

Interesting Results

Sure, we think everything in mathematics is interesting. But, there are always certain aspects of mathematics that intrigue almost everyone: the number pi, the constant e, interesting graphs. This week we present 5 new eActivities that focus on these strange and fascinating aspects of math.

This file includes eActivities on:

Sin Curve Watch an animation of a sin curve being formed.

Interesting Graphs Interesting graphs, but why do they look like that?

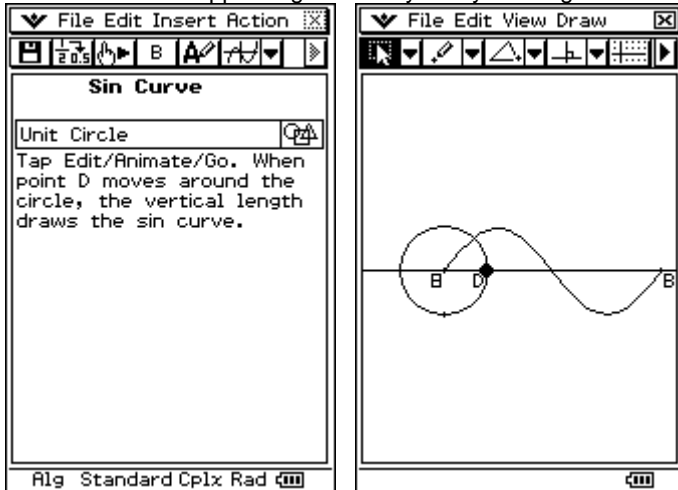
Number e Ever appearing in the most unlikely places.

Number pi The search for pi continues.

Solving Inequalities How do you solve inequalities using your ClassPad?

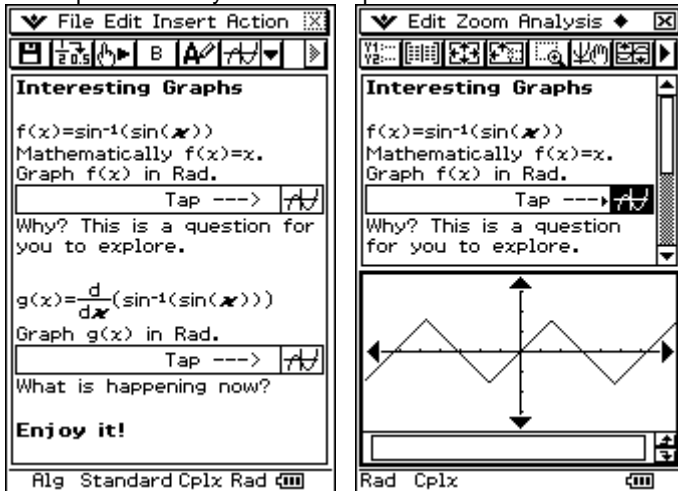
Sin Curve

Watch a sin curve appear right before your eyes using ClassPad's animation.



Interesting Graphs

Some questions for you to contemplate and discover the answers.



Number e

We find this number in so many fascinating places...and this example shows us yet another.

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Number $e=2.71\dots$

$f(x)=P(1+r)^x$
Use $P=\$1$ and $r=1$,
compounded x times per
year.
 $2 \Rightarrow x$

$(1+\frac{1}{x})^x$

2.25

Change the x value.

Graph

You will find the result
getting closer to the
number e when using the

Alg Standard Real Rad

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x

2.25

Change the x value.

Graph

You will find the result
getting closer to the
number e when using the
trace function on the
graph.

$\lim_{x \rightarrow \infty} \left(1 + \frac{1}{x}\right)^x$

approx(e)

2.718281828

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Number pi

Where can we find the number pi? Here is an example.

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Number pi

Definition: The ratio of
the circumference of a
circle to its diameter.

approx(π)

3.141592654

Example $\int f(x)dx$

<Gregory's series>
We use the fact that,
 $\tan^{-1}(x) = \int_0^x \frac{1}{1+t^2} dt$.

With the taylor series,

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With the taylor series,
 $\text{taylor}\left(\frac{1}{1+t^2}, t, 8\right)$
 $t^8 - t^6 + t^4 - t^2 + 1$
for $|x| \leq 1$.

Then,
 $\tan^{-1}(x) = \int_0^x \frac{1}{1+t^2} dt =$
 $\int_0^x (t^8 - t^6 + t^4 - t^2 + 1) dt$

$\frac{x^9}{9} - \frac{x^7}{7} + \frac{x^5}{5} - \frac{x^3}{3} + x$

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$12 \Rightarrow n$

$4 \int_0^1 \left(\text{taylor}\left(\frac{1}{1+t^2}, t, n\right) \right) dt$

$\frac{147916}{45045}$

approx(ans)

3.283738484

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Solving Inequalities

Several ways to approach solving inequalities on the ClassPad

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Solving Inequalities

When thinking about
solving this inequality,
 $x^2+3x-4 < 0$, what would
you do first?

1st
Try to factor.
 $\text{rFactor}(x^2+3x-4) < 0$
 $(x-1) \cdot (x+4) < 0$

We could also...
Draw the graph. Solution:
When is the graph less
than zero?

$y = x^2 + 3x - 4$

$x^2 + 3x - 4 < 0$

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$\text{rFactor}(x^2+3x-4) < 0$
 $(x-1) \cdot (x+4) < 0$

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$y = x^2 + 3x - 4$

$x^2 + 3x - 4 < 0$

The answer is $-4 < x < 1$.

Try to solve!
 $e^{x-3} < \frac{1}{6} x^2$

Hint

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Edit Zoom Analysis

Rad Cplx