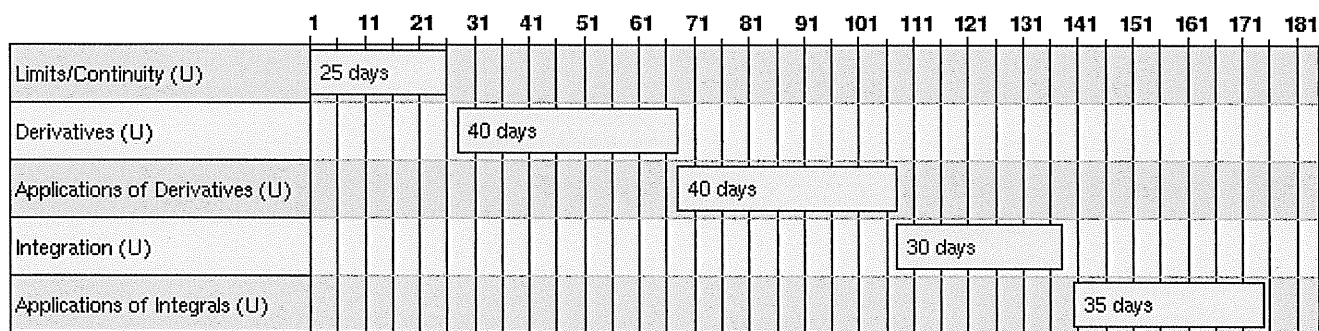


Folder: Mathematics

Group/District: PENNSYLVANIA

Course Map Timeline Calculus-CHS



☐ Essential (E)
 ☐ Important (I)
 ☐ Compact (C)
 ☐ Unranked (U)

Topic: Applications of Derivatives
 Subject(s): Math

Days: 40
 Grade(s): 11th, 12th

Key Learning:

Derivatives can be used to solve many real-world applications.



Unit Essential Question(s):

How can derivatives be used to solve various real-world problems?



Concept:
Chain Rule

Concept:
Newton's Method

Concept:
Rolle's Theorem



Lesson Essential Question(s):
 How can you use the Chain Rule to help solve related rate problems? (A)

 What is the difference between a derivative and differential? (A)

 How do you use differentials to approximate changes in function values? (A)

 How do you use differentials to make linear and quadratic approximations? (A)

Lesson Essential Question(s):
 How can you use Newton's Method to approximate the zeroes of a function? (A)

 How can a derivative be used to analyze the behavior of a function?(increasing, decreasing, monotone) (A)

 How can you use the first and second derivatives to locate relative and absolute extrema? (A)

Lesson Essential Question(s):
 What is/and how do you apply Rolle's Theorem and the Mean Value Theorem? (A)

 How do you the second derivative to test for concavity? (A)

 How do you the second derivative to test to locate points of inflection? (A)

 How do you use the analysis of a function to sketch its graph? (A)

 How do you use the analysis of a function to solve applied extrema problems? (A)



Vocabulary:
 differential

Vocabulary:
 Zeroes of a function, increasing, decreasing, monotone

Vocabulary:
 extrema, concavity, inflection point

Additional Information:

Attached Document(s):

Vocab Report for Topic: Applications of Derivatives

Subject(s): Math

Days: 40

Grade(s): 11th, 12th

Concept:

Chain Rule

differential -

Concept: Newton's Method

Zeroes of a function, increasing, decreasing, monotone -

Concept: Rolle's Theorem

extrema, concavity, inflection point -

Topic: Applications of Integrals
 Subject(s): Math

Days: 35
 Grade(s): 11th, 12th

Key Learning:
 Integrals can be used to solve many real-world problems.



Unit Essential Question(s):

How can I use integrals to solve real-world problems?



Concept:
 Evaluate Integrals

Concept:
 Application of Integrals

Concept:
 Mean Value Theorem



Lesson Essential Question(s):
 How can an integral be evaluated by using the Fundamental Theorem? (A)
 How can an integral be evaluated by using basic substitution? (A)
 How can you evaluate integrals involving trigonometric functions? (A)

Lesson Essential Question(s):
 How can the definite integral be used to find the area between curves? (A)
 How can the definite integral be used to find volumes of solids? (A)
 How can the definite integral be used to find the volume of solids of revolution? (A)
 How can the definite integral be used to find work done by a variable force? (A)
 How can the definite integral be used to find fluid force? (A)
 How can the definite integral be used to find centers of mass? (A)

Lesson Essential Question(s):
 How do you compute the average value of a function? (A)
 What is the Mean Value Theorem for Integrals? (A)
 How can you apply the Mean Value Theorem for Integrals? (A)



Vocabulary:

Vocabulary:

Vocabulary:
 Average value of a function, Mean Value Theorem

Additional Information:

Attached Document(s):

Vocab Report for Topic: Applications of Integrals

Subject(s): Math

Days: 35

Grade(s): 11th, 12th

Concept: Mean Value Theorem

Average value of a function -
Mean Value Theorem -

Topic: Derivatives

Subject(s): Math

Days: 40

Grade(s): 11th, 12th

Key Learning:

Values of a function change as the domain changes.



Unit Essential Question(s):

How do derivatives help us analyze a function?



Concept:

Definition of Derivative

Concept:

Graphing and Computing Derivatives



Lesson Essential Question(s):

How can the Intermediate Value Theorem be used as a proof that a function takes on a particular value on an interval? (A)

What are the connections between average rates of change and the slope of a secant line? (A)

What are the connections between instantaneous rates of change and the slope of the tangent line? (A)

How do you apply the definition of derivative as an interpretation of instantaneous rate of change? (A)

What are the various notations for the derivative? (which includes derivatives of higher order) (A)

Lesson Essential Question(s):

What is the relationship between the continuity of a function and the differentiability of the function? (A)

How do you sketch the graph of f' of graph f ? (A)

How do you sketch the graph of f'' of graph f ? (A)



Vocabulary:

Intermediate Value Theorem, Derivative, secant line, tangent line, instantaneous rate of change,

Vocabulary:

first derivative, second derivative, implicit differentiation

Additional Information:

Attached Document(s):

Vocab Report for Topic: Derivatives

Subject(s): Math

Days: 40

Grade(s): 11th, 12th

Concept

Definition of Derivative

Intermediate Value Theorem, Derivative, secant line, tangent line, instantaneous rate of change, -

Concept

Graphing and Computing Derivatives

first derivative, second derivative -
implicit differentiation -

Topic: Integration

Days: 30

Subject(s): Math

Grade(s): 11th, 12th

Key Learning:

Integration is the inverse of Differentiation

Unit Essential Question(s):

What does integration mean?

Concept:

Definitions of Integration

Concept:

Computing Integrals

Lesson Essential Question(s):

How do you determine the general anti-derivative of a function? (A)

What is an anti-derivative? (A)

How do you determine the particular anti-derivative of a function? (A)

Lesson Essential Question(s):

How do you evaluate the sums and limits of sums using sigma notation? (A)

How do you use a partition of an interval to approximate the area under a curve? (A)

How can you use the sum to find the area under a non-negative curve? (A)

How can a Reimann Sum be used to evaluate a definite integral? (A)

How can both forms of the Fundamental Theorem of Calculus be used to determine an integral? (A)



Vocabulary:

anti-derivative, particular anti-derivative, General anti-derivative

Vocabulary:

partition, sigma notation, Definite integral, Reimann Sum, Fundamental Theorem of Calculus

Additional Information:

Attached Document(s):

Vocab Report for Topic: Integration

Subject(s): Math

Days: 30

Grade(s): 11th, 12th

Concept

Definitions of Integration

- anti-derivative -
- particular anti-derivative -
- General anti-derivative -

Concept

Computing Integrals

- partition -
- sigma notation -
- Definite integral -
- Reimann Sum -
- Fundamental Theorem of Calculus -