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interactive mathematics
Learn math by playing with it!

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Chapter Contents

Feelings about school

Generally, how do you feel about school?

- I really love school
- I enjoy it
- It's OK
- I don't like it
- I hate it and can't wait to finish

Vote!

Votes so far: **1373**

Recommendation

From the math blog...

IntMath Newsletter: radius of curvature, log curve, free math videos

In this Newsletter:

1. Math of the great summer brain drain
2. Math tip: Radius of Curvature, an application of differentiation
3. Slope of the logarithm curve at any point
4. Friday math movie - Khan's Academy
5. How to import GeoGebra files into JSXGraph
6. Final thought – stay positive

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IntMath Newsletter: Radius of curvature, easy math publishing with MathJax

In this Newsletter:

1. Radius of curvature interactive graph
2. Easy math input and nice output using ASCIIMathML and Mathjax
3. Math poll
4. Math puzzles
5. Final thought: Never stop

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Radius of Curvature interactive graph update

Here's an updated interactive graph where you can explore the concept of radius of curvature....

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IntMath Newsletter: Fish, brain games

In this Newsletter:

1. Modeling fish stocks
2. National Geographic - memory game and brain interactive
3. Scope of the IntMath Newsletter
4. Math puzzles
5. Friday math movies
6. Final thought - Try!

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Unit Circle: an Introduction

The unit circle ties together 3 great strands in mathematics: Euclidean geometry, coordinate geometry and trigonometry....

more »

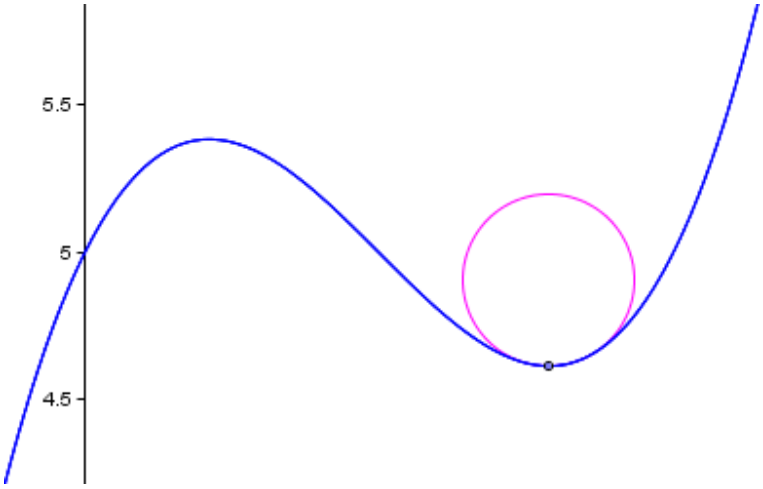
8. Radius of Curvature

By M. Bourne

We can draw a circle that closely fits nearby points on a local section of a curve, as follows.

Application - Radius of Curvature

When engineers design train tracks, they need to ensure the curvature of the track will be safe and provide a comfortable ride for the given speed of the trains. [Image source].



The **radius of curvature** of the curve is defined as the radius of the approximating circle. This radius changes as we move along the curve. How do we find this changing radius of curvature?

The formula for the radius of curvature at any point x for the curve $y = f(x)$ is given by:

$$\text{Radius of curvature} = \frac{[1 + (\frac{dy}{dx})^2]^{3/2}}{\left|\frac{d^2y}{dx^2}\right|}$$

Proof

Example 1

Need Graph Paper?

Download graph paper

Find the radius of curvature for the cubic

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

at the point $x = 1$.

Answer

Exploration

In the following interactive graph you can explore what "changing radius of curvature" means.

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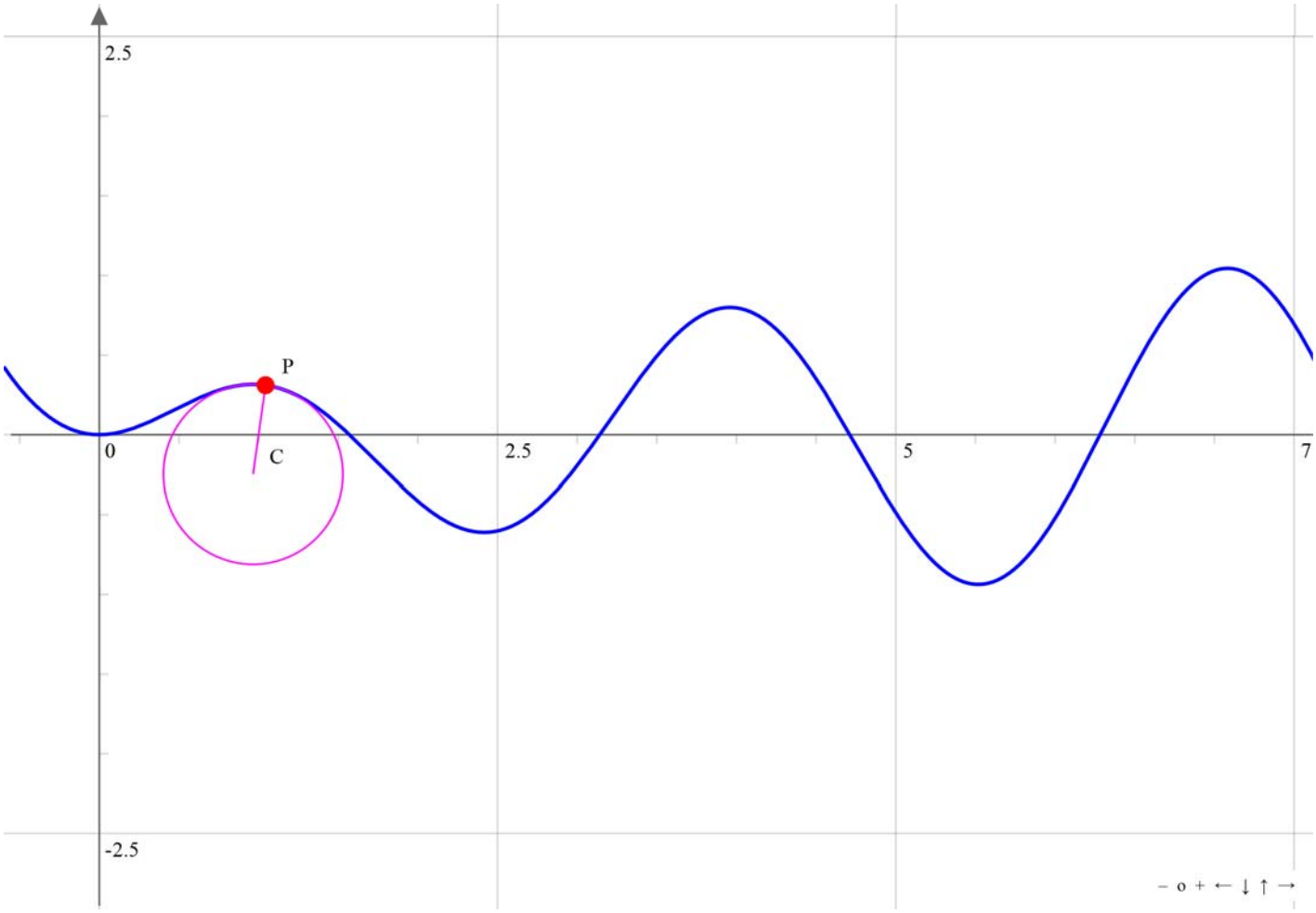
Slowly drag the point "P" around the curve to see the changing radius of curvature (segment CP). It works best if you use a left-right motion - don't worry about following the up-down of the graph.



You'll notice at the **point of inflexion** there is interesting behavior. The circle changes from being below the curve to above (when moving left to right). When we are right on the point of inflexion, what does the circle become?

Example 2

[This example was supplied by a reader.]

We have a curve which is defined by data points and we don't know the function for this data. How can we find the radius of curvature?

We take any 3 data points to illustrate ways of solving this. I chose the points (1, 1), (2, 3) and (3,8).

We'll do this in 3 different ways, just for fun (and for learning about how different math approaches can be used)!

Method 1: Approximation Using a Parabolic Fit and Calculus Methods

Answer

Method 2: Using Linear Approximations and Calculus Methods

Answer

Method 3: Finding the Radius of the Circle through our 3 Points

Answer

7. Applied Maximum and Minimum Problems
Applications of Differentiation Problem Solver

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