What's Going On?

Checking In Your Thoughts...

Minds on Family Ties

Action! Families of Parabolas

Consolidation TIPS

Learning Goal - I will be able to create quadratic functions from given information.

Checking In

LGL

Determine the roots (zeros) of the given function.

$$f(x) = -2x^2 - 3x + 7$$

$$X = -(-3)^{\frac{1}{2}} \int (-3)^{2} - 4(-2)(7)$$

$$= 3 + \int (-3)^{2} - 4(-2)(7)$$

$$= -4$$

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$$= -4$$

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$$= -2.77 \text{ AND } 1.27$$

Checking In

Unit Test Thursday

Family Ties

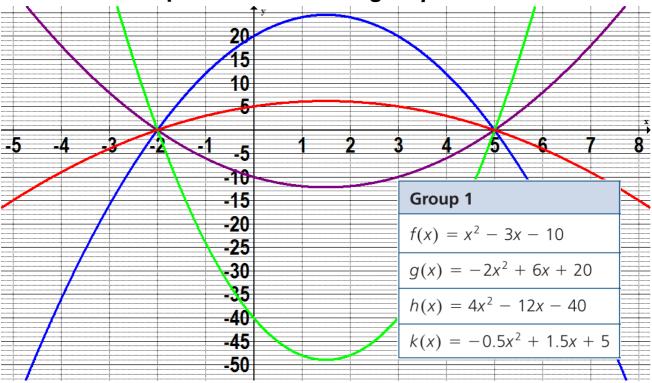
Group 1	Group 2	Group 3
$f(x) = x^2 - 3x - 10$	$m(x) = -2x^2 + 4x + 1$	$r(x) = -3x^2 + 5x - 2$
$g(x) = -2x^2 + 6x + 20$	$n(x) = 0.5x^2 - 1x + 3.5$	$s(x) = 2x^2 + x - 2$
$h(x) = 4x^2 - 12x - 40$	$p(x) = -6x^2 + 12x - 3$	$t(x) = 7x^2 - 2x - 2$
$k(x) = -0.5x^2 + 1.5x + 5$	$q(x) = 10x^2 - 20x + 13$	$u(x) = -4x^2 - 4x - 2$

Function	Vertex	Zeros	y-Intercept
f(x)			
g(x)			
h(x)			
k(x)			
m(x)			
n(x)			
p(x)			
q(x)			

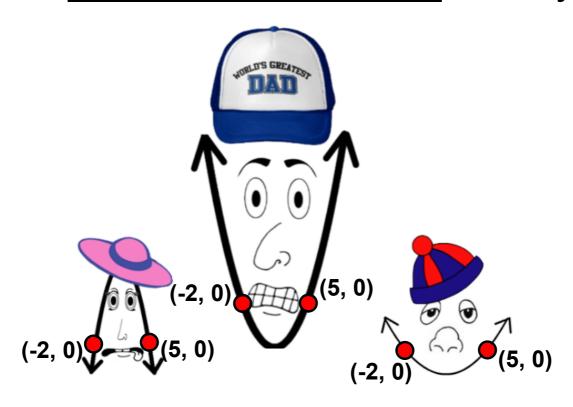
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Function	Vertex	Zeros	y-Intercept
f(x)	(1.5,-12.25	,	-10
g(x)	(1.5,24.5)	X=5, X=-2	20
h(x)		X-5, X=-2	-40
k(x)	(1.5,6.125)	X=5, X=-2	5
m(x)	(8)	X=2 and X=-2	y- 1
n(x)	5/2.25	X=1+13	Y=3.5
p(x)	(1,3)	X=149+172 X=144-172	-3
q(x)	(1,3)	11/2 Solution	13

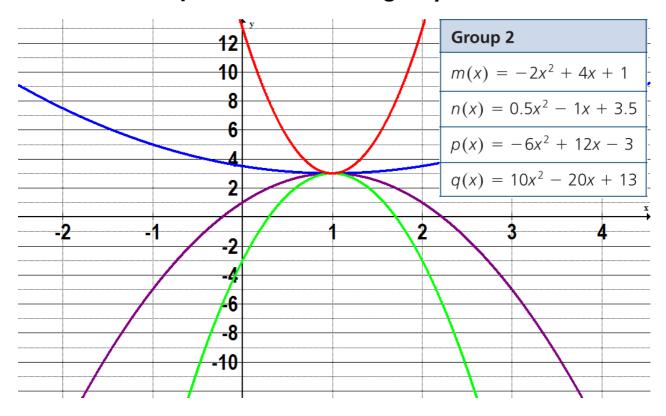
Family Ties



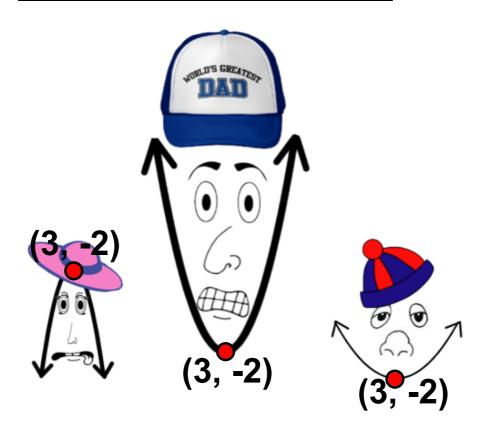
The Zeros Family



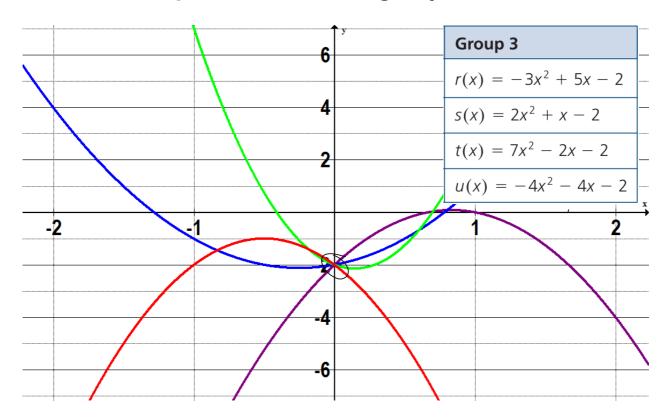
Family Ties



The Vectex Family



Family Ties



All in the Family

Family of Parabolas

A group of parabolas that share a common characteristic.

There are three types of quadratic families:

- 1. Zeros (x-intercepts / roots)
- 2. Vertex
- 3. y-Intercept

What's My Equation?

Determine the equation of the parabola with x-intercepts -4 and 3, that passes through (2, 7).

Because we have both x-intercepts, we should use the "factored form" equation.

$$y = a(x - x_1)(x - x_2)$$

The zeros are -4 and 3.

The x-value we have is 2, the y-value is 7.

*Be sure to plug the zeros in **properly**.

$$7 = a(2-4)(2-3)$$

$$7 = a(6)(-1)$$

$$7 = a(6)$$

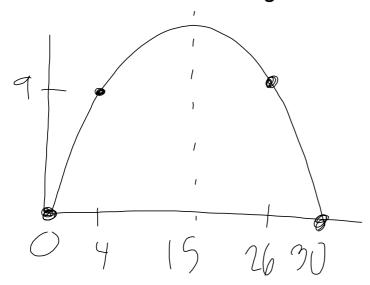
$$4 = -7(x+4)(x-3)$$

$$6$$

Welcome to North Bay!

The entranceway to the city of North Bay used to be an arch that can be modelled by the equation of a parabola.

If the edge of the arch is the origin, and the arch is 30 m wide, what is the equation of the parabola if the height of the arch 4 m from the edge of the base is 9 m?



$$h(4) = -\frac{9}{104}(4-0)(d-30)$$

$$= -\frac{9}{104}(4-30)$$

$$9 = a(26)(-4)$$
 $6 = -4$
 104

Modelling

The percent of 15- to 19-year old males who smoke has been tracked by Health Canada. The data from 1981 to 1996 are given in the table below.

Year	1981	1983	1985	1986	1989	1991	1994	1995	1996
Smokers (%)	43.4	39.6	26.7	25.2	22.6	22.6	27.3	28.5	29.1

- a. Draw a scatter plot of the data and a curve of best fit.
- b. Estimate the location of the vertex.
- c. Determine a quadratic function that will model the data.
- d. Based on the model, what percent of 15- to 19-year old males are expected to be smoking today?
- e. Based on the model, when is it expected that the percent of 15- to 19-year old males smoking will reach 50%?

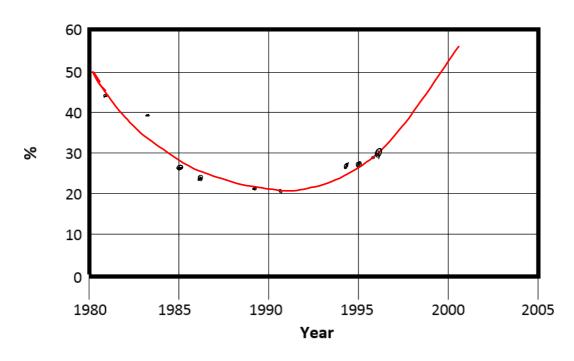
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Percent of 15- to 19-Year Old Males that Smoke



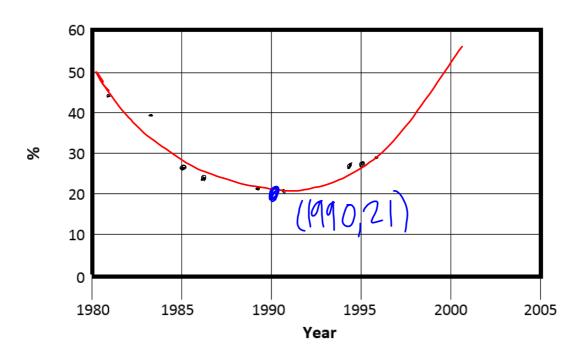
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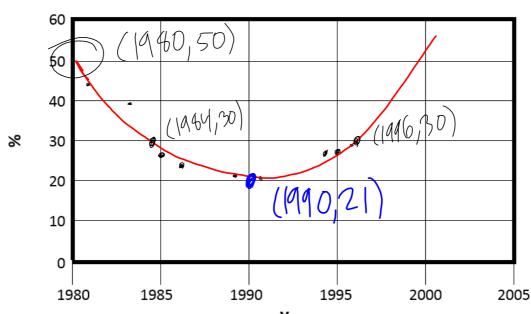
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Percent of 15- to 19-Year Old Males that Smoke



 $V = a(x-h)^{2} + k$ $S0 = a(1960-1990)^{2} + 21$ S0 = a(100) + 21

$$a = \frac{29}{100}$$
 $9 = 0.29$

$$5(t) = 0.29(t - 1990)^2 + 21$$



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- d. Based on the model, what percent of 15- to 19-year old males are expected to be smoking today?

$$5(t) = 0.29(t - 1990)^2 + 21$$

$$S(t) = 0.29(2015 - 1990)^2 + 21$$

$$S(t) = 0.29(25)^2 + 21$$

$$S(t) = 0.29(625) + 21$$

$$S(t) = 181.25 + 21$$

$$S(t) = 202.25$$

The model predicts that approximately 202% of males between the ages of 15 and 19 will be smokers in 2015.

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$$S(t) = 0.29(t - 1990)^2 + 21$$

Sub in 50 for S(t) and "solve" for t

$$50 = 0.29(t - 1990)^2 + 21$$

Consolidation

TIPS

A tunnel with a parabolic arch is 12 m wide. If the height of the arch 4 m from the left edge is 6 m, can a truck that is 5 m tall and 3.5 m wide pass through the tunnel? Justify the decision.