

# Mathematics Class Slides

## Bronx Early College Academy

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22 October - 2 November 2018

3.1 Drui - Intro to Vectors, Monday Oct 22

3.2 Drui - Deltamath differentiation practice, Tuesday Oct 23

3.3 Drui - Resultant vectors, Wednesday Oct 24

3.4 Drui - Distance, Thursday Oct 25

3.5 Drui - Unit vectors, Friday Oct 26

3.6 Drui - Unit vectors, Monday Oct 29

3.7 Drui - Deltamath differentiation practice, Tuesday Oct 30

3.8 Drui - Unit vectors, Wednesday Oct 31

3.9 Drui - Unit vectors, Monday Nov 5

## GQ: What are the basic elements of vector algebra?

CCSS: HSF.IF.B.4 Interpret key features of functions and their graphs 3.1

Do Now: Differentiate each function.

1.  $f(x) = x^3 - 4x$
2.  $g(x) = \ln x$
3.  $y = (x^3 - 4x)(\ln x)$
4. Write down the value of  $\cos \frac{\pi}{3}$ . (sketch first. no calculator)
5. Skills check #1-3 p. 404-5

Lesson: Vector concepts and notation pp. 406-410

Homework: Exercises 12A pp. 410-411

## GQ: How do we differentiate functions?

CCSS: HSF-IF.B.6 Interpret functions, and their rate of change

3.2

Do Now quiz, mixed review.

Complete the problem set without a calculator, then begin Deltamath.

Lesson: Differentiation practice

Homework: Complete Deltamath problem set at home

## GQ: How do we add vectors?

CCSS: HSF.IF.B.4 Interpret key features of functions and their graphs

3.3

Do Now: Differentiate each function.  $k \in \mathbb{R}$

1.  $f(x) = kx^2 - 4x^{-1}$
2.  $g(x) = \ln kx$
3.  $h(x) = e^{kx}$
4. Write down the value of  $\cos \frac{2\pi}{3}$ . (sketch first. no calculator)

Lesson: Parallelism, scalar multiplication, position, addition pp. 411-417

Homework: Exercises 12B (odds), 12C (odds), pp. 410-416

## GQ: How do we calculate distance in space?

CCSS: HSG.SRT.C.8 Use the Pythagorean theorem to solve applied problems

3.4

Do Now: Differentiate each function.

1.  $f(x) = x^{-1} - 4x^{-2}$
2.  $g(x) = \sin x^2$
3.  $y = (x^3 - 4x) \div (\ln x)$
4. Write down the value of  $\sin \frac{\pi}{4}$ . (sketch first. no calculator)

Lesson: Length calculation using the Pythagorean formula, unit vectors pp. 418-419

Homework: Exercises 12D p. 417, 12F odds p. 420.

## GQ: How do we calculate distance in space?

CCSS: HSG.SRT.C.8 Use the Pythagorean theorem to solve applied problems

3.5

Do Now: Let  $g(x) = \frac{\ln x}{x^2}$  for  $x > 0$ .

1. Use the quotient rule to show that  $g'(x) = \frac{1 - 2 \ln x}{x^3}$
2. The graph of  $g$  has a maximum point at  $A$ . Find the  $x$ -coordinate of  $A$ .
3. Given the point  $P(4, 5)$ . State the position vector  $\overrightarrow{OP}$  in unit vector form.
4. Find the magnitude of  $\overrightarrow{OP}$ .

Lesson: Collinear points, unit vectors pp. 418-419

Homework: Exercises 12E p. 418.

## GQ: How do we add vectors?

CCSS: HSG.SRT.C.8 Use the Pythagorean theorem to solve applied problems

3.6

Do Now: Let  $f(x) = xe^x$ .

1. Find  $f'(x)$
2. The graph of  $f$  has a minimum point at  $A$ . Find the exact values of the  $x$ - and  $y$ -coordinates of  $A$ .
3. Given the point  $A(5, 12)$ . State the position vector  $\overrightarrow{OA}$  in unit vector form.
4. Find the unit vector parallel to  $\overrightarrow{OA}$ .

Lesson: Adding vectors, the zero vector and equilibrium pp. 420-422

Homework: Exercises 12F (evens) p. 420, 12G (a and c) p. 422-423.



## GQ: How do we differentiate functions?

CCSS: HSF-IF.B.6 Interpret functions, and their rate of change

3.7

Deltamath individualized work: Differentiation practice, vector algebra

Homework: Complete Deltamath problem set at home

## GQ: How do we use vector calculations in geometric proofs?

CCSS: HSG.SRT.C.8 Use the Pythagorean theorem to solve applied problems

3.8

Do Now: Let  $f(x) = x^2 \sin x$ .

1. Find  $f'(x)$
2. Find the gradient of  $f$  when  $x = \frac{\pi}{2}$ . (no calculator)
3. The graph of  $f$  has a maximum point at  $A$ ,  $0 \leq x \leq 2\pi$ . Find the  $x$ - and  $y$ -coordinates of  $A$ . (use a graphing calculator)
4. Sketch  $f(x)$  over the domain  $0 \leq x \leq 2\pi$ , marking the sign of the derivative on an axis. Explain how the 1st derivative test applies (p. 233).

Lesson: Geometric proofs pp. 423-424

Homework: Exercises 12H (pick 3) p. 424-5. (Deltamath)

## GQ: How do we use vector calculations in geometric proofs?

CCSS: HSG.SRT.C.8 Use the Pythagorean theorem to solve applied problems

3.9

Do Now: Let  $f(x) = \sin \frac{x}{2}$ .

1. Find  $f'(x)$
2. Find the gradient of  $f$  when  $x = \frac{\pi}{2}$ . (no calculator)
3. The graph of  $f$  has a maximum point at  $A$ ,  $0 \leq x \leq 2\pi$ . Find the  $x$ - and  $y$ -coordinates of  $A$ .
4. Sketch  $f(x)$  over the domain  $0 \leq x \leq 2\pi$ , marking the sign of the derivative on an axis. Explain how the 1st derivative test applies (p. 233).

Lesson: Geometric proofs pp. 423-425

Homework: Pretest handout. **Exam Friday**