LESSON MAKER PRO

Derivative Power Moves

Use the power rule to find rates of change.

HIGH SCHOOL · MA.912.C.2

MA.912.C.2 "Develop an understanding for and determine derivatives."

NAME _____ DATE _____

POWER RULE

For a term ax^n, multiply a by n, then subtract 1 from the exponent. The derivative of a constant is 0. Find the derivative of each term, then add or subtract the results.

WORKED EXAMPLE

Find the derivative of $f(x) = 17x^{12} - 19$.

1. Multiply 17 by 12: 204.
2. Subtract 1 from the exponent: $204x^{11}$.
3. The derivative of -19 is 0.
4. $f'(x) = 204x^{11}$.

Answer: $204x^{11}$

PRACTICE 6 problems

1 Find the derivative of $y = 5x^6$.

ANSWER _____

2 Find the derivative of $y = x^8$.

ANSWER _____

3 Find the derivative of $f(x) = 9x^5 + 2x$.

ANSWER _____

4 Find the derivative of $g(x) = 8x^4 - 5x^2 + 1$.

ANSWER _____

5 Find the derivative of $h(x) = 3x^7 - 4$.

ANSWER _____

6 Find the derivative of $p(x) = x^9 - 5x^3 + 8$.

ANSWER _____

APPLY IT Show your work

1 A video creator models the number of followers gained after posting a video with $S(x) = x^3 + 5x^2$, where x is the number of hours after posting. What is the instantaneous follower-gain rate at x = 2?

WORK SPACE

ANSWER _____

2 A school club models its net profit from selling custom phone cases with $P(x) = x^4 - 8x^2 + 6x$, where x is the number of sales batches and P is measured in dollars. What is the marginal profit at x = 1?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Find $q'(x)$ for $q(x) = (x^2 + 3)(x^3 - 2)$. You may use the product rule or expand first.

WORK SPACE AND ANSWER

ANSWER KEY

Derivative Power Moves

HIGH SCHOOL · MA.912.C.2

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find the derivative of $y = 5x^6$.	**$30x^5$**
2	Find the derivative of $y = x^8$.	**$8x^7$**
3	Find the derivative of $f(x) = 9x^5 + 2x$.	**$45x^4 + 2$**
4	Find the derivative of $g(x) = 8x^4 - 5x^2 + 1$.	**$32x^3 - 10x$**
5	Find the derivative of $h(x) = 3x^7 - 4$.	**$21x^6$**
6	Find the derivative of $p(x) = x^9 - 5x^3 + 8$.	**$9x^8 - 15x^2$**

PART 2 · APPLY IT

1. **32 followers per hour** Find $S'(x) = 3x^2 + 10x$. Substitute $x = 2$ to get $3(2^2) + 10(2) = 32$.
2. **-6 dollars per batch** Find $P'(x) = 4x^3 - 16x + 6$. Substitute $x = 1$ to get $4 - 16 + 6 = -6$.

CHALLENGE

$5x^4 + 9x^2 - 4x$

Accept equivalent algebraic forms, including terms written in a different order. For the word problems, accept the numerical rate with correct equivalent units.