Section 10.1

Parametric FRQ Example

Greg Kelly, Hanford High School, Richland, Washington

Chapter 10 AP Packet #12 (1973 BC4)

A kite flies according to the parametric equations $x = \frac{t}{8}$ and $y = -\frac{3}{64}t(t - 128)$ where t is measured in seconds and $0 \leq t \leq 90$.

a. How high is the kite above the ground at $t = 32$ seconds?

$$y(32) = -\frac{3}{64} \cdot 32(32 - 128)$$

$$= -\frac{3}{2}(-96)$$

$$= 3(48)$$

$$= 144$$

Chapter 10 AP Packet #12 (1973 BC4)

A kite flies according to the parametric equations $x = \frac{t}{8}$ and $y = -\frac{3}{64}t(t - 128)$ where t is measured in seconds and $0 \leq t \leq 90$.

b. At what rate is the kite rising at t = 32 seconds?

$$y = -\frac{3}{64}(t^2 - 128t)$$

$$\frac{dy}{dt} = -\frac{3}{64}(2t - 128)$$

$$\left.\frac{dy}{dt}\right|_{t=32} = -\frac{3}{64}(64 - 128) = 3$$

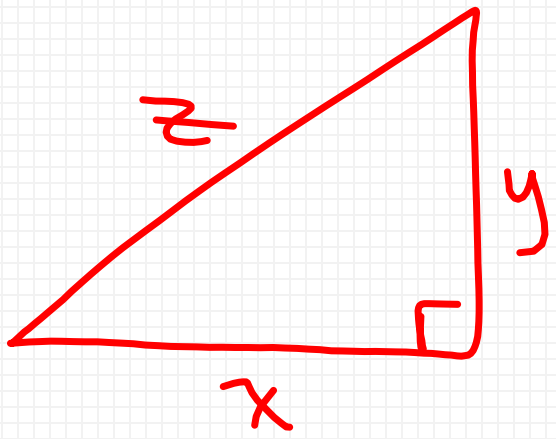
Chapter 10 AP Packet #12 (1973 BC4)

A kite flies according to the parametric equations $x = \frac{t}{8}$ and $y = -\frac{3}{64}t(t - 128)$ where t is measured in seconds and $0 \le t \le 90$.

c. At what rate is the string being reeled out at $t = 32$ seconds?

$x(32) = 4 \quad x'(32) = \frac{1}{8}$

$y(32) = 144 \quad y'(32) = 3$



$x^2 + y^2 = z^2$

$x\frac{dx}{dt} + y\frac{dy}{dt} = z\frac{dz}{dt}$

$$\frac{4\left(\frac{1}{8}\right) + 144(3)}{\sqrt{4^2 + 144^2}} = \sqrt{4^2 + 144^2}\cdot\frac{dz}{dt}$$

FREEZE:

$z = \sqrt{4^2 + 144^2}$

144

4

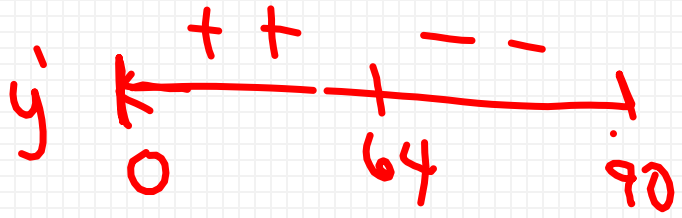
Chapter 10 AP Packet #12 (1973 BC4)

A kite flies according to the parametric equations $x = \frac{t}{8}$ and $y = -\frac{3}{64}t(t - 128)$ where t is measured in seconds and $0 \le t \le 90$.

d. At what time does the kite start to lose altitude?

$y'(t) = -\frac{3}{64}(2t - 128) = 0$

$t = 64$



SINCE y' CHANGES FROM + TO −

AT $t = 64$, KITE STARTS LOSING ALTITUDE AT $t = 64$.

Classwork:

AP Packet #14, 16

Homework:

AP Packet #1-17