

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

CHALLENGE

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

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

- 32 followers per hour** Find $S'(x) = 3x^2 + 10x$. Substitute $x = 2$ to get $3(2^2) + 10(2) = 32$.
- 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.