 to 12.

10. For $xy = 4$, find the slope at $(1, 4)$.

11. A square's side is 12 and grows at 1 cm/s. How fast is its area growing?

12. A rectangle has perimeter 8. What's its largest area?

13. Find $\int_0^9 2x\,dx$.

Challenge

14. For $x^2 + xy + y^2 = 21$, find the slope at $(1, 4)$.

15. A 13 ft ladder's base moves out at 5 ft/s. How fast does the top fall when the base is 5 ft out? Give a positive number.

16. A farmer has 68 m of fence for three sides of a rectangle along a wall. What's the largest area?

17. Find the area between $y = 16$ and $y = x^2$. It's $\frac{4}{3}k$ with $k = 4^3$. Give k.

18. Find the slope of $x^3 + y^3 = 35$ at $(3, 2)$.

© No Limit Math. Free for personal and classroom use.

More derivatives and applications Worksheet: Answer Key

AP and College Calculus

1. (D) $-\dfrac{x}{y}$

   $2x + 2yy' = 0$.

2. 14

   Multiply the rates.

3. 6

   $-2x + 12 = 0$.

4. 21

   It's a rectangle.

5. (B) $6y^5 \dfrac{dy}{dx}$

   Power rule, then the chain rule.

6. 2

   $2yy' = 4$.

7. -3

   $2xx' + 2yy' = 0$.

8. 0

   $x = 4$, then substitute.

9. 72

   A triangle, or $\int_0^{12} x\,dx$.

10. -4

    $y' = -\dfrac{y}{x}$.

11. 24

    $\dfrac{dA}{dt} = 2s\dfrac{ds}{dt}$.

12. 4

    It's a square with side 2.

13. 81

    $[x^2]_0^9$.

14. $-\dfrac{2}{3}$

    $2x + y + xy' + 2yy' = 0$, so $y' = -\dfrac{2x + y}{x + 2y}$.

15. $\dfrac{25}{12}$

    $y = 12$. $5x' + 12y' = 0$.

16. 578

    $A = w(68 - 2w)$, so $w = 17$.

17. 64

    $\int_{-4}^{4}(16 - x^2)\,dx = \frac{4}{3}4^3$.

18. $-\frac{9}{4}$

    $3x^2 + 3y^2y' = 0$.

Stuck on something? Book a free 20-minute consultation at nolimitmath.com/book.