

Math

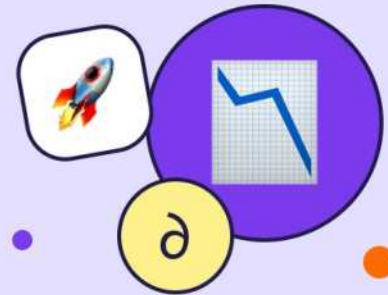
Grade 12

Introduction to derivatives

Find rates of change and slopes of curves with the power rule.



I can differentiate polynomials and interpret the result.



1 ∂ Complete the table

Fill in the empty boxes.

$f(x)$	$f'(x)$
x^3	
$5x^2$	
$4x - 7$	
$2x^4 + x$	
6	

2 🚀 Pick the answer

Circle the right answer.

1. The derivative gives...

☐ A the slope of the tangent

☐ B the area under the curve

☐ C the y-intercept

2. If $f'(x) = 0$ at a point, the tangent there is...

☐ A vertical

☐ B horizontal

☐ C undefined

3. $s(t) = 5t^2$ gives distance in metres. What is the speed at $t = 3$ s?

☐ A 45 m/s

☐ B 15 m/s

☐ C 30 m/s

3 Differentiate

Write $f'(x)$ for each function.

1. $f(x) = x^5$ $f'(x) =$ _____
2. $f(x) = 3x^2 - 4x$ $f'(x) =$ _____
3. $f(x) = x^3 - 2x^2 + x$ $f'(x) =$ _____
4. $f(x) = -4x^3$ $f'(x) =$ _____
5. $f(x) = 2x^2 + 3$ $f'(2) =$ _____

4 Values and slopes

$f(x) = x^2 - 2x$. Fill in $f(x)$ and $f'(x)$.

x	-1	0	1	2	3
f(x)					
f'(x)					

5 Match the derivative

Draw a line to match each pair.

☐ $f(x) = x^2$ •

☐ $f(x) = 4x$ •

☐ $f(x) = x^3$ •

☐ $f(x) = 9$ •

• A. 0

• B. $3x^2$

• C. 4

• D. $2x$

6 True or false

Circle true or false.

1. The derivative of x^2 is $2x$.

True

False

2. If $f'(x) > 0$, then f is increasing.

True

False

3. The derivative of $5x$ is $5x$.

True

False

4. At a minimum point, $f'(x) = 0$.

True

False

5. The derivative of $x^3 + 10$ is $3x^2 + 10$.

True

False

7 Tangents and turning points

Circle the right answer.

1. What is the slope of the tangent to $f(x) = x^2$ at $x = 3$?

A 9

B 6

C 3

2. Which line is the tangent to $f(x) = x^2$ at the point $(1, 1)$?

A $y = 2x - 1$

B $y = x$

C $y = 2x + 1$

3. $f(x) = x^3 - 3x$. Where is $f'(x) = 0$?

A $x = 0$

B $x = 3$

C $x = -1$ and $x = 1$

8 Think and write

Find the turning point of $f(x) = x^2 - 6x + 5$ and say whether it is a minimum or maximum.

How did it go?



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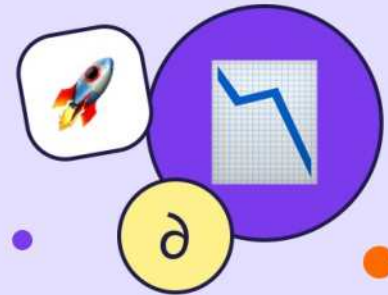
Answer key

Introduction to derivatives

Find rates of change and slopes of curves with the power rule.



I can differentiate polynomials and interpret the result.



1 ∂ Complete the table

Fill in the empty boxes.

$f(x)$	$f'(x)$
x^3	$3x^2$
$5x^2$	$10x$
$4x - 7$	4
$2x^4 + x$	$8x^3 + 1$
6	0

2 🚀 Pick the answer

Circle the right answer.

1. The derivative gives...

☐ A the slope of the tangent

☐ B the area under the curve

☐ C the y-intercept

2. If $f'(x) = 0$ at a point, the tangent there is...

☐ A vertical

☐ B horizontal

☐ C undefined

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☐ A 45 m/s

☐ B 15 m/s

☐ C 30 m/s

3 Differentiate

Write $f'(x)$ for each function.

1. $f(x) = x^5$ $f'(x) =$ $5x^4$

2. $f(x) = 3x^2 - 4x$ $f'(x) =$ $6x - 4$

3. $f(x) = x^3 - 2x^2 + x$ $f'(x) =$ $3x^2 - 4x + 1$

4. $f(x) = -4x^3$ $f'(x) =$ $-12x^2$

5. $f(x) = 2x^2 + 3$ $f'(2) =$ 8

4 Values and slopes

$f(x) = x^2 - 2x$. Fill in $f(x)$ and $f'(x)$.

x	-1	0	1	2	3
f(x)	3	0	-1	0	3
f'(x)	-4	-2	0	2	4

5 Match the derivative

Draw a line to match each pair.

D $f(x) = x^2$ •

C $f(x) = 4x$ •

B $f(x) = x^3$ •

A $f(x) = 9$ •

• **A.** 0

• **B.** $3x^2$

• **C.** 4

• **D.** $2x$

6 True or false

Circle true or false.

1. The derivative of x^2 is $2x$.

True

False

2. If $f'(x) > 0$, then f is increasing.

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3. The derivative of $5x$ is $5x$.

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4. At a minimum point, $f'(x) = 0$.

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False

5. The derivative of $x^3 + 10$ is $3x^2 + 10$.

True

False

7 Tangents and turning points

Circle the right answer.

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3. $f(x) = x^3 - 3x$. Where is $f'(x) = 0$?

A $x = 0$

B $x = 3$

C $x = -1$ and $x = 1$

8 Think and write

Find the turning point of $f(x) = x^2 - 6x + 5$ and say whether it is a minimum or maximum.

$f'(x) = 2x - 6 = 0$, $x = 3$, $f(3) = -4$: $(3, -4)$ minimum

How did it go?



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