What's Going On?

Checking In	Your Thoughts...
Minds on	Think Pair Share
Action!	Our Old Friend k
Consolidation	Clear / Unclear

Learning Goal - I will be able to solve Linear-Quadratic Systems.

Checking In

F.F.M.

Please do this before you RAFT

Simplify fully.

SHOW ALL OF YOUR WORK... OR ELSE!

$$(1-\sqrt{3})(2+\sqrt{6})(5+\sqrt{2})$$

$$= (2+\sqrt{6}-2\sqrt{3}-\sqrt{18})(5+\sqrt{2})$$

$$= 10+5\sqrt{6}-10\sqrt{3}-5\sqrt{18}+2\sqrt{2}+\sqrt{12}-2\sqrt{6}-\sqrt{36}$$

$$= 10+5\sqrt{6}-10\sqrt{3}-5\sqrt{9\times 2}+2\sqrt{2}+\sqrt{4\times 3}-2\sqrt{6}-6$$

$$= 10+5\sqrt{6}-10\sqrt{3}-15\sqrt{2}+2\sqrt{2}+2\sqrt{3}-2\sqrt{6}-6$$

$$= 10-6+5\sqrt{6}-2\sqrt{6}-10\sqrt{3}+2\sqrt{3}-15\sqrt{2}+2\sqrt{2}$$

$$= 4+3\sqrt{6}-8\sqrt{3}-13\sqrt{2}$$

$$\boxed{= 4-13\sqrt{2}-8\sqrt{3}+3\sqrt{6}}$$

Checking In

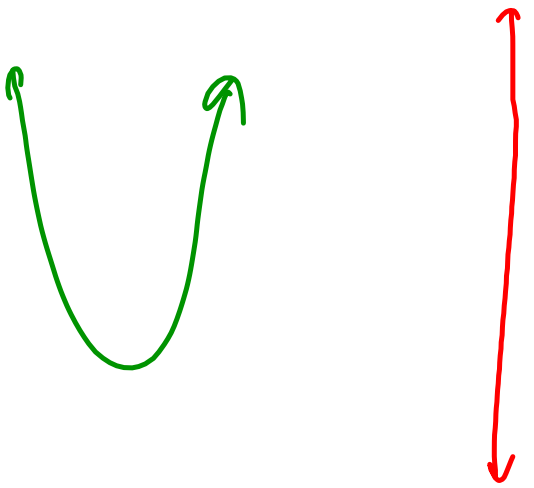
Unit Test

Next Tuesday

Minds on

Think, Pair, Share

In how many ways can a line intersect a parabola?

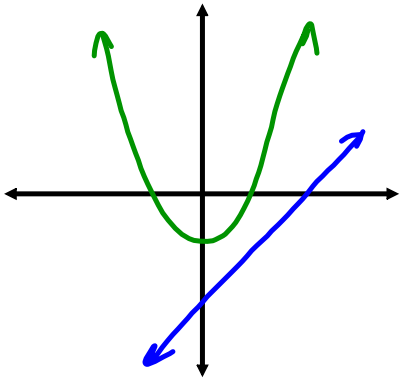


Minds on

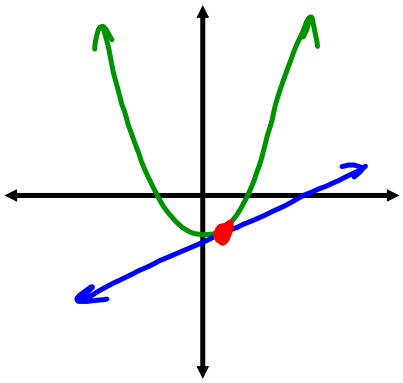
Think, Pair, Share

In how many ways can a line intersect a parabola?

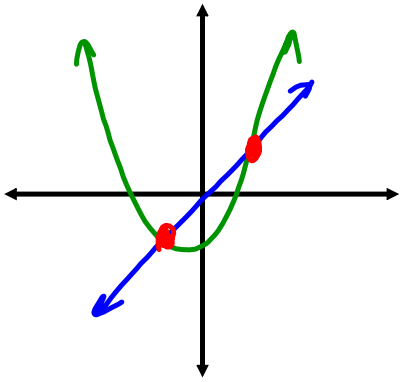
No intersections



1 Point of Intersection



2 POIs



Minds on

Linear-Quadratic Systems

A line can intersect a parabola in 3 different ways:

2 1. Two points of intersection.

1 2. One point of intersection.

(the line is said to run "tangent" to the parabola)

0 3. No points of intersection.

Minds on

Think, Pair, Share

How can we determine whether a line and a parabola meet once, twice or never without actually solving?

$f(x) = 2x^2 + 3x - 1$ $g(x) = 4x + 2$

$2x^2 + 3x - 1 = 4x + 2$

1. Set the equations equal
2. Move everything to one side to get a new quadratic equation.
3. Compute/solve the discriminant

if $b^2 - 4ac > 0$ 2 POIs

$= 0$ 1 POI

< 0 0 POIs

Minds on

Think, Pair, Share

How can we determine the point(s) of intersection of a line and a parabola?

Parabola Line

$2x^2+3x-1 = 4x+2$

$-4x-2$

$2x^2+3x-1-4x-2=0$

$2x^2-x-3=0$

$a \quad b \quad c$

1. Set equations equal.
2. "Solve for x"
   - → factor
   - → quadratic formula

Action!

Our Good Friend k

$6x - 9$

Determine the value(s) of k that such that **g(x) = 6x + k** intersects **f(x) = 4x² - 2x - 5** at only one point.

$f(x) = g(x)$

$4x^2 - 2x - 5 = (6x + k)$ 0

$-6x - k \quad -6x - k$

$4x^2 - 8x - 5 - k = 0$

$a \quad b \quad c$

$b^2 - 4ac = 0$

$(-8)^2 - 4(4)(-5-k) = 0$

$64 - 16(-5-k) = 0$

$64 + 80 + 16k = 0$

$144 + 16k = 0$

$-144 \qquad -144$

$\frac{16k}{16} = \frac{-144}{16}$

$k = -9$

Action!

Our Good Friend k

Determine the value(s) of k that such that **g(x) = -2x + k** does not intersect **f(x) = -3x² + 4x + 1.**

No solutions, discriminant < 0

$$-3x^2+4x+1=-2x+k$$
$$+2x-k \quad +2x-k$$
$$\underbrace{-3x^2}_{a}+\underbrace{6x}_{b}+\underbrace{1-k}_{c}=0$$

$$b^2-4ac<0$$
$$(6)^2-4(-3)(1-k)<0$$
$$36+12(1-k)<0$$
$$36+12-12k<0$$
$$36+12<12k$$
$$\frac{48}{12}<\frac{12k}{12}$$
$$\boxed{k>4}$$

Action!

Skeet shooting

The height *h(t)* of a baseball, in meters, at time t seconds after it is tossed out of a window is modelled by the function $h(t) = -5t^2 + 20t + 15$. A boy shoots at the baseball with a paintball gun. The trajectory of the paintball is given by the function $g(t) = 3t + 3$. Will the paintball hit the baseball? If so, when? At what height will the baseball be?

$h(t) = g(t)$

$-5t^2 + 20t + 15 = 3t + 3$

$-3t - 3 \quad -3t - 3$

$-5t^2 - 17t + 12 = 0$

$a \times c = -60$ } $-20 \times 3 = -60$

$b = -17$ } $-20 + 3 = -17$

$-5t^2 - 20t + 3t + 12 = 0$

$-5t(t - 4) + 3(t - 4) = 0$

$(-5t + 3)(t - 4) = 0$

$-5t + 3 = 0 \qquad t - 4 = 0$

$t = \frac{3}{5} \qquad t = 4s$

$= 0.6s$

∴ the paintball will hit the baseball after 0.6s. (and the trajectory would intersect again after 4s)

b) Height of ball

$$h(0.6) = -5(0.6)^2 + 20(0.6) + 15$$
$$= 25.2\text{m}$$

The ball will be 25.2m in the air.

* Note the height of the ball would not be 25.2m after 4s unless the paintball was shot perfectly horizontally (think symmetry)

Consolidation

Clear / Unclear

Determining features from a graph

Determining features from an equation

Completing the Square

Solving by Factoring

Solving by the Quadratic Formula

Determining the Inverse of a Quadratic

Profit Functions

Radicals

Determining an Equation from Given Information

Linear-Quadratic Systems

Consolidation

Homework

Pg. 198

2 - 6, 8 - 12

Pg. 202 - 203

ALL

review