

# Algebra 1 Unit 3 Common Assessment

## Exponential Functions

### Answers and Directions Sheet

#### **Teacher Directions:**

- Print two test booklets:
  - a. Part I is made up of questions 1-11. A DataDirector answer sheet will be used for this part. See the next two pages for directions on Data Director. Print a class set of assessments for #1-11 and do not allow students to write in this booklet. Make scrap paper available to students to work out any problems.
  - b. Part II is made up of questions 12-15. Data Director will not be used for this part. Print assessments so that each student has their own and have them record their answers and work in this booklet.
- Students may use a calculator on both parts of the assessment.
- Encourage students to carefully and thoroughly read the directions. Failure to do so may result in a loss of points on several problems, particularly items 13 c, d and 14.
- The test has a total of 25 possible points.

#### **Directions to Students:**

- Do not write on Part I of the assessment. Record your answers on the provided answer sheet. Scrap paper is available for you to use. You may write on Part II of the assessment only.
- A calculator is available for both parts of this assessment.
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- You will have the entire hour to complete the test.
- Please use your best test taking strategies.

# Printing Answer Documents

[www.achievedata.com/macomb](http://www.achievedata.com/macomb)

- \_\_\_\_\_ Go to the Intranet
  
- \_\_\_\_\_ On the left-hand column under *"Interactive Tools"* click *"Data Director"*
  
- \_\_\_\_\_ Enter your User Name (first initial of first name followed by your last name) and Password if you forgot your password, select the link below the *"Login"* key
  
- \_\_\_\_\_ Select the paper and pencil icon titled *"Assessments"*. You will find it in the lower left hand corner of the screen.
  
- \_\_\_\_\_ Enter *"83342"* in the *"Search by Assessment ID"* Box. Make sure the year selected is 2012-2013.
  
- \_\_\_\_\_ Select the *"Shared Assessments"* folder
  
- \_\_\_\_\_ Select the file *"2012-2013, HLW, Algebra 1, Unit 3 Exponential Functions"*
  
- \_\_\_\_\_ Scroll down to the bottom of the screen. Select the PDF file in the Downloadable Assessment Materials box titled *"with student names"*
  
- \_\_\_\_\_ In the first box titled *"Print answer sheets for individual or multiple classes"* select *"Continue to next step"*.
  
- \_\_\_\_\_ Choose your name, the correct semester, and the periods you are printing answer sheets for. To select multiple periods, hold down the CTRL key. **Do not select a grade** as it is possible you have students from multiple grades inside your class. To deselect a grade, hold down the CTRL key and select the grade. Click *"Generate Report"*.
  
- \_\_\_\_\_ Follow directions on page for printing.

# Printing Reports

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- \_\_\_\_\_ Follow directions by your scanner to scan your bubble sheets.
  
- \_\_\_\_\_ Click on the Intranet
  
- \_\_\_\_\_ On the left-hand column under *"Interactive Tools"* click *"Data Director"*
  
- \_\_\_\_\_ Enter your User Name (first initial of first name followed by your last name) and Password (if you forgot your password, select the link below the *"Login"* key
  
- \_\_\_\_\_ Select the paper and pencil icon titled *"Assessments"*. You will find it in the lower left hand corner of the screen.
  
- \_\_\_\_\_ Enter *"83342"* in the *"Search by Assessment ID Box."* Make sure the year selected is 2012-2013.
  
- \_\_\_\_\_ Select the *"Shared Assessments"* folder
  
- \_\_\_\_\_ Select the file *"2012-2013, HLW, Algebra 1, Unit 3 Exponential Functions"*
  
- \_\_\_\_\_ Select *"Classroom Assessment Report."* You will find it on the far right side of the screen under *"Reports related to this assessment."*
  
- \_\_\_\_\_ Click the PDF Icon to open the file
  
- \_\_\_\_\_ Print

## Grading the Assessment

**Abbreviations:** see page 27 of the [hyperlinked document](#) for a detailed explanation of the following codes

SR – Selected Response

ER – Extended Response

CR- Constructed Response

Part I				
Item No.	Item Type	Points	Answer	Standard
1	SR	1	b	F.IF.2
2	SR	1	c ; Students may answer this question using a table or a graph	A.REI.11
3	SR	1	c	F.IF.4
4	SR	1	d	8.EE.1
5	SR	1	b	8.EE.1
6	SR	1	b	8.EE.1
7	SR	1	b	8.EE.1
8	SR	1	b	8.EE.1
9	SR	1	c	8.EE.1
10	SR	1	b	8.EE.1
11	SR	1	c	8.EE.1
	<b>TOTAL</b>	<b>11</b>		

Properties of Exponents (sections 7.1, 7.3-7.5) are 8<sup>th</sup> grade standards. 8<sup>th</sup> teachers have taught this material starting in SY 2012/2013. You may consider formatively assessing your students on this material at the beginning of the unit starting in SY 2013/2014 to gauge student knowledge of these concepts.

Part II				
Item No.	Item Type	Points	Answer	Standard
12	CR	2	$2 \cdot 3^x$ ; Students may write this using either an equation or function notation. 1 Point for a = 2 1 Point for b = 3	F.BF.1 A.CED.2 F.LE.2
13	CR	8	a) $13,000 \cdot (0.85)^x$ ; Students may write this using either an equation or function notation. 1 Point for a = 13,000 1 Point for b = 0.85  b) \$2559.37 ; Students may round down to \$2559 for full credit 1 point for correct answer. If a student wrote an incorrect equation	a) F.BF.1 a) A.CED.2 a) F.LE.2 b) F.IF.2 c) A.CED.2 c) F.IF.7

			<p>in part a) but successfully evaluated their incorrect equation for 10 years, then give full credit (1 point)</p> <p>c) If students successfully graphed their incorrect equation, then students will not be marked down.  1 point for appropriate scale  1 point for appropriate label  1 point for correct graph using equation from part a)</p> <p>d) Domain: <math>[0, 86]</math> or anything within that range. At 87 years, the car is worth less than 1 cent.  Range: <math>[0, 13000]</math> or anything within that range. The cars value cannot exceed \$13000 or fall below \$0.  1 point for appropriate domain and appropriate explanation  1 point for appropriate range and appropriate explanation</p>	d) F.IF.5																														
14	CR	2	<p>Range: <math>\{0.8, 2, 50\}</math>  2 Points for all three correct answers  1 Point for two of three correct answers  0 Point for one or less correct answers</p>	F.IF.1 F.IF.2																														
15	CR	2	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Months</th> <th>Option 1</th> <th>Option 2</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>5,600</td> <td>5</td> </tr> <tr> <td>2</td> <td>8,700</td> <td>10</td> </tr> <tr> <td>3</td> <td>11,800</td> <td>20</td> </tr> <tr> <td>4</td> <td>14,900</td> <td>40</td> </tr> <tr> <td>5</td> <td>18,000</td> <td>80</td> </tr> <tr> <td>...</td> <td>...</td> <td>...</td> </tr> <tr> <td>13</td> <td>42,800</td> <td>20,480</td> </tr> <tr> <td>14</td> <td>45,900</td> <td>40,960</td> </tr> <tr> <td>15</td> <td>49,000</td> <td>81,920</td> </tr> </tbody> </table> <p>Answers may vary but sample responses include: a student would choose Option 1 if they plan on working for 14 months or less. If a student plans on working 15 months or longer, then they should choose Option 2 because that is when Option 2 exceeds Option 1 in pay.  2 Points for appropriate explanation with no errors in reasoning  1 Point for appropriate explanation with minor errors in reasoning  0 Points for no explanation or illogical reasoning</p>	Months	Option 1	Option 2	1	5,600	5	2	8,700	10	3	11,800	20	4	14,900	40	5	18,000	80	...	...	...	13	42,800	20,480	14	45,900	40,960	15	49,000	81,920	F.LE.3
Months	Option 1	Option 2																																
1	5,600	5																																
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	<b>TOTAL</b>	14																																

# Algebra 1 Unit 3 Common Assessment

## Exponential Functions

### PART I

Use the following information for questions 1-3.

Growth of bacteria in milk causes a need to “time-date” the containers so that shoppers will buy the milk and consume it before number of bacteria grows too large, making the milk unsafe to drink. The model  $B(x) = 500 \cdot (2.8)^x$  represents the growth of the bacteria in milk, where  $B(x)$  is the total number of bacteria present in the milk, and  $x$  represents the number of days after the milk has been packaged. Assume for the problem that this model is accurate, and that no other factors affect the milk.

- 1) What is the bacteria count in the milk 4 days after it has been packaged?
  - a) Approximately 11,000
  - b) Approximately 31,000
  - c) Approximately 86,000
  - d) Approximately 241,000
  
- 2) Suppose that milk is safe to drink as long as the bacteria count is less than 5,000,000. What is the first day after packaging that the milk becomes unsafe to drink?
  - a) The 5<sup>th</sup> day
  - b) The 7<sup>th</sup> day
  - c) The 9<sup>th</sup> day
  - d) The 10<sup>th</sup> day
  
- 3) Which one of the statements below is true?
  - a) Using the function  $B(x) = 500 \cdot (2.8)^x$ , 500 represents the rate of growth of the bacteria
  - b) The number of new bacteria added each day remains the same
  - c) The graph of the amount of bacteria has a horizontal asymptote

Completely simplify the expression for questions 4-11.

4)  $(-5.1)^0$

- a) -5.1                      b) -1                      c) 0                      d) 1

5)  $\frac{3}{g^{-2}h^3}$

- a)  $\frac{3}{g^2h^3}$                       b)  $\frac{3g^2}{h^3}$                       c)  $\frac{6g}{h^3}$                       d)  $\frac{3}{gh^3}$

6)  $4^{-6} \cdot 4^7$

a) 1

b) 4

c) 13

d)  $4^{13}$

7)  $4c^{-1} \cdot 3c^{10}$

a)  $12c^{-10}$

b)  $12c^9$

c)  $7c^{-10}$

d)  $7c^9$

8)  $(m^7)^2$

a)  $m^9$

b)  $m^{14}$

c)  $m^{49}$

d)  $2m^{14}$

9)  $(y^{-5})^{-10} \cdot y^{10}$

a)  $y^{-60}$

b)  $y^{-40}$

c)  $y^{60}$

d)  $y^{500}$

10)  $\frac{n^6}{n^2}$

a)  $\frac{1}{n^4}$

b)  $n^4$

c)  $n^8$

d)  $n^{12}$

11)  $\frac{c^8d^{-12}}{c^{-4}d^{-8}}$

a)  $c^{12}d^4$

b)  $c^{-4}d^{-4}$

c)  $\frac{c^{12}}{d^4}$

d)  $\frac{d^{-4}}{c^{-12}}$

## PART II

12) E. Coli bacteria is growing on your kitchen counter. The amount of bacteria after 1, 2, 3, and 4 hours is given in the table below. Using the table, write a rule that represents the growth of the bacteria.

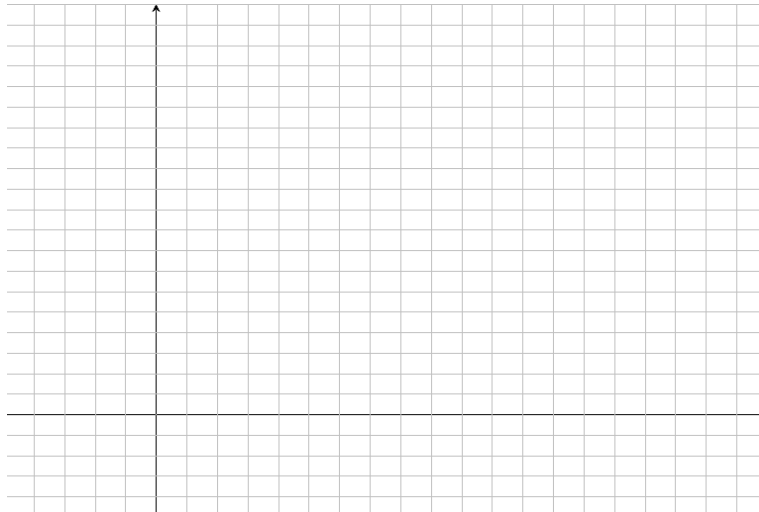
Time (hours)	E. Coli Bacteria
1	6
2	18
3	54
4	162

13) A high school senior buys a car for \$13,000. The value of the car decreases by 15% per year.

a) Write an equation that models this context

b) How much is the car worth after 10 years?

c) Graph your equation from part a). **Scale and label the graph.**



d) What is a **real world domain and range** for this problem? Explain your answer.

14) Determine the range of the function  $y = 2(5)^x$  for a domain of  $\{-2, 0, 2\}$



15) An employer offers you a position and gives you two options for your pay:

Option 1: You would be paid \$3100 per month and get a signing bonus of \$2500

Option 2: You would get paid \$5 for the first month and then your pay would double each month after that.

Which option would you chose? Explain how you would make your decision. Under what conditions would you pick option 1? Under what conditions would you pick option 2? Use specific mathematical evidence (like equation, table, and/or graph) to support your claims. A table and graph has been provided for you to use.