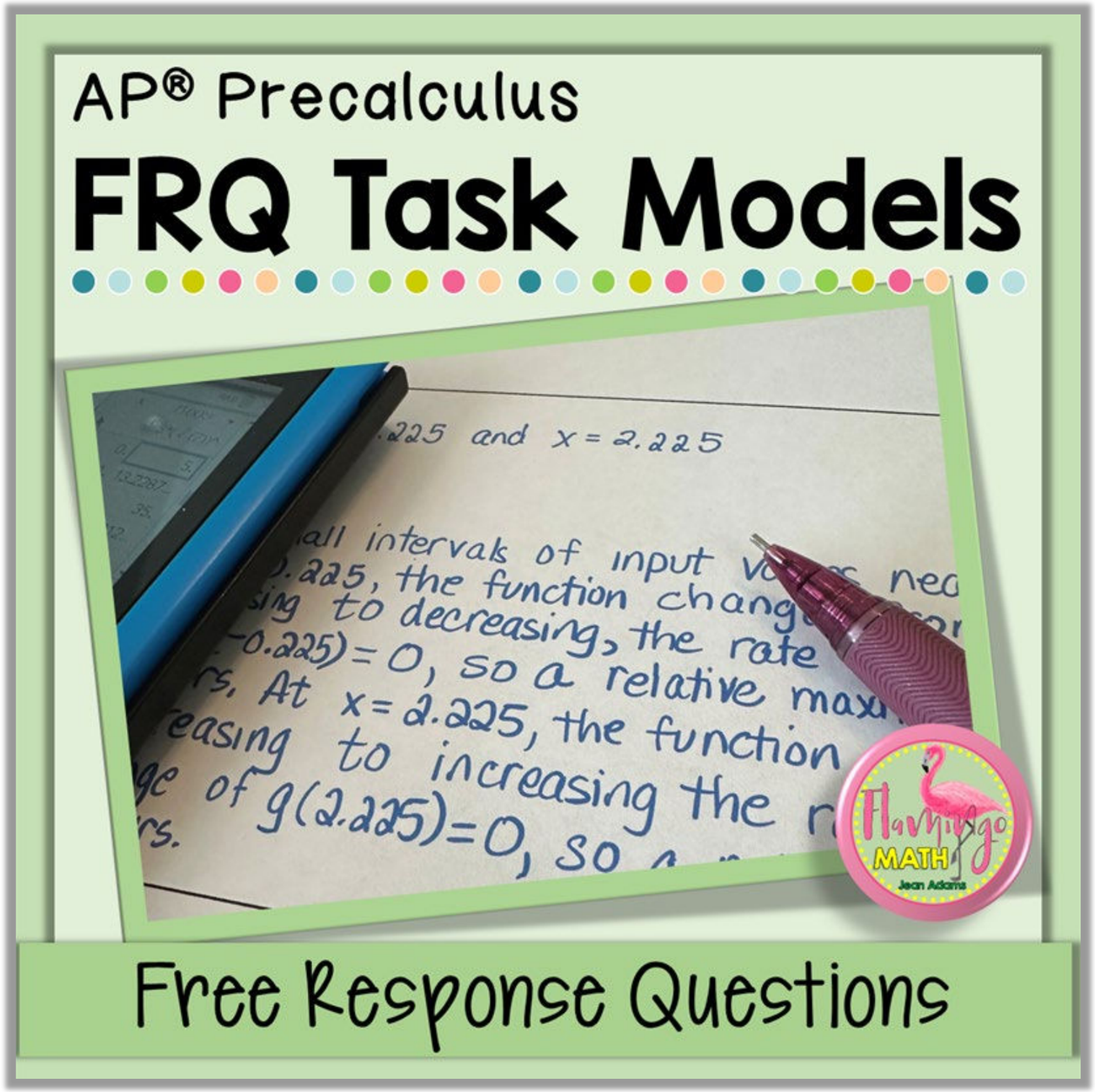
The AP Precalculus FRQ Task Models Bundle provides to meet your needs for your year end review plans!

What makes this AP Precalculus FRQ Task Models Bundle special?

- ❑ Each task model is aligned to the CED requirements for the AP Precalculus Exam!
- ❑ There are three unique FRQ's for each task model!
- ❑ Created to support both new and experienced teachers.
- ❑ There are calculator help sheets and tips for that explain student expectations for each FRQ

Take a look!



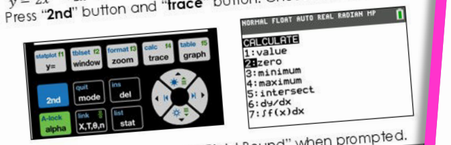
Flamingo Math by Jean Adams

Teacher Resources. . .

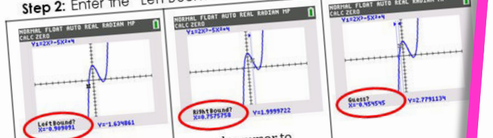
FRQ 1: Function Concepts
(Calculator)
Focus-Units 1 & 2

- This question ***will not be a word problem.***
- Presents functions expressed graphically, numerically, and analytically.
- Includes three parts and requires students to work with a variety of concepts
- May include function composition, inverse functions, function input-output values, zeros of a function, end behavior of a function, and identification of an ap
- function type to construct a function model.
- Part C will **always** require that you give a reason. This reason must corresp
- Precalculus concepts. Students should read the question stem carefully si
- question itself may tell you what type of reason you should use.
- Students should **store** values in the calculator. ***Do not round answers until***

Storing Values:
Graph function in Y1:
Given: $y = 2x^3 - 5x^2 + 4$, find zeros, maximum, minimum.
Step 1: Press "**2nd**" button and "**trace**" button. Choose the **task** you want



Step 2: Enter the "Left Bound" and "Right Bound" when prompted.



Move the cursor to **LEFT** of the value you want to find. Press **ENTER**.

Move the cursor to **RIGHT** of the value you want to find. Press **ENTER**.

When you see **GUESS** press **ENTER**.

Step 3: Store Values
1. Enter the value you want to store, $x = -0.780776\ldots$
2. Press STO→
3. Press ALPHA
4. Press the letter of the variable you want to use
5. Press ENTER.

FRQ 2: Modeling a Non-Periodic Context (Calculator)
Focus-Units 1 & 2

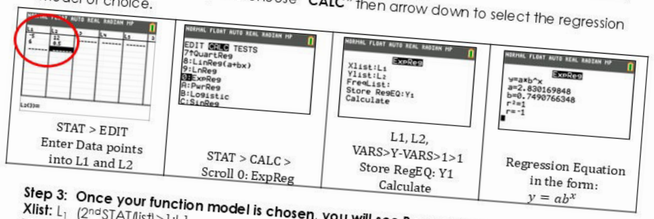
- This question presents a real-life context ***and will be a word problem.***
- Part A: Students use given information to construct a function model by building a system of equations and finding the parameters using a method of choice.
- Possible function types include:
  - polynomial (mostly linear and quadratic, possibly cubic)
  - piecewise-defined
  - exponential
  - logarithmic
- Part A: Will always involve writing equations to solve for a max of 4 values. One point for equations, one point for correctly finding the values.
- Part B: Will focus on AROC. Students calculate, apply, and reason with average rates of change and their units. Worth 3 of the 6 points.
- Part C: Will always be about a limitation or an assumption of the model. Students justify a conclusion about assumptions or limitations of a model. Worth 1 point.
- Know how to run regressions to find a model.

Find Regression Equations to Model Data and Plot the Corresponding Residuals
(linear, quadratic, cubic, quartic, exponential, logarithmic, and sinusoidal)

Given a table of data or information stated in a word problem,
Step 1: Enter data as a coordinate pair (x, y) becomes (L_1, L_2)
Press "**STAT**" button and "**1:Edit**" button. Enter the x-values into L_1 and the corresponding y-value into L_2



Step 2: Choose the regression model you want to consider.
Press **"STAT"** then arrow right to choose **"CALC"** then arrow down to select the regression model of choice.



STAT > EDIT
Enter Data points into L1 and L2

STAT > CALC > Scroll 0: ExpReg

L1, L2,
VARS>Y-VARS>1>1
Store RegEQ: Y1
Calculate

Regression Equation in the form: $y = ab^x$

Step 3: Once your function model is chosen, you will see Regression Type Window:
Xlist: L_1 (2^{nd}STAT(list)>1:L1
Ylist: L_2 (2^{nd}STAT(list)>1:L2
FreqList: (Ignore this setting, it is not needed)
***Store RegEQ:** (This step stores your equation into the Y= location to see the graph). Press "**ALPHA**" then press **"trace"(calc)**, choose an empty Y#= that isn't being used. (**Note:** If an equation is entered into Y1 it will overwrite the equation by choosing Y1.)
Calculate: Press **"ENTER"**
Your regression values will be shown at the top of the screen. In this example we have $y = ab^x$, so the values for a and b are shown.

FRQ 3: Modeling a Periodic Context (No Calculator)
Focus-Units 1 & 3

- Presents a real-life context modeled by either a sine or cosine function. May also include a diagram.
- Part A: Will always have the same wording. Students are given two full cycles of a graph, unlabeled, with max, min and midline. Students use the given information to identify correct coordinates of these five labeled points on the graph.
- Part B: Wording will always be the same, but you may be given either a sine or and cosine function. You will always be defining the parameters, a, b, c, and d, but you wi not write the equation.
- Part C: Will focus on function behavior, describing the behavior on a given interval, and then describe the change in the rate of change on a particular interval.
- Both parts will require students to construct the sinusoidal model by using the context to determine the amplitude, frequency, period, vertical shift, phase shift, midline, etc.

FRQ 4: Symbolic Manipulations
(No Calculator)
Focus-Units 2 & 3

- This question ***will not be a word problem.***
- Presents several functions: exponential, logarithmic, trigonometric, and/or inverse trigonometric. Exponentials can include natural base, e.
- Part A: Students will either rewrite expressions or solve equations (*but not both*). Wo points.
- Part B: Will be either rewriting or solving (whatever Part A was not.) Worth 2 points
- Part C: Will always include language about input and output. This part is the mos challenging part of the problem.
- It is important to know trig values (***unit circle***) and be able to write solutions in g
- Students must know how to use properties of exponents and logarithms to simp form.
- Students must know how to use properties of exponents and logarithms to simp expand, condense, and solve equations.
- Students must show the work that leads to the answers in each part of the qu
- Students must show the work that leads to the answers in each part of the qu

Directions:

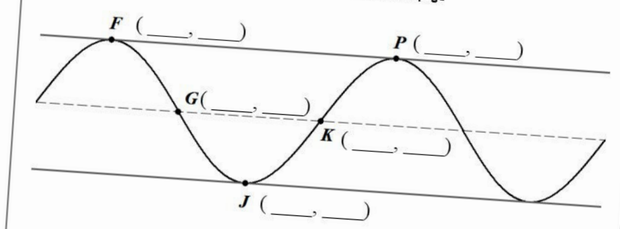
- Unless otherwise specified, the domain of a function f is assumed to be the set of all real numbers x for which $f(x)$ is a real number. Angle measures for trigonometric functions are assumed to be in radians.
- Solutions to equations must be real numbers. Determine the exact value of any expression that can be obtained without a calculator. For example, $\log_2 8$, $\cos\left(\frac{\pi}{2}\right)$, and $\sin^{-1}(1)$ can be evaluated without a calculator.
- Unless otherwise specified, combine terms using algebraic methods and rules for exponents and logarithms, where applicable. For example, $2x + 3x$, $5^2 \cdot 5^2$, $\frac{x^5}{x^2}$, and $\ln 3 + \ln 5$ should be rewritten in equivalent forms.
- For each part of the question, show the work that leads to your answers.

Flamingo Math.com

3 3 3 3 3 3 3 3 3

NO CALCULATOR ALLOWED

Answer QUESTION 3 PART A on this page



3 3 3 3 3 3 3 3 3

NO CALCULATOR ALLOWED

Answer QUESTION 3 PARTS B AND C on this page.

PART B

$a =$ _____
$b =$ _____
$c =$ _____
$d =$ _____

PART C

i

ii

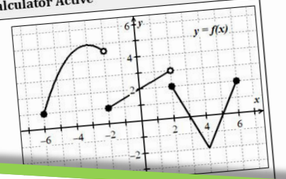
Flamingo Math by Jean Adams

Task Model Prompts. . .

FRQ 1 Sample FRQ Task Model C — Name _____ Date _____ Period _____

Free Response: Calculator Active

The figure shows the graph of the function f on its domain $[-6, 6]$.
The function g is given by $g(x) = -2 \cdot (3)^{x+2} - 1$



Part A:
i. The function h
decimal appr
your answer.
ii. Find all real z

Part B:
i. Find all the
are no such
ii. Determine
using the

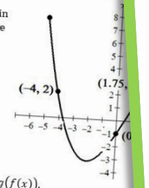
Part C:
i. Determi
ii. Give a
of $y =$

© 2023 Jean

FRQ 1 Sample FRQ Task Model A — Name _____ Date _____ Period _____

Free Response: Calculator Active

The figure shows the graph of the function f on its domain $[-5, 5]$. The points $(-4, 2)$, $(0, -1)$, $(1.75, 2)$ and $(4, 2)$ are on the graph of f.
The function g is given by $g(x) = 2.714(0.8)^x$



Part A: The function h is defined by $h(x) = (g \circ f)(x) = g(f(x))$.
i. Find the value of $h(4)$ as a decimal approximation or indicate that it is not def
the work that leads to your answer.
ii. Find the values of $f^{-1}(2)$ or indicate that it is not defined.

Part B:
i. Find all the values of x where $g(x) = 3$ or indicate there are no such values.
ii. Determine the end behavior of $g(x)$ as x increases without bound. Express your a
using the mathematical notation of a limit.

Part C:
i. Determine if f has an inverse function.
ii. Give a reason for your answer based on the definition of a function and the graph of $y = f(x)$. Refer to values from the graph in your reasoning.

© 2023 Jean Adams

FRQ 2 Sample FRQ Task Model A — Name _____ Date _____ Period _____

Free Response: Calculator Active

Time, hours	1	2	3	4	5	6
$B(t)$ (in CFUs)	618	763	945	1165	1440	1778

Dr. Ramirez took a blood sample from a patient suspected of having a bacterial infection. A lab technician observed that the bacteria count had increased significantly. At one hour after the blood sample was drawn, the technician began recording the total number of colony-forming units (CFUs) of bacteria in the sample every hour. The table gives values for the number of bacteria present in the sample over a six-hour period.
The level of the CFUs in the blood sample can be modeled by the function $B(t) = ab^t$, where $B(t)$ is the number of CFUs in the blood sample, for any hour, t, since the initial sample reading.

the data points, $(1, 618)$ and $(2, 763)$ to write two equations that can be used to find values for constants a and b in the expression for $B(t)$.
d the values for a and b.

FRQ 2 Sample FRQ Task Model B — Name _____ Date _____ Period _____

Free Response: Calculator Active

On Feb 14, 2025, the highly anticipated movie premier for the Marvel series *Captain America: Brave New World* , recorded an initial burst of excitement in a local community, with 1120 tickets purchased in the first hour, ($t = 0$). After three hours ($t = 3$) there were 1805 tickets sold. The number of tickets sold in a given hour can be modeled by the function A given as $A(t) = a + b\ln(t + 1)$, where $A(t)$ is the number of tickets sold, on hour t since the movie premier time $t = 0$.

Part A:
i. Use the given data to write two equations that can be used to find the values for constants a and b in the expression for $A(t)$.
ii. Find the values of a and b as decimal approximations.

Part B:
i. Use the given data to find the average rate of change of the number of tickets sold from $t = 0$ to $t = 3$ hours. Express your answer as a decimal approximation. Show the computations that lead to your answer.
ii. Use the average rate of change found in (i) to estimate the number of tickets sold on the first day at time $t = 4$. Show the work that leads to your answer.
iii. Let S_t represent the estimate of the number of tickets sold using the average rate of change found in (i). The average rates of change found in (i) can be used to estimate the number of tickets sold at time t hours for $t > 3$ hours. Will the estimates, found using S_t be less than or greater than the number of tickets predicted by the model A at time for $t > 3$ hours? Explain your reasoning. Your explanation should include a reference to the graph of A.

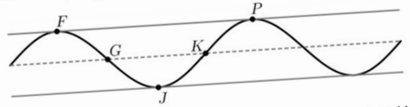
Part C: The movie producers reported that daily sales of tickets decreased each hour after $t = 3$. Explain why the error in the model A increased after $t = 3$.

FRQ 3 Sample FRQ Task Model A — Name _____ Date _____ Period _____

Free Response: No Calculator Allowed

A tsunami, caused by an underwater earthquake, causes the water to first oscillate from its normal level, rising and falling an equal distance above its normal level. After a recorded quake in the Pacific Ocean, a tsunami warning was issued for the coast of California. The geological technician monitoring the increased wave activity reports that the tidal surge appears to have a maximum wave height of 12 feet above the average water depth of 13 feet and completes a full cycle in 16 minutes. At time $t = 0$, the technician notes that the depth of the water is at 13 feet, and is decreasing. The sinusoidal function h models the depth of the water, in feet, as a function of time t in minutes. The depth of the water increases and decreases periodically with time.

A. The graph of h and its dashed midline for two full cycles is shown below. Five points F, G, J, K, and P are labeled. No scale and axis are represented. Determine the possible coordinate point $(t, h(t))$ for all five points.



B. ...tion h can be written in the form $h(t) = a\cos[b(t + c)] + d$. Find values of the

FRQ 3 Sample FRQ Task Model C — Name _____ Date _____ Period _____

Free Response: No Calculator Allowed

An amusement park is building a traditional wooden roller coaster in a new section of the park. Your engineering firm has been hired to design a section that falls and rises in a sinusoidal shape.
In order to calculate the weight and stress loads accurately, your firm needs to model the function behavior of the track. The maximum point on the track is 44 meters, and the minimum is 2 meters below the ground. The park wants this section to complete the run in 18 seconds.

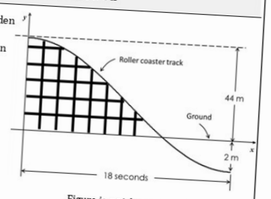


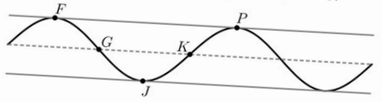
Figure is ***not*** drawn to scale.

The periodic function $h(t)$ represent the height, in meters, the track is from the ground as a function of time, t, in seconds. At $t = 0$, the ride is at the maximum height above the ground.

Part A:

The graph of h and its dashed midline for two full cycles is shown. Five points, F, G, J, K, and P, are labeled on the graph. No scale is indicated, and no axes are presented.

Determine the possible coordinates $(t, d(t))$ for the five points F, G, J, K, and P.



Part B:

The function h can be written in the form $h(t) = a\sin(b[x + c]) + d$. Find the value for the constants a, b, c, and d.

© 2023 Jean Adams

FRQ 4 Sample FRQ Task Model A — Name _____ Date _____ Period _____

Free Response: No Calculator Allowed

Part A:

The functions f and g are given by

$$f(x) = 2\cos x + \sqrt{3}$$
$$g(x) = \log_2(8x) - \log_2(x - 3)$$

i. Solve $f(x) = 0$ over the interval $[0, 2\pi)$.

ii. Solve $g(x) = 4$ over all values of x in the domain of g.

Part B:

The functions $h(x)$ and $k(x)$ are given by

$$h(x) = 9^{-x} \cdot 27^{2x}$$
$$k(x) = \cos(x)[\tan(x) + \cot(x)]$$

i. Rewrite $h(x)$ as an exponential expression of the form b^x Show your work that leads to your answer.

ii. Rewrite $k(x)$ as an expression involving $\csc(x)$ and no other trigonometric function. Show your work that leads to your answer.

FRQ 4 Sample FRQ Task Model C — Name _____ Date _____ Period _____

Free Response: No Calculator Allowed

Part A:

The functions h and k are given by

$$h(x) = 2e^{x+4}$$
$$k(x) = 3\tan^2(x) - 1$$

i. Solve $h(x) = 6$ for values of x in the domain of g.

ii. Solve $k(x) = 8$ over all values of x in the domain of g.

Part B:

The functions $m(x)$ and $p(x)$ are given by

$$m(x) = \log_{10}(7x^5) + \log_{10}(4x^2) - 3\log_{10}(x)$$
$$p(x) = \left(\frac{1 - \cos^2 x}{\cos x}\right)\csc x$$

i. Rewrite $m(x)$ as a single logarithm base 10 without negative exponents in any part of the expression. Show your work that leads to your answer.

ii. Rewrite $p(x)$ as a single term involving $\tan x$. Show your work that leads to your answer.

Part C: The function $r(x)$ is given by $r(x) = \cos^{-1}(\sin(3x))$.
Find all input values in the domain of r that yield an output value of 0.

Flamingo Math by Jean Adams

Teacher Reviews. . .

I cannot speak highly enough of Flamingo Math's AP Precalculus bundle. I have used it the past two years and my students have performed magnificently on their AP Exam. The bundle follows the CED well. Everything you need if you are just starting out teaching an AP course.

Paced well with excellent examples and plenty of practice. Had the best AP scores in math at my site since I started using this the first year.

This curriculum is complete, organized and detailed. I didn't use any other curriculum than this. SY 2024-2025 was my first time teaching an AP class. My students all scored 3 or higher with an average of 4.2. Thanks so much, Jean, for your hard work.

As more schools move to AP Precalculus it's nice to have some refreshed assignments ready to go. I choose to go with Flamingo Math because of their consistent quality and massive amounts of resources for the money

Let's Connect!


www.Instagram.com/flamingomath_


www.facebook.com/FlamingoMath2.0


www.flamingomath.com


www.youtube.com/c/JeanAdamsFlamingoMath16