Welcome MYP Math 9: Please reflect.

	Assignment Effort Grade (Circle One)	Comments (What was interesting or challenging?)
Monday Date: 2/12 Topic: Nothing due... Index Laws Quiz was Friday!	0 1 2	
Tuesday Date: 2/13 Topic: 23B Exponential Functions, 23C Graphs	0 1 2	
Wednesday Date: 2/14 Topic: 23D: Exponential Growth	0 1 2	
Thursday Date: 2/15 Topic: 23E: Exponential Decay	0 1 2	
Friday Date: Topic: **Enjoy your long weekend! :)**	0 1 2	

Exponential Growth & Decay (23D & E)

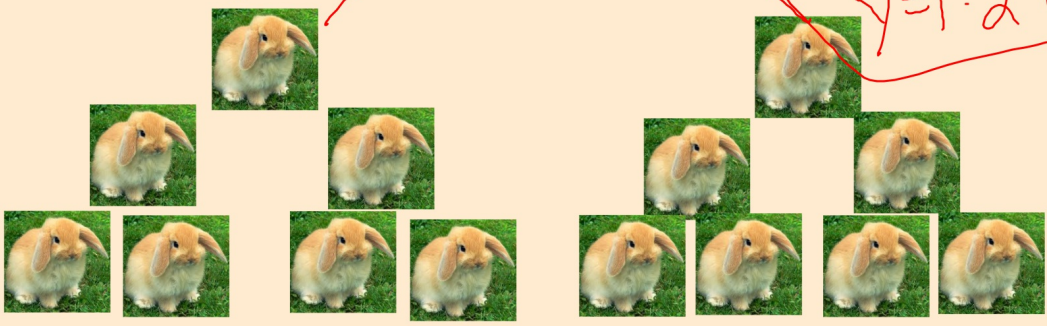
Warm-up:

2 rabbit babies were born.
Those 2 babies had 2 babies each.
Then each of those babies had 2 babies!
Draw a picture to model the scenario.

$y = 2^x$

$2^0 = 1$

$y = 1 \cdot 2^x$



Done:? What equation models this growth?

Class Plan:

1. Warm-up

2. 23C Growth, 23D Decay

3. Practice

D	GROWTH
E	DECAY

Do: Choose

Growing Rabbit Population or **Cooling Liquid Temperature**

Fill in Table and Graph

Work Together!

2) Do the otherside!

3) **Done:?** Ask teacher about logarithms.

D GROWTH

Example 6 Self Tutor

The population of rabbits on a farm is given by the function $R = 50 \times (1.07)^n$ where n is the number of weeks after the rabbit farm was established.

a What was the original rabbit population?

b How many rabbits were present after 15 weeks?

c How many rabbits were present after 30 weeks?

d Sketch the graph of R against n for $n \geqslant 0$.

e How long will it take for the population to reach 500?

D Show work by substitution! GROWTH

Directions:

1) Read the problem above, then enter the population equation into your graphing calculator. Use the table function to complete the table (*the table answers questions* ***a, b, c,*** and ***e***).

Time (weeks)	0 (Question **a**)	15 (Question **b**)	30 (Question **c**)	• • •	??_____
Population (rabbits)	50	137			500 Rabbits!

$$R = 50 \times (1.07)^n$$

$R = 50(1.07)^{15}$

$R \approx 50(2.76)$

$R \approx 138$

D Show work by substitution! GROWTH

Show work

Directions:

1) Read the problem above, then enter the population equation into your graphing calculator. Use the table function to complete the table (*the table answers questions* ***a, b, c,*** and ***e***).

Time (weeks)	0 (Question **a**)	15 (Question **b**)	30 (Question **c**)	• • •	??_____
Population (rabbits)				• • •	500 Rabbits!

$$R = 50 \times (1.07)^n$$

$R = 50(1.07)^{15}$

$R = 50(2.76)$

$R \approx 137.95$ Rabbits

Solution

a When $n = 0$, $R = 50 \times (1.07)^0$

$= 50 \times 1$

$= 50$ $\therefore$ there were 50 rabbits originally.

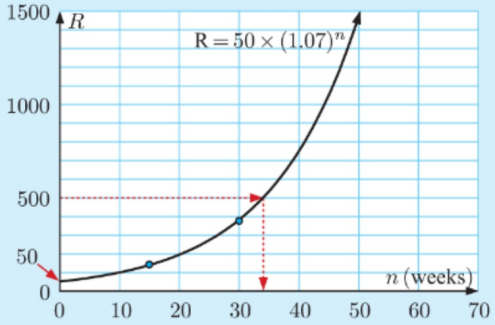
b When $n = 15$, $R = 50 \times (1.07)^{15}$

≈ 137.95 $\therefore$ there were 138 rabbits after 15 weeks.

c When $n = 30$, $R = 50 \times (1.07)^{30}$

≈ 380.61 $\therefore$ there were 381 rabbits after 30 weeks.

d



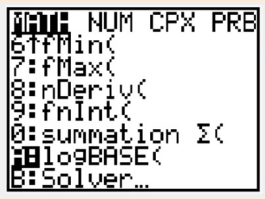
e From the graph, the number of weeks to reach 500 rabbits is approximately 34.

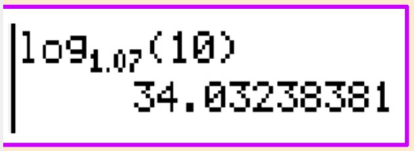
Growth: # weeks for 500 bunnys??

$$y = b^x \Leftrightarrow x = \log_b(y)$$

$$10 = 1.07^x \Leftrightarrow x = \log_{1.07}(10)$$

$$x \approx 34.03, \quad 1.07^{34.03} \approx 10$$





1) MATH
2) logBASE(
3) Enter base and y-value)

Decay: # minutes for 25°C??

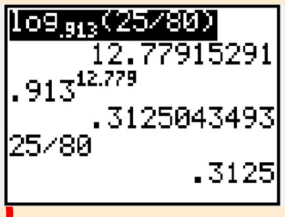
$$y = b^x \Leftrightarrow x = \log_b(y)$$

$$\left(\frac{25}{80}\right) = .913^x \Leftrightarrow x = \log_{.913}\left(\frac{25}{80}\right)$$

.3125

$$x \approx 12.779, \quad .913^{12.779} \approx \left(\frac{25}{80}\right) \approx .3125$$

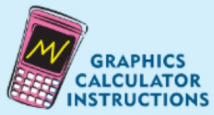
1) MATH
2) logBASE(
3) Enter base and y-value)



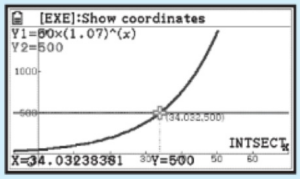
Solution

e From the graph, the number of weeks to reach 500 rabbits is approximately 34.

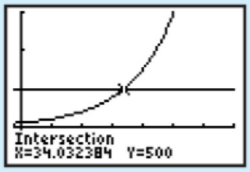
Alternatively, we could use technology to find where the graph cuts the line $R = 500$.



Casio fx-CG20



TI-84 Plus



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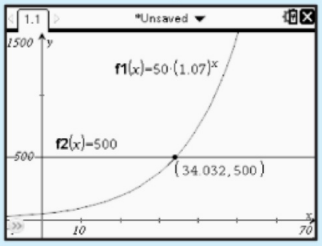


$\therefore$ it will take about 34 weeks.

E DECAY

5 The temperature of a liquid t minutes after it was heated, is given by $T = 80 \times (0.913)^t$ °C.

a Find the initial temperature of the liquid.

b Find the temperature of the liquid after:

i 12 minutes **ii** 24 minutes **iii** 36 minutes.

c Sketch the graph of T against t for $t \geqslant 0$.

d Find the time taken for the temperature to fall to 25°C.

E Show work by substitution! DECAY

Directions:

1) Read the problem above, then enter the temperature equation into your graphing calculator. Use the table function to complete the table (*table answers questions* ***a, b, c, e***).

Time (minutes)	0 (Question a)	12 (Question bi)	24 (bii)	36 (biii)	• • •	??_____
Temperature (Degrees $^{\circ}C$)						$25^{\circ}C$

$$T = 80 \times (0.913)^t$$

$T = 80(.913)^{24}$

$T = 80(.112)$

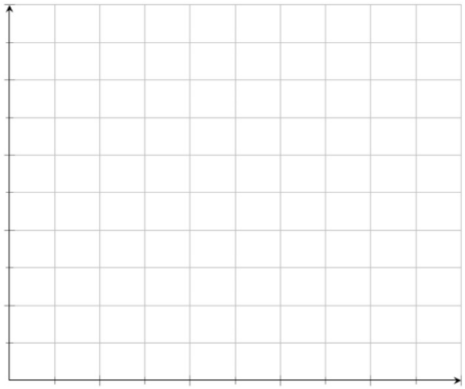
$T \approx 9^{\circ}C$

E Show work by substitution! DECAY

Directions:

1) Read the problem above, then enter the temperature equation into your graphing calculator. Use the table function to complete the table (*table answers questions* ***a, b, c, e***).

Time (minutes)	0 (Question a)	12 (Question bi)	24 (bii)	36 (biii)	• • •	??_____
Temperature (Degrees $^{\circ}C$)		26.8				$25^{\circ}C$



$$T = 80 \times (0.913)^t$$

$T = 80(.913)^{12}$

$T \approx 80(.335)$

$T \approx 26.8^{\circ}C$

E DECAY

5 The temperature of a liquid t minutes after it was heated, is given by $T = 80 \times (0.913)^t$ °C.

a Find the initial temperature of the liquid.

b Find the temperature of the liquid after:

i 12 minutes **ii** 24 minutes **iii** 36 minutes.

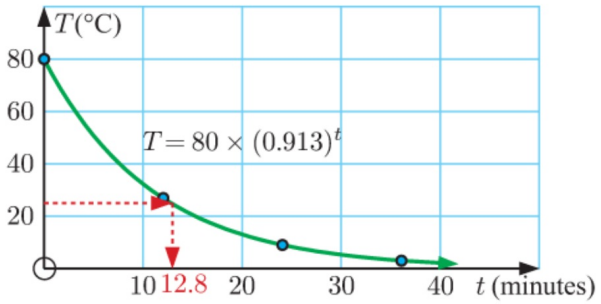
c Sketch the graph of T against t for $t \geqslant 0$.

d Find the time taken for the temperature to fall to 25°C.

Solution

5 **a** 80°C **b** **i** 26.8°C **ii** 9.00°C **iii** 3.02°C

c



d ≈ 12.8 minutes

Exercises...
Continue working on previous handouts from your textbook!
Growth 23D & Decay 23E

Quiz scores posted by 3 pm.

Quizzes back on Tuesday