Name _____ Date _____ Class _____

Unit Test

Growing, Growing, Growing

1. Several species of whale have been declared endangered. When the populations of a particular whale species fall dangerously low, biologists encourage governments to agree to a ban on hunting the species.
Suppose that, in the year 2000, there were only 5,000 whales of a particular species and that the population was predicted to continue to decline as shown in the table.

Year (y)	Whales (w)
0 (2000)	5,000
1 (2001)	4,500
2 (2002)	4,050
3 (2003)	3,645
4 (2004)	3,281
5 (2005)	2,952
6 (2006)	2,657

a. Which equation below models this population pattern?

A. $W = 5{,}000(0.1^y)$ **B.** $W = 5{,}000(0.9^y)$

C. $W = 5{,}000 - 500^y$ **D.** $W = 5{,}000^y$

b. What is the **decay factor** for the relationship? Explain how you determined your answer.

c. According to the **prediction**, what will the whale population be in **2007**?

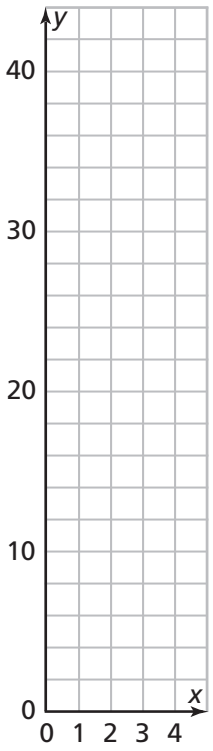
d. Suppose the danger point for these whales comes when the **population falls below 2,000 whales**.
When will this happen?

Explain.

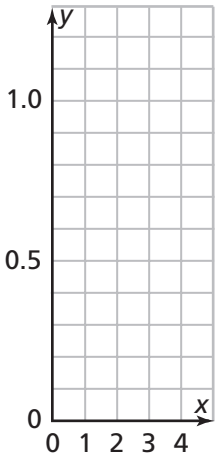
Unit Test *(continued)*

2. a. On Grid I, sketch and label graphs of $y = 2^x$ and $y = 2.5^x$. On Grid II, sketch and label graphs of $y = 0.5^x$ and $y = 0.8^x$.

Grid I



Grid II



b. In Grid I, which **equation** represents the **faster rate of growth**?

c. In Grid II, which **equation** represents the **faster rate of decay**?

d. How does the **graph** help you to answer parts (b) and (c)?

e. How do the **equations** help you to answer parts (b) and (c)?

Unit Test *(continued)*

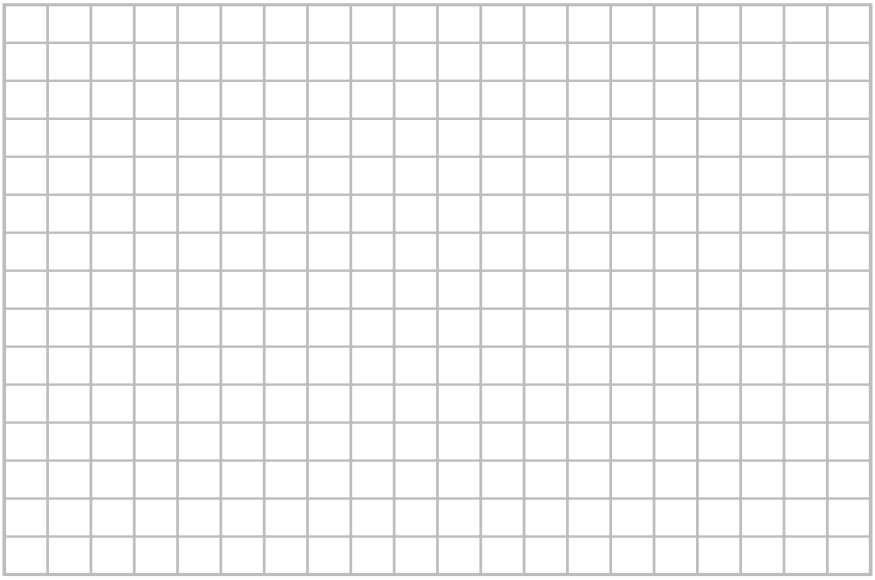
3. Belinda has a plan for distributing prize money for a trivia contest. For the **first correct response**, the contestant will receive $500. For the **second correct response**, the contestant will receive **an additional** $100, for a total of $600. For the **third correct response**, the contestant will receive $100 **more**, for a total of $700. Belinda's plan continues in this pattern.

a. Make a table showing the amount of money a contestant would receive for answering questions 1 through 6 correctly.

Trivia Contest Prize Money

Number of Correct Responses	1	2	3	4	5	6
Total Money Received	$500	$600	$700			

b. Make a graph of the data in your table.



c. Write an **equation** for the relationship between the **number of correct responses** c and the **amount of money** the contestant will receive m.

Unit Test *(continued)*

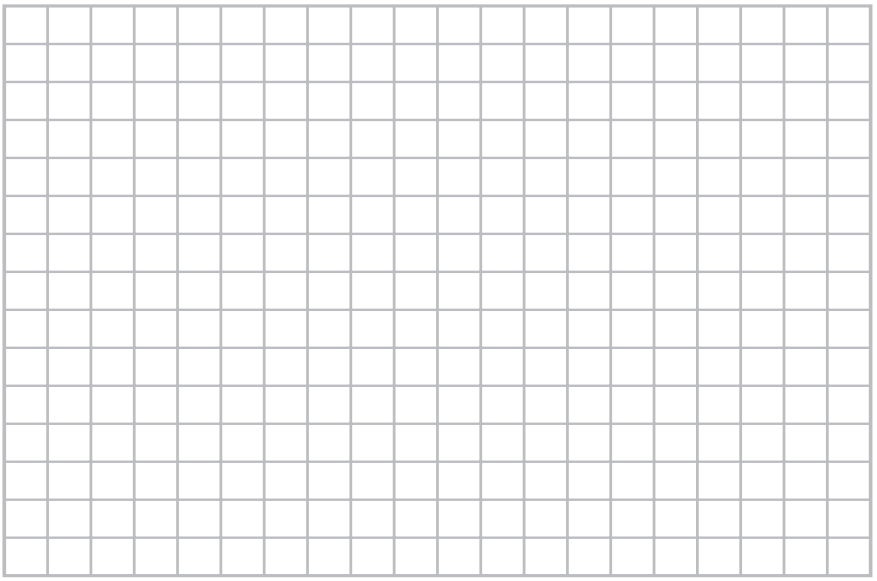
4. Monty has a different plan for distributing prize money for the trivia contest. The contestant will receive $5 for the first correct response. For the second correct response, the total winnings will increase to $25, for the third correct response, the total winnings will increase to $125, and so on.

a. Make a table showing a contestant's earnings for answering questions 1 through 6 correctly.

Trivia Contest Prize Money

Number of Correct Responses	1	2	3	4	5	6
Total Earnings	$5	$25	$125			

b. Make a graph of the data in your table.



c. Write an **equation** for the *relationship* between the **number of correct responses** c and the **amount of money** the contestant will receive m.

Unit Test *(continued)*

5. How are the patterns of change in Belinda's and Monty's plans (Exercises 3 and 4) alike?

How are they different?

6. Decide whether each of the following statements is true or false. Explain your reasoning.

a. $25^{100} \times 25^{10} = 25^{1000}$

b. $4^9 \times 5^9 - 9^9$

c. $(3^6)^8 = 3^{48}$

d. $\frac{10^6}{10^2} = 10^3$

e. $7^0 = 1$

7. Write $11 \times 11 \times 11$ in exponential form.