

GSE Algebra I
Common Unit Pre/Post Assessment
Unit 4: Modeling and Analyzing Exponential Functions
Student Version

Directions:

Today you will be taking the GSE Algebra I, Unit 4 assessment Modeling and Analyzing Exponential Functions.

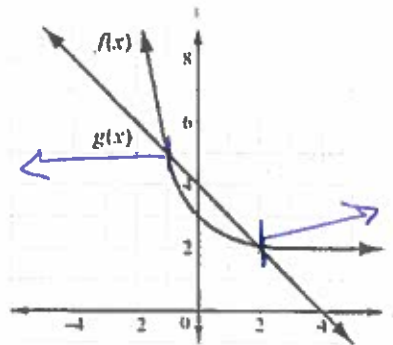
You will have 60 minutes to complete the assessment.

Do your best work. Read each question carefully. For each selected-response item, indicate the best answer. For each constructed-response item, provide the most detailed and accurate response possible. Be sure to record your responses, legibly, on the answer document provided. The standard for each assessment item is referenced above the item.

You may use scratch paper to complete your work. The use of a scientific or graphing calculator may be necessary to solve some assessment items.

A.CED.1

1. Two functions are graphed on this coordinate plane. For what values of x does it appear that $f(x)$ is greater than $g(x)$?

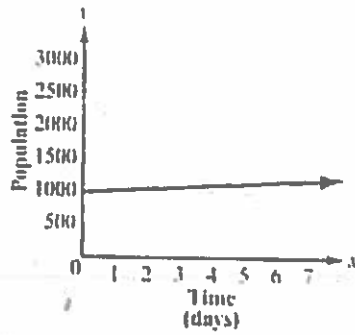


- a. $2 < x < 5$
 b. $-1 < x < 1.9$
 c. $x < 2$ or $x > 5$
 d. $x < -1$ or $x > 1.9$

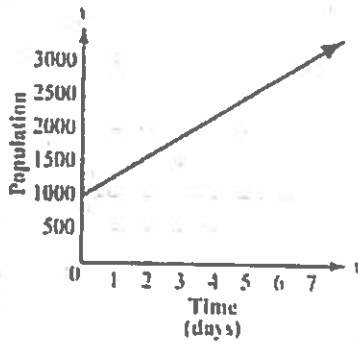
42

A.CED.1

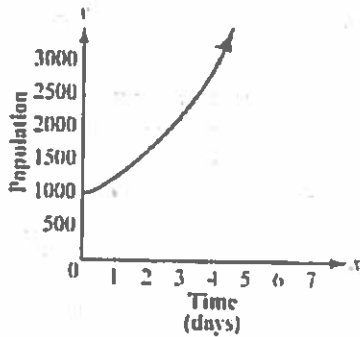
2. A colony of bacteria is increasing at a rate of 30% per day. The colony began with a population of 1000. Which graph best models the population growth of the colony of bacteria?



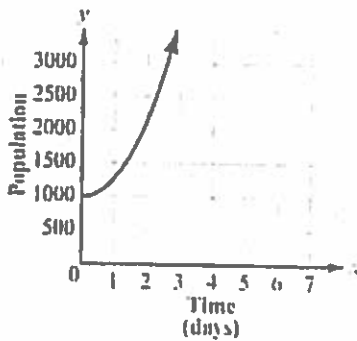
a.



b.



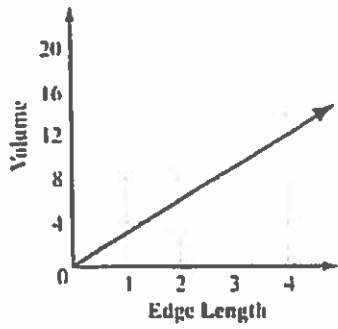
c.



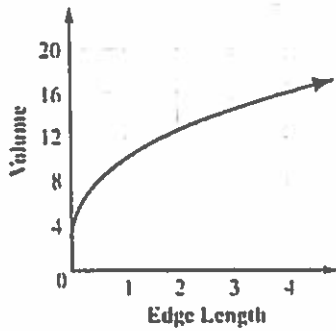
d.

A.CED.2

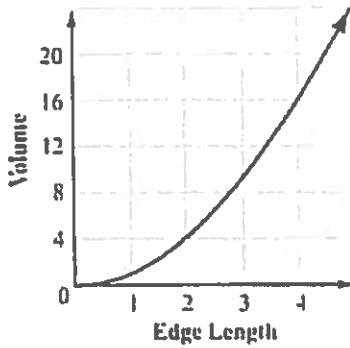
3. The volume of a cube is a function of the length of its edges. Which graph models this relationship?



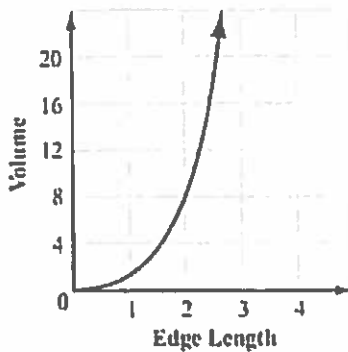
a.



b.



c.



d.

$$V = l^3$$

l	V
0	0
1	1
2	8
3	27
4	64

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A.CED.2

4. Andrew invested \$1000 in his savings account. The interest rate, r , is compounded annually. Which equation shows the amount, A , in his account after x years?

- a. $A = 1000r^x$
- b. $A = 1000(r - 1)^x$
- c. $A = 1000(1 + r)^x$
- d. $A = 1000(1 - r)^x$

$1000(1+r)^x$

$y = P(1+r)^t$
Exponential growth model

F.BF.1a

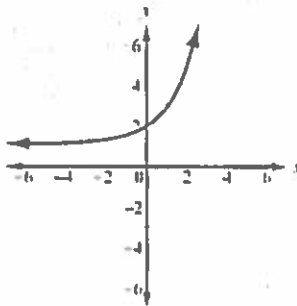
5. Ahmad is trying to visit all 50 states. In 1995 he visited 2 states, in 1996 he visited 3 more states, in 1997 he visited 4 more states, and in 1998 he visited 5 more states. If he continues this pattern, in what year will he visit the 50th state?

- a. 2001
- b. 2003
- c. 2005
- d. 2007

95	96	97	98	99	2000	2001	2002	2003
2	5	9	14	20	27	35	44	54

F.IF.2

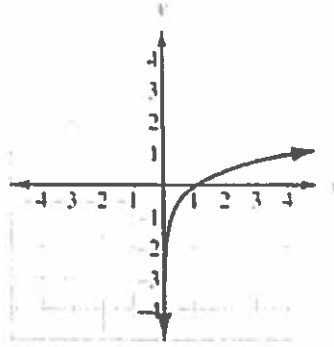
6. The graph of the function $h(x) = 2^x + 1$ is shown on this coordinate plane.



- a. The function $h(x)$ has $x > 1$ as its domain and all real numbers as its range.
- b. The function $h^{-1}(x)$ has $x > 1$ as its domain and all real numbers as its range.
- c. The function $h(x)$ has all real numbers as its domain and $y > 2$ as its range.
- d. The function $h^{-1}(x)$ has all real numbers as its domain and $y > 2$ as its range.

F.IF.4

7. This is a graph of a function.

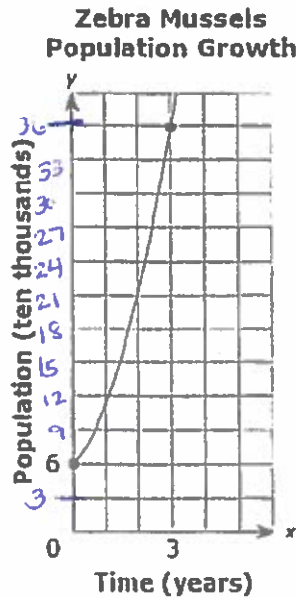


Which statement about the function is correct?

- a. Its domain is $(-\infty, 0)$.
- b. Its range is $(-\infty, 0)$.
- c. Its domain is $(-\infty, \infty)$.
- d. Its range is $(-\infty, \infty)$.

F.BF.4

8. A team of aquatic biologists estimated that 60,000 zebra mussels were present in a local lake in 1995. The population growth over time is modeled by the graph of the function as shown.



Based on the graph, which is the best estimate for the number of zebra mussels in 1998?

- a. 160,00
- b. 300,000
- c. 360,000
- d. 480,000

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F.BF.1

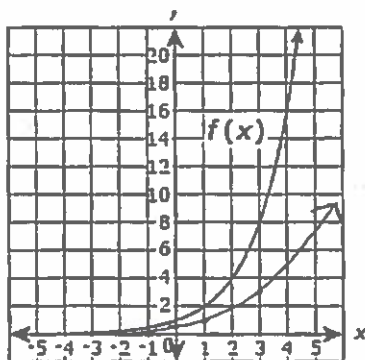
9. **Constructed Response:** During the first month of a new business, the expenses were \$180 and the revenue was \$15. During each of the next several months, the expenses and the revenue increased as shown in the table. Write an equation that expresses the revenue, R , as a function of the number of months, m .

Time (months)	Expenses (dollars)	Revenue (dollars)
1	180	15
2	190	30
3	200	60
4	210	120

$R = 180 + 10m$

F.BF.3

10. **Constructed Response:** The function $f(x)$ is graphed on the coordinate grid. After transformation T is performed on $f(x)$, the function $g(x) = 2^{x-1.5}$ is created.



x	y
-3	.04
-1	.18
0	.35
1	.71
3	2.8

What effect did transformation T have on the graph $f(x)$? Explain your answer.

not as steep, increases slower

F.BF.2

11. **Constructed Response:** Tara earns \$38,000 during the first year at her job. Each year after the first year, she will receive a raise of 5%. $P = 38000$ $r = .05$

$y = P(1+r)^t$

Part A

Write the equation of a function, S , that gives Tara's salary, $S(x)$, as a function of the number of years, x , after she started her job.

Part B

$S(x) = 38000(1+.05)^x = 38000(1.05)^x$

If no other conditions change, how many years will it take for Tara's salary to double from her initial salary of \$38,000? Explain your answer.

15 years

~~$38000(1.05)^x$~~ $38000(1.05)^{15}$
 $20(1.05)^{15}$ 78999.27

Part C

At the end of the first year, Tara's employer decided to award her a \$3,000 bonus in addition to the 5% yearly raise. The bonus will not be included in the salary used to compute Tara's 5% increase the next year.

