Coordinate Algebra EOC (GSE) Quiz Answer Key

Functions - (MGSE9-12.F.LE.1) Linear And Exponential

Student Name: _____ Date: _____

Teacher Name: THUYNGA DAO Score: _____

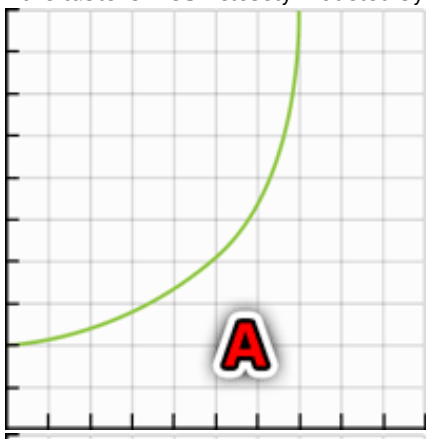
1)

table

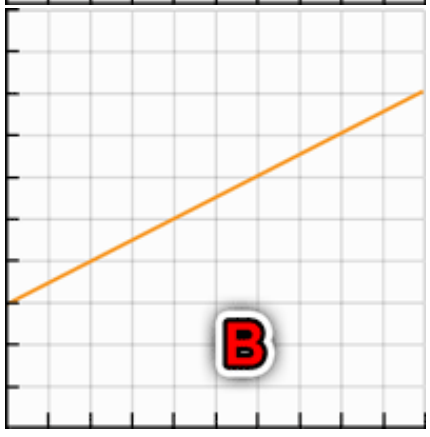
x	2	4	6	8	10
y	3	5	7	9	11

The data in the table is MOST closely modeled by graph

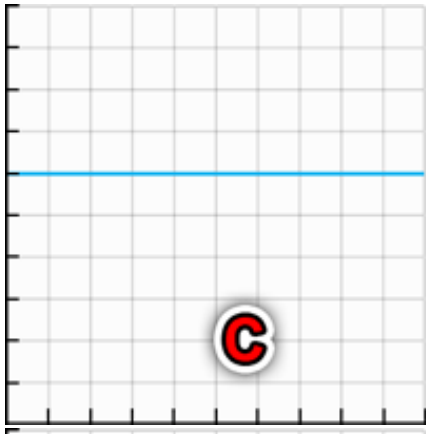
A)



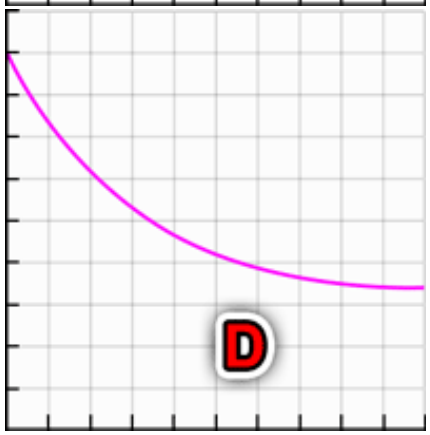
B)



C)



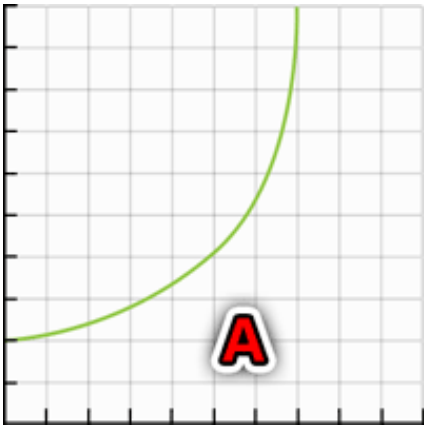
D)



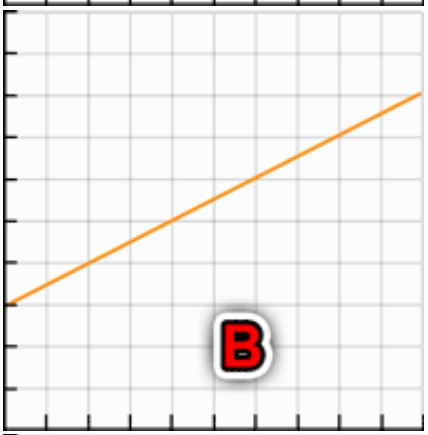
Explanation:
B is best, since it appears to be linear, and the values in the table follow the linear pattern y = 2x + 1.

2) You are going to model the population size of a species of bird that is gradually becoming extinct. Which graph is the BEST choice for doing this?

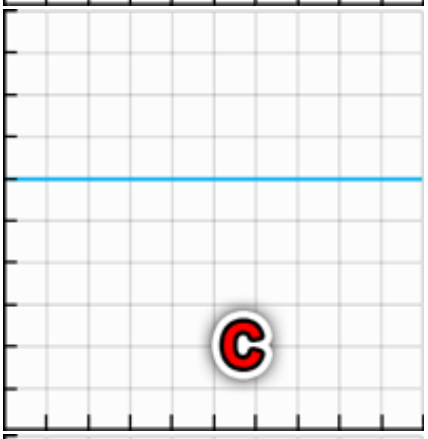
A)



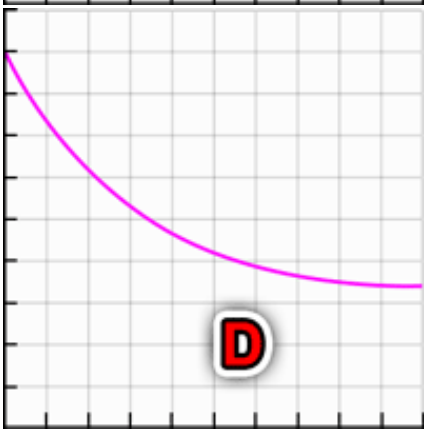
B)



C)



D)

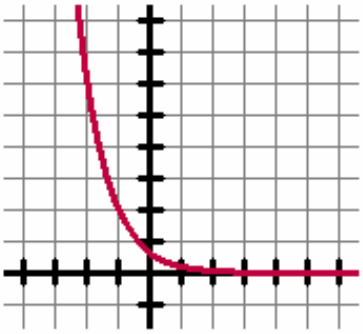


Explanation:

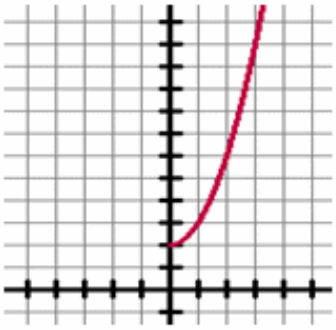
D is best, since it is decreasing from left to right at a slower and slower rate.

3)

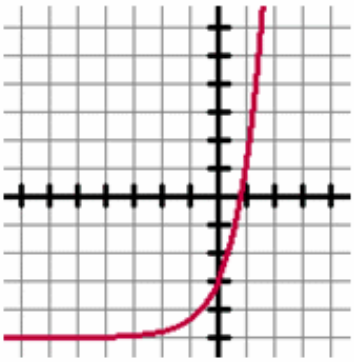
I.



II.



III.



IV.

Identify the graph(s) of exponential decay.

A) I only
B) III and IV only
C) II and IV only
D) II, III, and IV only

Explanation:
The correct answer is **I only**. Exponential decay functions are of the form $f(x) = a^*b^X + c$, where $x < 0$, $b > 0$ and $b \neq 1$. Graphically as x increases without bound y decreases towards the horizontal asymptote.

4) The cost of vacation to a cabin resort for a night is $95 for each person. Each cabin also has to pays a $25 recreational equipment rental fee. Model the cost, C, for x for a one night stay at the resort.

A) C(x) = 25x
B) C(x) = 95x
C) C(x) = 95 + 25
D) C(x) = 95x + 25

Explanation:
C(x) = 95x + 25 is correct, since the $25 cost is fixed, but the $95 cost increases as x increases.

5) The cost of membership at local country club is $125 per family member per month. Each family also has to pay $75 in service fees. Model the cost, C, for a membership for a family with x members.

A) C(x) = 75x
B) C(x) = 125x
C) C(x) = 125x + 75
D) C(x) = 125 + 75x

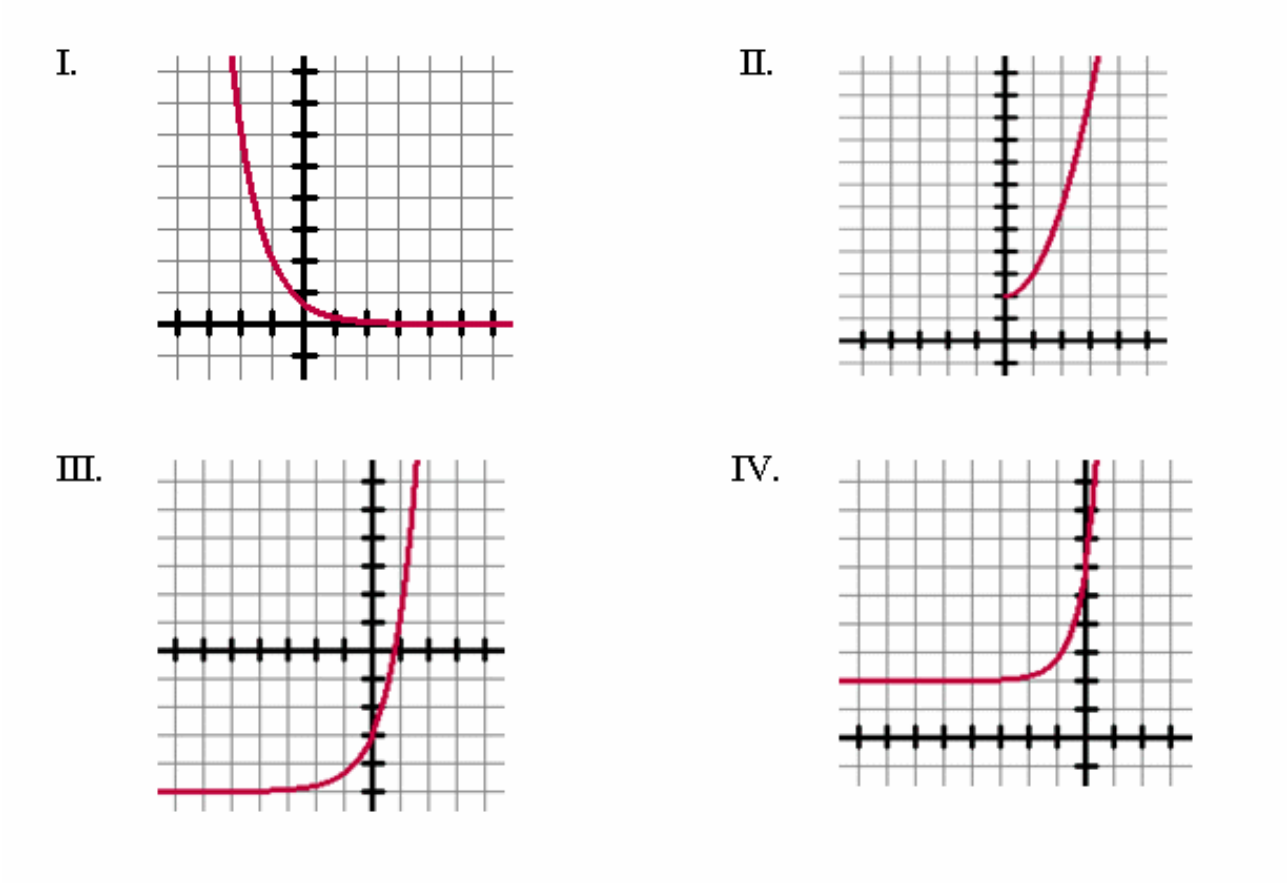
Explanation:
C(x) = 125x + 75 is correct, since the $75 cost is fixed, but the $125 cost increases as x increases.

6) A new car worth $20,000 loses 20% of its value every year. Is the value of the car represented by a linear or exponential function?

A) linear
B) exponential
C) both linear and exponential
D) neither linear or exponential

Explanation:
exponential is correct. Use the function $f(x) = c(1-r)^t$; $f(x) = 20000(1-.20)^t$ The independent variable appears as an exponents and the graph of the function is curved.

7)



Identify the graph(s) of exponential growth.

A) I only
B) III and IV only
C) II and IV only
D) II, III, and IV only

Explanation:
The correct answer is **III and IV**. Exponential growth functions are of the form $f(x) = a*b^x + c$, where $x > 0$, $b > 0$ and $b \neq 1$. Graphically as x increases without bound so does y. They also have a horizontal asymptote.

8) A membership to the local gym cost $40 and then $2 per visit. What is the maximum number of visits that can be made for $90 and is it modeled by a linear function or a exponential function?

A) 25; linear
B) 25; exponential
C) 45; linear
D) 45; exponential

Explanation:
25; linear

90 = 2x + 40
50 = 2x
25 = x

9)

I. $f(x) = 9 \bullet 5^x - 4$
II. $g(x) = 4x^2 + 3$
III. $h(x) = 16 \bullet 11^{-x+3}$
IV. $m(x) = 6^{x+1} - 3$

Identify the function(s) that represent exponential growth.

A) I only
B) III only
C) I and IV only
D) I, II, and IV only

Explanation:
The correct answer is **I and IV**. Exponential growth functions are of the form $f(x) = a^*b^x + c$, where $x > 0$, $b > 0$ and $b \neq 1$.

10) If the number of bacteria in a colony doubles every 210 minutes and the population is currently 8,000 bacteria, what will the population be in 630 minutes and is it modeled by a linear function or a exponential function?

A) 24,000; linear function
B) 24,000; exponential function
C) 64,000; linear function
D) 64,000; exponential function

Explanation:
64,000; exponential function

Determine how many times the population will double.

$\frac{630}{210} = 3$

Multiply the population by 2 a total of 3 times.

$8{,}000 \times 2^3 = 64{,}000$

11) If a city that currently has a population of 1000 triples in size every 8 years, what will the population be in 24 years and is the population growth modeled by a linear function or an exponential function?

A) 10,000; linear
B) 10,000; exponential
C) 27,000; linear
D) 27,000; exponential

Explanation:
27,000; exponential

$24 \div 8 = 3$

The population will triple three times.

$1000 \times 3^3 = 27{,}000$

12)

I. $f(x) = 3 \cdot 5^{-x}$
II. $f(x) = (\frac{1}{2})^x$
III. $f(x) = -7e^x + 8$

Identify the functions which represent exponential decay.

A) I and II only
B) I and III only
C) I, II, and III
D) II and III only

Explanation:
I and II only is correct. Exponential decay functions have the form $f(x) = ab^x + c$. Function I is already in this form, and function II can be rewritten by changing $\frac{1}{2}$ to 2^{-1}, and then getting 2^{-x}.

13) If there is 360 grams of radioactive material with a half-life of 8 hours, how much of the radioactive material will be left after 32 hours and is the radioactive decay modeled by a linear function or an exponential function?

A) 22.5 grams; linear
B) 22.5 grams; exponential
C) 45 grams; linear
D) 45 grams; exponential

Explanation:
22.5 grams; exponential

$32 \div 8 = 4$

The material will half 4 times.

$360 \times (\frac{1}{2})^4 = 22.5$

14) If there is 520 grams of radioactive material with a half-life of 12 hours, how much of the radioactive material will be left after 72 hours and is the radioactive decay modeled by a linear function or an exponential function?

A) 8.125 gram; linear
B) 8.125 grams; exponential
C) 16.25 grams; linear
D) 16.25 grams; exponential

Explanation:
8.125 grams grams; exponential

72 ÷ 12 = 6

The material will half 6 times.

$520 \times (\frac{1}{2})^6 = 8.125$ grams

15) Hank bought a $24,000 car when he graduated from college. If his car depreciates at a rate of 10% per year, how long will it take for the car to lose half its value?

A) 4 months
B) 5 years
C) 6 years, 7 months
D) 7 years, 4 months

Explanation:
6 years, 7 months is correct.

For a decay problem, we use the formula $A = A_o(1 - r)^t$

A = 12,000
A_o = 24,000
r = .1
t = ?

$12{,}000 = 24{,}000(1-.1)^t$

$\frac{1}{2} = .9^t$

$t = \log_{.9}(\frac{1}{2})$

$t = \frac{\ln(\frac{1}{2})}{\ln(.9)}$

$t \approx 6.5788$, which is about 6 years and 7 months.

16) A lifetime membership to the zoo cost $30 and then just $2 per visit. What is the maximum number of visits that can be made for $50 and is it modeled by a linear function or a exponential function?

A) 10 visits; linear function
B) 10 visits; exponential function
C) 25 visits; linear function
D) 25 visits; exponential function

Explanation:
10 visits, linear function

50 = 2x + 30
20 = 2x
10 = x

17) If the number of bacteria in a colony triples every 60 minutes and the population is currently 2,000 bacteria, what will the population be in 240 minutes and is the growth modeled by a linear function or a exponential function?

A) 20,000; linear
B) 20,000; exponential
C) 162,000; linear
D) 162,000; exponential

Explanation:
162,000; exponential

$240 \div 60 = 4$

The population will triple four times.

$2000 \times 3^4 = 162{,}000$

18) If a town with a population of 10,000 doubles every 14 years, what will the population be in 42 years and is it modeled by a linear function or a exponential function?

A) 30,000; linear function
B) 30,000; exponential function
C) 80,000; linear function
D) 80,000; exponential function

Explanation:
80,000; exponential function

Determine how many times the population will double.

$\frac{42}{14} = 3$

Multiply the population by 2 a total of 3 times.

$10{,}000 \times 2^3 = 80{,}000$