

BE - Algebra 2 - Monday 5-9-11

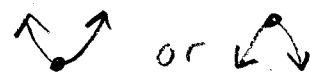
① WRITE THE "Standard Form"
OF THE EQUATION for:

Ⓐ Parabola Ⓑ Circle

Ⓒ Ellipse Ⓓ hyperbola

REF. CH 8

Ⓐ $y = a(x-h)^2 + k$



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



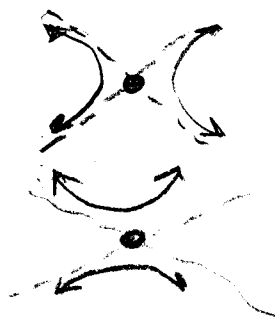
Ⓑ $(x-h)^2 + (y-k)^2 = r^2$ Ⓞ

Ⓒ $\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$

or $\frac{(y-k)^2}{a^2} + \frac{(x-h)^2}{b^2} = 1$

Ⓓ $\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$

or $\frac{(y-k)^2}{a^2} - \frac{(x-h)^2}{b^2} = 1$



Alg. 2 Homework Review Pg 564 #15-20

(15) Bacteria, reproduce $\Rightarrow$ binary fission

$$\Rightarrow 2^0, 2^1, 2^2, \dots$$

$$\Rightarrow t = 20 \text{ min} = \frac{1}{3} \text{ hr}$$

Using $B = B_0 e^{kt} \Rightarrow$ Find k

Since the number of bacteria doubles every 20 min. $\Rightarrow \frac{B}{B_0} = \frac{2}{1}$

$$\therefore 2 = e^{k \cdot 20} \quad \text{use } t = 20 \text{ min}$$

$$\ln 2 = 20k \ln e$$

$$.693147 = 20k$$

$$\therefore \boxed{k \approx 0.034657359}$$

(16) THE EQUATION TO MODEL THIS growth of bacteria is:

$$\boxed{B = B_0 e^{(0.034657)t}}$$

B_0 = starting number of bacteria

t = time in minutes

NOTE: if you wanted a formula for t in hours or days, how would you find one?

ANS: find k using $\frac{20}{60}$ or $\frac{20}{1440}$ $\leftarrow \frac{\text{min}}{\text{hr}}$ or $\frac{\text{min}}{\text{day}}$

① GDP of US $\uparrow 3.2\%$ from 1985-1999
 (in 1996 dollars) 14 years

WHAT DOES THIS MEAN?

In 1985 GDP = \$5717 billion = 5717×10^9
 $= 5.717 \times 10^{12}$

Assuming growth = $3.2\% = .032$ per year CONTINUES. ESTIMATE GDP IN 2010 = $t = 25$

1985 = $t = 0$ $r = k = 0.032$

Let's compare CONTINUOUS vs. discrete growth

④ discrete

$$A = A_0(1+r)^t$$

$$A = 5.712 \times 10^{12} (1.032)^{25}$$

$$A = 5.712 \times 10^{12} (2.19782)$$

$$A = 1.2554 \times 10^{13}$$

BOOK Answer $\downarrow$

$$A = 12.554 \text{ trillion}$$

Growth is yearly "chunks" of 3.2%
 A new dollar waits for a year and suddenly grows 3.2%.

⑥ CONTINUOUS

$$A = A_0 e^{rt}$$

$$A = 5.712 \times 10^{12} e^{(.032)25}$$

$$A = 5.712 \times 10^{12} (2.2255)$$

$$A = 1.2712 \times 10^{13}$$

$$A = 12.712 \text{ trillion}$$

CONTINUOUS GROWTH AT 3.2%.
 Every new dollar immediately starts to grow at 3.2% per yr.

⑧ $GDP = 20 \times 10^{12} = \text{when?} \Rightarrow \frac{A}{A_0} = \frac{20 \times 10^{12}}{5.712 \times 10^{12}} \approx 3.501$
 $\therefore \log(3.501) = t(\log 1.032)$
 $t = \frac{.54419}{.01368} \quad t \approx 39.78 \approx 40 \therefore \boxed{2025}$

①9 1928 } Woman's High Jump $\Rightarrow 62.5$ in
Olympics } Men's High Jump $\Rightarrow 76.5$ in

r for woman $\approx 0.38\%$ per year

r for men $\approx 0.3\%$ per year.

$$t = 0 = 1928$$

Find year when Woman's = Men's

Assume r STAYS AT .38 and .3%

$$r_w = .38\% = .0038 \quad r_m = .3\% = .003$$

$$H_w = H_0 (1 + r_w)^t \therefore H_w = 62.5 (1.0038)^t$$

$$H_m = H_0 (1 + r_m)^t \therefore H_m = 76.5 (1.003)^t$$

$$H_w = H_m \therefore 62.5 (1.0038)^t = 76.5 (1.003)^t$$

$$\therefore \frac{76.5}{62.5} = \frac{1.0038^t}{1.003^t}$$

$$\log(1.224) = \log\left(\frac{1.0038^t}{1.003^t}\right)$$

$$0.08778 = \log 1.0038^t - \log 1.003^t$$

$$0.08778 = t (.001647) - t (.001300)$$

$$0.08778 = .0003463 t$$

$$\therefore t = \frac{.08778}{.0003463} \approx 253.5 \text{ year} \approx 254$$

$$\therefore t = 0 = 1925 \Rightarrow \approx \boxed{2182 \text{ } H_w = H_m}$$

FYI

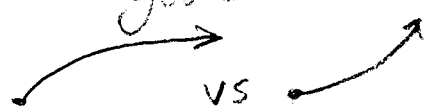
Birmingham News

Sunday May 8, 2011 AHSAA

State Track & Field Results

High Jump

3A Girls = $5'02'' = 62$ in. Alona @ Bayside3A Boys = $6'02'' = 74$ in. Chris @ Rogers6A Girls = $5'9'' = 69$ in. Chardonn @ Hoover6A Boys = $6'6'' = 78$ in. Jaylon @ Hoover

Exponential Growth is NOT a good model for this record 

World Record $\Rightarrow$ Mens: Javier Sotomayor $8'1\frac{1}{2}''$ Cuba 1993Womens: Stelka Kostadinova $6'10\frac{1}{2}''$ Bulgaria 1987

(20) New House 10 years Ago

$$C_0 = \$120,000$$

$$C = \$191,000$$

$$t = 10 \text{ years}$$

Assume * steady growth $\Rightarrow$ find r
 *(use e)

$$C = C_0 e^{rt}$$

$$191000 = 120000 e^{10r}$$

$$\frac{191000}{120000} = e^{10r}$$

$$\ln(1.5917) = 10r$$

$$\frac{0.46478}{10} = r$$

$$r = 0.046478$$

$$r \approx 4.6 \% \text{ per Year}$$

Book used $C = C_0(1+r)^t \approx 4.8\%$

Yearly "chunks" vs steady growth

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Homework: ① Pg. 563-565

4-9, 21, 23, 34-37.

② Read

"An Intuitive Guide to
Exponential Functions and e "
(see link @ Bulldogmath.com)
