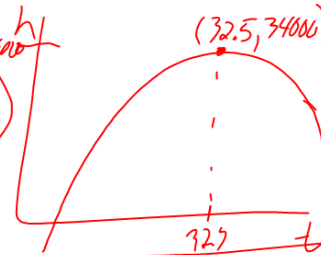


50. **AEROSPACE** NASA's KC135A aircraft flies in parabolic arcs to simulate the weightlessness experienced by astronauts in space. The height h of the aircraft (in feet) t seconds after it begins its parabolic flight can be modeled by the equation $h(t) = -9.09(t - 32.5)^2 + 34,000$. What is the maximum height of the aircraft during this maneuver and when does it occur?

Vertex $(32.5, 34,000)$

max: 34,000 ft
32.5 sec



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$$y = 4x^2 + 24x$$

$$y = 4(x^2 + 6x + 9) - 9(4)$$

$$\frac{b}{2} = -3$$

$$y = 4(x + 3)^2 - 36$$

Vertex $(-3, -36)$

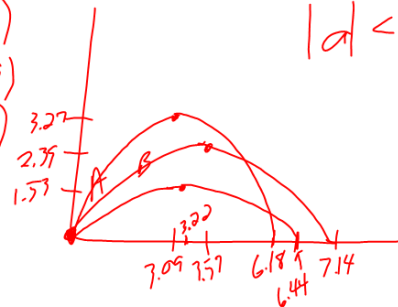
axis: $x = -3$

opens: up

A $(3.09, 3.27)$

B $(3.57, 2.39)$

C $(3.22, 1.53)$



$(2, -1)$

$$y = a(x - h)^2 + k$$

$$y = -(x - 2)^2 - 1$$

Product Property

$$x^m \cdot x^n = x^{m+n}$$

$$x^7 \cdot x^{-3} = x^4$$

Quotient Property

$$\frac{x^m}{x^n} = x^{m-n}$$

$$\frac{x^5}{x^3} = \frac{\cancel{x} \cdot \cancel{x} \cdot \cancel{x} \cdot x \cdot x}{\cancel{x} \cdot \cancel{x} \cdot \cancel{x}} = x^2$$

Negative exponents

$$x^{-m} = \frac{1}{x^m}$$

or

$$\frac{1}{x^{-m}} = x^m$$

$$2x^{-3} = \frac{2}{x^3}$$

$$\frac{1}{x^{-4}} = x^4$$

Power of a power

$$(x^m)^n = x^{mn}$$

$$(x^5)^3 = x^{15}$$

Power of a product

$$(xy)^m = x^m y^m$$

$$(x^2 y^3)^4 = (x^2)^4 (y^3)^4 = x^8 y^{12}$$

$$\frac{x^3}{x^5} = x^{-2} = \frac{1}{x^2}$$

Diagram showing the cancellation of three x's from the numerator and denominator, leaving x⁻² or 1/x². The remaining x's in the denominator are circled and labeled with an arrow pointing to the final result.