

## CH. 8 Exponential Functions Assessment

Name Exemplar PER \_\_\_\_\_ DATE \_\_\_\_\_

FLE1	FLE2	FLE5	FIFC7e

*Computation*

4	3	2	1
Response has no recall errors, <i>minimal</i> procedural errors* and no conceptual errors**	Response has no recall errors, minimal procedural errors and <i>minimal</i> conceptual errors	Response has no recall errors, but has several procedural errors <u>OR</u> several conceptual errors	Recall errors exist <u>OR</u> Steps taken are not related to problem <u>OR</u> Response left blank

*Written Responses*

4	3	2	1
Response is written in a complete sentence and uses appropriate academic vocab	Response is written in a complete sentence, and minimal errors exist in use of academic vocab	Response is not written in a complete sentence <u>OR</u> no academic vocab	Concept of response is not related to problem <u>OR</u> Response is left blank

\*Procedural errors are mistakes made in the math

\*\*Conceptual errors are mistakes made in the steps one take

1. (FLE1) Write your answer in complete sentences in the space provided.

Jamil has two bank accounts from which he has never withdrawn any money. The table below shows the balances in Jamil's two accounts over 6 years.

**Anil's Bank Accounts**

Time (years)	Account 1	Account 2
0	\$200.00	\$200.00
1	\$240.00	\$240.00
3	\$320.00	\$345.60
6	\$440.00	\$597.20

<p>0 200 ↓ +40</p> <p>1 240 ↓ +40</p> <p>2 280 ↓ +40</p> <p>3 320 ↓ +40</p> <p>4 360 ↓ +40</p> <p>5 400 ↓ +40</p> <p>6 440 ↓ +40</p>	<p>0 200 ↓ × 1.2</p> <p>1 240 ↓ × 1.2</p> <p>2 288 ↓ × 1.2</p> <p>3 345.60 ↓ × 1.2</p> <p>4 414.72 ↓ × 1.2</p> <p>5 497.66 ↓ × 1.2</p> <p>6 597.20 ↓ × 1.2</p>
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If he never withdraws money from either account, explain how to determine which account exhibits linear growth and which exhibits exponential growth. Show your work.

Account 1 exhibits a linear growth since there is a common difference of \$40 between from year to year.

Account 2 exhibits an exponential growth since each year the account balance is being multiplied by 1.2.

2. (FLE1) Show your work neatly and circle the correct answer(s).

Mr. and Mrs. Davis each have a retirement account, and they have bank accounts for each of their two children. The tables below represent current balances for the four accounts after x years.

Which of the accounts show an exponential growth pattern? Select all that apply.

A.

x (Number of Years)	y (Balance in dollars)
1	544
3	1,584
5	2,624
8	4,184
12	6,264

1 544 ↓ +520

2 1064 ↓ +520

3 1584 ↓ +520

4 2104 ↓ +520

5 2624 ↓ +520

LINEAR!

B.

x (Number of Years)	y (Balance in dollars)
2	469
3	687
5	1,123
7	1,559
10	2,213

1 251 ↓ -218

2 469 ↓ +218

3 687 ↓ +218

4 905 ↓ +218

5 1,123 ↓ +218

LINEAR!

C.

x (Number of Years)	y (Balance in dollars)
2	9
4	81
5	243
7	2,187
8	6,561

1 3 ↓ × 3

2 9 ↓ × 3

3 27 ↓ × 3

4 81 ↓ × 3

5 243

3. (FLE2) Show your work neatly and circle your answer.

This table shows pairs of values for a function,  $f(n)$ .

$n$	1	2	3	4	5
$f(n)$	1.5	0.3	0.06	0.012	0.0024

Which equation defines the function?

- A.  $f(n) = 0.2(1.5)^n$   
 B.  $f(n) = 0.2(7.5)^n$   
 C.  $f(n) = 1.5(0.2)^n$   
 D.  $f(n) = 7.5(0.2)^n$

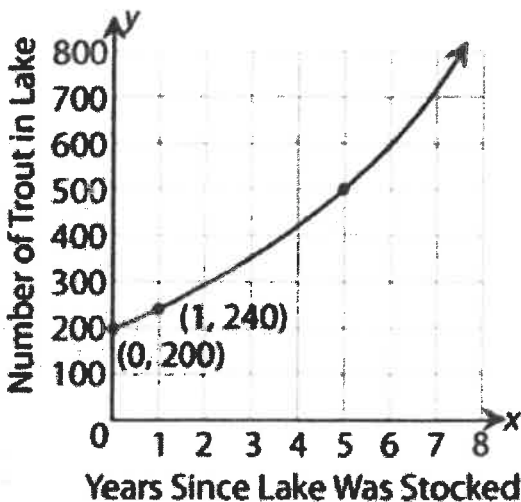
$$\frac{0.3}{1.5} = 0.2$$

$$\frac{0.012}{0.06} = 0.2 \leftarrow \text{growth rate}$$

$$\frac{1.5}{0.2} = 7.5 \leftarrow \text{"starting value" (zeroth term)}$$

4. (FLE2) Show your work neatly and box your answer.

A lake was restocked with native trout. The number of trout increased by the same percent each year, as shown in the graph below.



$$y\text{-intercept} = 200$$

$$\text{growth rate} = \frac{240}{200} = 1.2$$

$$y = 200(1.2)^x$$

Write a function that represents the relationship between  $y$ , the number of trout in the lake, and  $x$ , the years since the lake was restocked.

5. (FLE5) Explain your answer(s) in complete sentences in the space provided.

The number of ants in an ant colony can be estimated using the function shown below,

$$f(t) = 2 \cdot b^t$$

where  $f(t)$  represents the ant population in millions and  $t$  represents time in years.

Which statements about the function are true? Choose all that are correct and explain how you know in the space below.

<p><input checked="" type="checkbox"/> A. The number 2 in the function represents the beginning population in millions.</p> <p><input checked="" type="checkbox"/> B. The value of <math>b</math> in the function represents the beginning population in millions.</p> <p><input checked="" type="checkbox"/> C. The value of <math>b</math> in the function represents the growth rate of the function.</p> <p><input checked="" type="checkbox"/> D. The value of <math>f(0)</math> must be 1 because <math>b^0 = 1</math>.</p> <p><input checked="" type="checkbox"/> E. The number 2 in the function represents the growth rate of the function.</p> <p><input checked="" type="checkbox"/> F. The value of <math>f(1)</math> must be 2 because <math>b^1 = 1</math>.</p> <p style="text-align: center;">↑ not true!</p>	<p>2 is the "starting value"</p> <hr/> <p>so it makes sense to represent the "beginning population"</p> <hr/> <p><math>b</math> is the growth rate</p> <hr/> <p>since it is being raised to a power of "t"</p>
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6. (FLE5) Write your answer in complete sentences in the space provided.

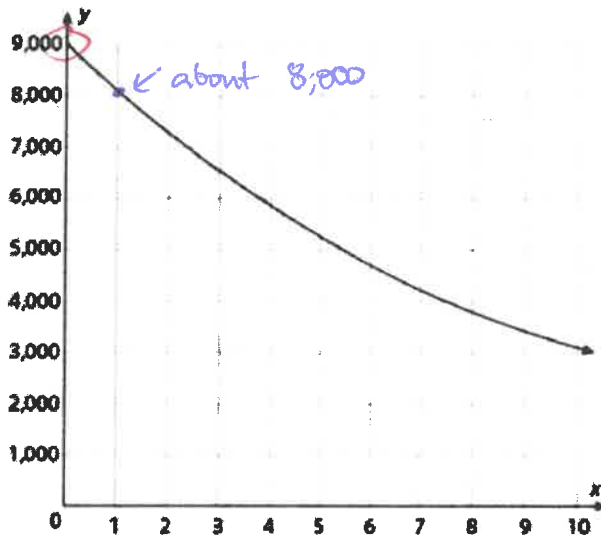
The value of a motorcycle changes according to the equation  $V = 5,000(1.03)^t$ , where  $V$  = value in dollars and  $t$  = time in years.

What do the numerical values of the equation represent? Explain each in the space below.

5000 represents the initial cost of the motorcycle and 1.03 implies that the value of the motorcycle is increasing by 3% each year.

7. (FIFC7e) Show your work neatly.

The number of movie rental stores in the country changed over a 10-year period as shown in the graph below. Let  $x$  represent the time in years and  $y$  represent the number of movie rental stores.



Which is the best approximation for the equation describing this relationship?

- A.  $y = 9,000(0.9)^x$   
 B.  $y = 9,000 - 3,000x$  ← Linear!  
 C.  $y = 9,000(0.1)^x$   
 D.  $y = 9,000 - 6,000x$  ← Linear!

Starting value = 9,000

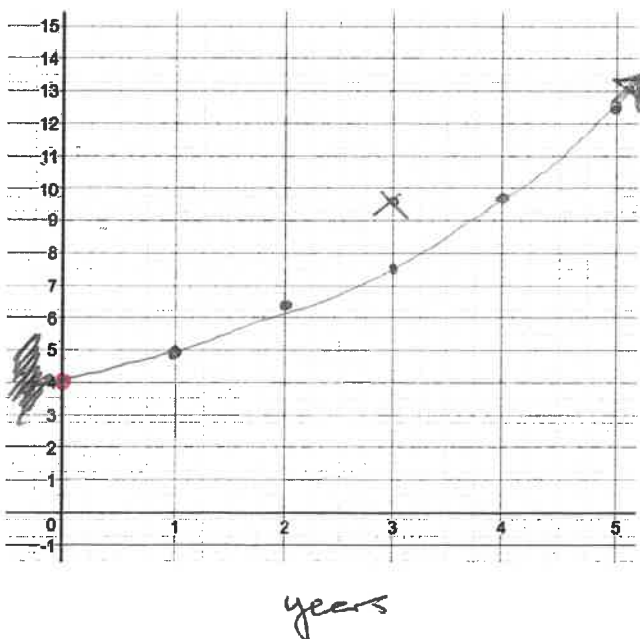
Growth rate

$$\frac{8000}{9000} = 0.8\bar{8}$$

8. (FIFC7e) Show your work neatly.

The number of registered voters in a certain state is growing according to the equation  $y = 4(1.25)^x$ . If  $x$  is the time in years and  $y$  represents millions of voters, draw a graph that represents this equation.

(NOTE: label your axes!)



$$y = 4(1.25)^x$$

x	y
0	$4(1.25)^0 = 4$
1	$4(1.25)^1 = 5$
2	$4(1.25)^2 = 6.25$
3	$4(1.25)^3 = 7.81$
4	$4(1.25)^4 = 9.77$
5	$4(1.25)^5 = 12.21$

