Coordinate Algebra EOC (GSE) Quiz Answer Key
Functions - (MGSE9-12.F.LE.2) Linear And Exponential Functions

Student Name: _____   Date: _____

Teacher Name: THUYNGA DAO   Score: _____

1)

$$3, 9, 27, 81...$$

Which exponential function describes the given sequence?
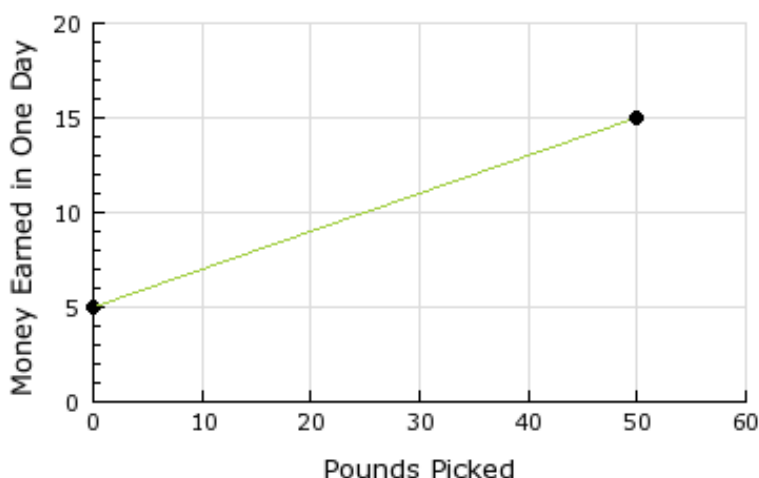
A) $y = (-\frac{1}{3})^x$

B) $y = \frac{1}{3}x$

C) $y = (-3)^x$

D) $y = 3^x$

Explanation:
The common ratio is 3. The first term is 3 or 3^1; the second term is 9 or 3^2; the third term is 27 or 3^3; the fourth term is 81 or 3^4. The correct answer is **$y = 3^x$**.

2)

Which situation matches the graph shown?
A)   Jimmy has a summer job, he picks blueberries. He makes $5 a day plus $2 for every pound picked.
B)   Jimmy has a summer job, he picks blueberries. He makes $2 a day plus $5 for every 10 pounds picked.
C)   Jimmy has a summer job, he picks blueberries. He makes $2 a day minus $5 for every 10 pounds picked.
D)   Jimmy has a summer job, he picks blueberries. He makes $5 a day plus $2 for every 10 pounds picked.

Explanation:
Jimmy has a summer job, he picks blueberries. He makes $5 a day plus $2 for every 10 pounds picked.

3) Jeremy bought a new truck for $32,000. The value of the truck after t years can be represented by the formula $V = 32,000(.8)^t$. When will the truck be worth approximately $6700?

A) in 5 years
B) in 7 years
C) in 8 years
D) in 9 years

Explanation:
The solution is **in 7 years**. To calculate the value of the truck after 7 years be plug 7 in for t in the given formula.

$V = 32,000(.8)^t$
$V = 32,000(.8)^7$
$V = 6711$ or approximately 6700

4) A new tennis club opened with 25 members. The membership of the club can be approximated by the formula $C = 25(1.2)^m$ where m represents the number of months and C represents the total club membership. After how many months will the club have about 43 members?

A) 2
B) 3
C) 4
D) 5

Explanation:
The solution is **3** months. If you plug 3 in to the given formula the result is 43.2 or approximately 43 members.

5)
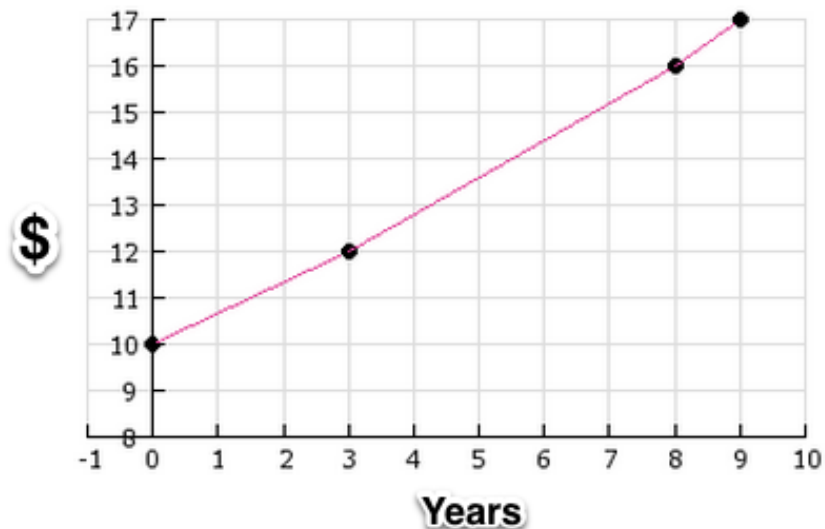
Campbell invests $10 in an account that earns 6% interest compounded monthly. A graph showing the growth of the money each year is shown. After how many years will Campbell have approximately $12 in her account?

- A)   2 years
- **B)   3 years**
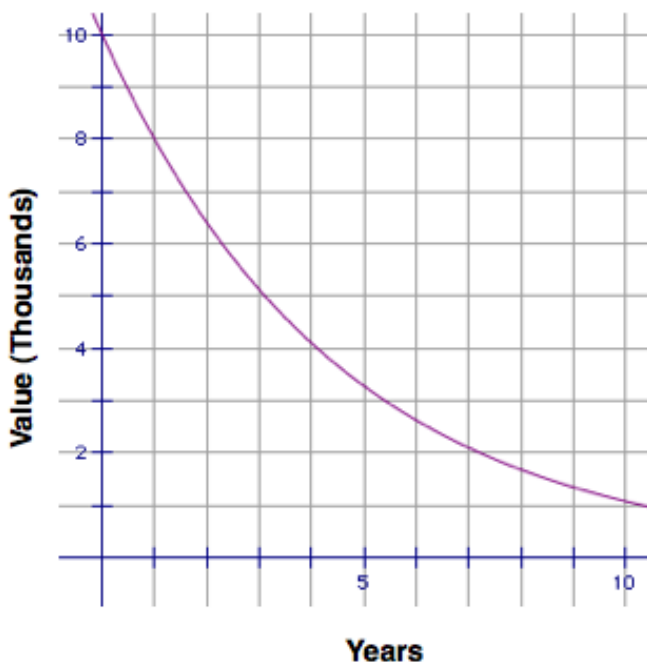- C)   4 years
- D)   5 years

Explanation:
The solution is **3 years**. Since interest is compounded monthly that is .5% per month, we can look at the graph and determine when the value is approximately $12. You can also use the compound interest formula shown to confirm that the value is approximately $12 after 3 years.

$V = 10(1.005)^{12(3)}$
$V = \$11.97$

6)

Michelle buys a motorcycle for $10,000. The motorcycle loses 20% of its value each year. The depreciation of the motorcycle is shown by the graph. After how many years is the value of the motorcycle worth $6400?

A)   1 year
B)   **2 years**
C)   4 years
D)   6 years

Explanation:
The solution is **2 years**. We can look at the graph to determine when the value appears to be $6400. The value after 2 years is $6400. We can also use the calculation shown to confirm this answer.

$V = 10{,}000(.8)^2$
$V = \$6{,}400$

7) When Katie was born her mother invested $5000 in an account for her college savings. The interest rate is 3.5% compounded annually. To represent this, we can use the formula $V = 5000(1 + r)^t$ where r represents the interest rate and t represents the time in years. How much will Katie have in her account when she turns 18?
A) $5,175
B) $7,127
C)   **$9,287**
D) $12,472

Explanation:
The solution is **$9,287**. To calculate this amount plug in .035 for r and 18 for t in the formula $V = 5000(1 + r)^t$.

8) The enrollment at a high school for the year 2007 is approximately 1500. The growth of the school population can be represented by the equation $P = 1500(1.04)^x$ where x represents the years after 2007. After how many years will the population of the school be approximately 1900?
A)   5
B)   **6**
C)   7
D)   8

Explanation:
The solution is **6**. After about 6 years the population of the school is approximately 1900. This can be determined by solving the equation

$1900 = 1500(1.04)^x$.

9) Five years ago Gary invested $10,000 into an account that makes 6% compounded annually. The value in the account after x years is represented by the formula $V = 10,000(1.06)^x$. Assuming that Gary has made no deposits or withdrawals, how much money is in the account now?

- A) $11,583.46
- B) $12,624.77
- **C) $13,382.26**
- D) $14,185.19

Explanation:
The solution is **$13,382.26**. To determine the amount after 5 years, we can plug in 5 for x to calculate the amount.

10) Jeremy bought a new truck for $32,000. The value of the truck after t years can be represented by the formula $V = 32,000(.8)^t$. How much will the truck be worth in 2 years?

- **A) $20,480**
- B) $25,600
- C) $27,830
- D) $30,780

Explanation:
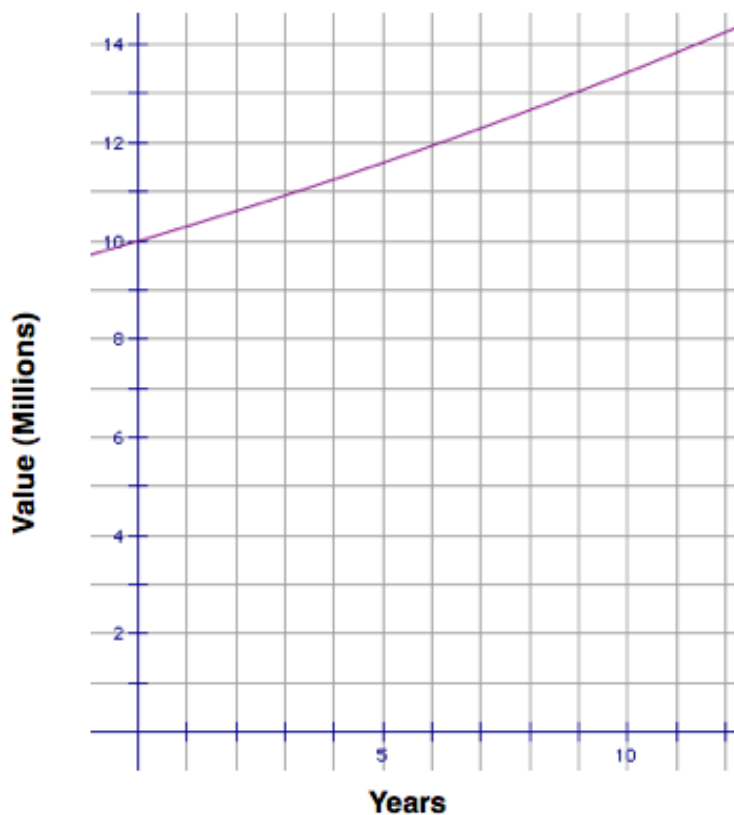The solution is **$20,480**. To calculate the value of the truck after 2 years be plug 2 in for t in the given formula.

$V = 32,000(.8)^t$
$V = 32,000(.8)^2$
$V = \$20,480$

11)

Jonathan and Sarah purchased a beach house for $10,000,000. The home appreciates at a rate of 3% per year. The appreciation of the house is shown in the graph. The home is currently worth about $13,000,000. Jonathan and Sarah have owned the home for about _____ years.

- A)   7
- **B)   9**
- C)   11

D)   13

Explanation:
The solution is **9** years. We can determine this by looking at the graph or by using the calculation shown.

$V = 10,000,000(1.03)^9$
$V = \$13,047,731.84$

12) Mike and Beatrice purchase a house for $200,000. If the equation $V = 200,000(1.03)^x$ represents the value of the house after x years, how many years will it take the house to be worth approximately $225,000?

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

Explanation:
The solution is **4 years**. If we plug in 4 for x the result is $V = 200,000(1.03)^4 = 225,102$ or approximately 225,000.

13)

Exponential Function

x	y
0	1
1	2
2	4
3	8

The table is that of an exponential function. Following the pattern, what is the value of y when x is 5?

  A)   10
  B)   16
  C)   **32**
  D)   64

Explanation:
The base of the exponential function is 2. Therefore, y = **32** when x = 5 since $2^5 = 32$.
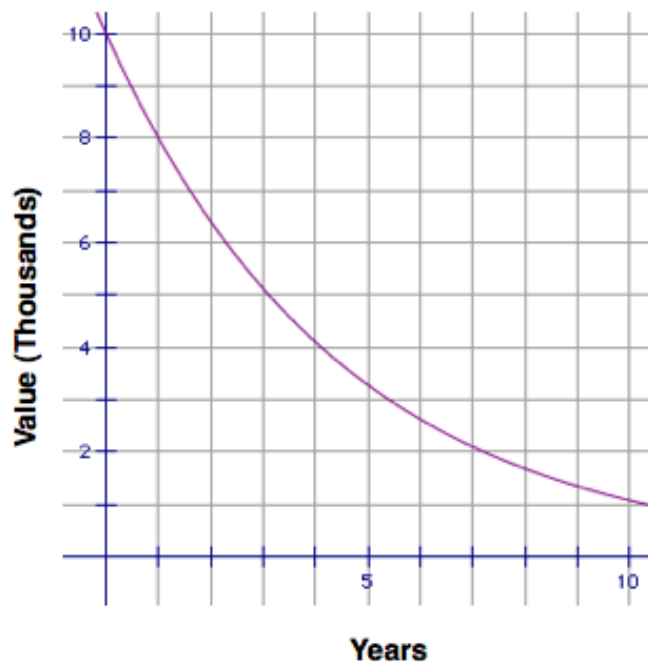
14) Holly deposited $10,000 in an investment account. After 6 years the account is worth approximately $13,400. Which formula represents the value of the account after t years?

  A) $V = 10,000(1.04)^t$
  B) $V = 10,000(.05)^t$
  C)   **$V = 10,000(1.05)^t$**
  D) $V = 10,000(.04)^t$

Explanation:
The solution is **$V = 10,000(1.05)^t$**. Plugging 6 in for t yields a value of approximately $13,400.

15)

Years

Michelle buys a motorcycle for $10,000. The motorcycle loses 20% of its value each year. The depreciation of the motorcycle is shown by the graph. After how many years is the value of the motorcycle worth less than $3000?

  A)   1 year

B)   2 years
C)   4 years
D)   **6 years**

Explanation:
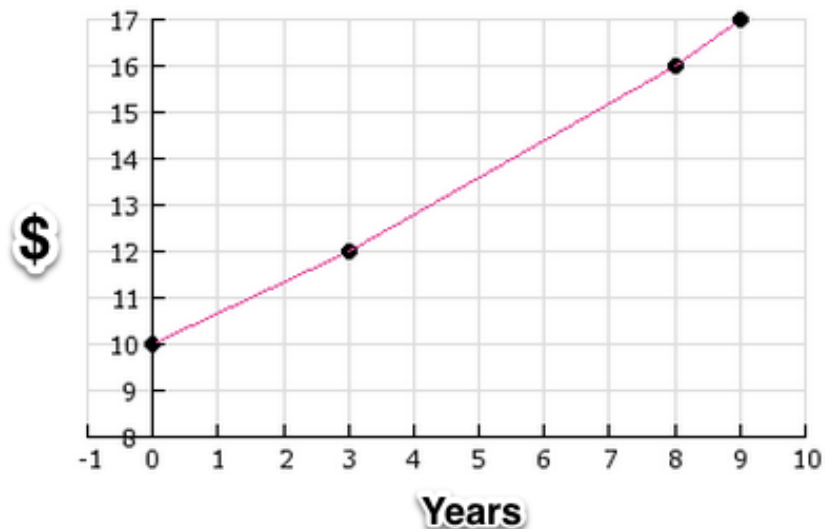The solution is **6 years**. We can look at the graph to determine when the value drops below $3000. This happens after 6 years. We can also use the calculation shown to confirm this answer.

$V = 10,000(.8)^6$
$V = \$2,621.44$

16)

Years

Campbell invests $10 in an account that earns 6% interest compounded monthly. A graph showing the growth of the money each year is provided. After _____ years she will have more than $15.

- A) 4
- B) 5
- C) 6
- **D) 7**

Explanation:
The solution is **7**. Since interest is compounded monthly that is .5% per month. We can look at the graph and determine when the value first exceeds $15. It can be seen that this happens after 7 years. You can also use the compound interest formula shown to confirm that the value is more than $15 at 7 years.

$V = 10(1.005)^{12(7)}$
$V = \$15.20$

17) What are the first seven terms of the sequence whose first term is 100, and each term after the first is 8 less than the preceding term?

- A) 92, 84, 76, 68, 60, 52, 44
- B) 100, 108, 116, 124, 132, 140, 148
- **C) 100, 92, 84, 76, 68, 60, 52**
- D) 108, 116, 124, 132, 140, 148, 156

Explanation:
The correct answer is **100, 92, 84, 76, 68, 60, 52**. The first term is 100 and then subtract 8, that becomes the second term, etc. until you have 7 numbers.

18)
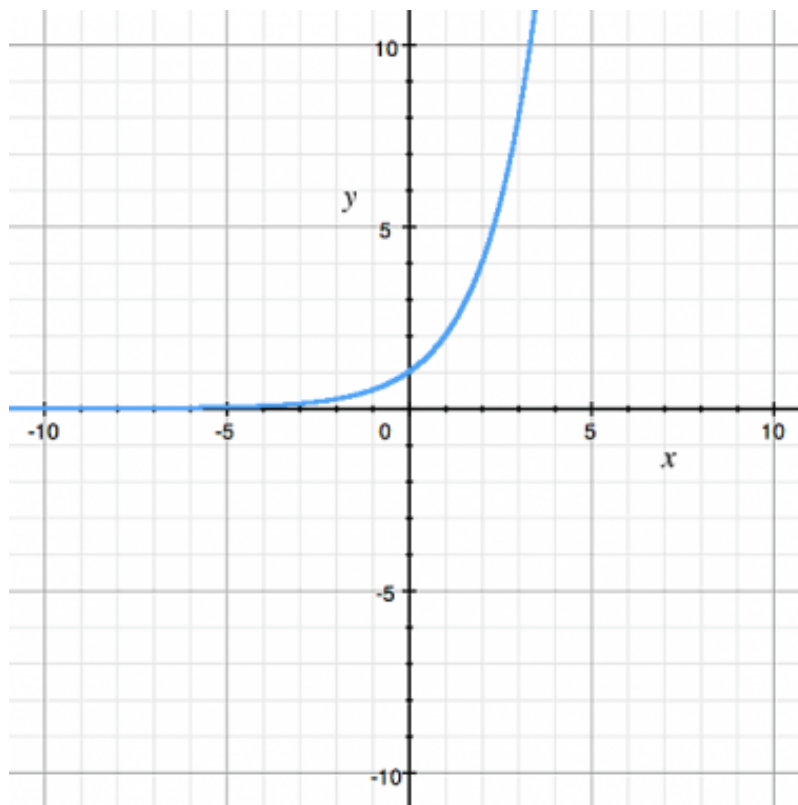
Which exponential function/geometric sequence matches the graph?

A) $y = -\frac{1}{2}x$

B) $y = \frac{1}{2}x$

C) $y = -2^x$

D) $y = 2^x$

Explanation:
The domain of this function is the term number and the range is the actual term. The points that we can tell are plotted are (1,2) (2,4), and (3,8). The geometric sequence is 2,4,8... The correct equation that matches the graph is $y = 2^x$.

19) Initially a pool contains 350 gallons of water. A hose is placed in the pool and the water is turned on. The hose adds 5.2 gallons of water per minute. Model the total amount, V, of water in the pool for x, the number of minutes the hose has been on.

A)   V(x) = 5.2x

B)   V(x) = 350x - 5.2

C)   V(x) = 350x + 5.2

D)   V(x) = 5.2x + 350

Explanation:
V(x) = 5.2x + 350 is correct, since the pool began with 350 gallons, and each minute, x, adds 5.2 gallons.

20)
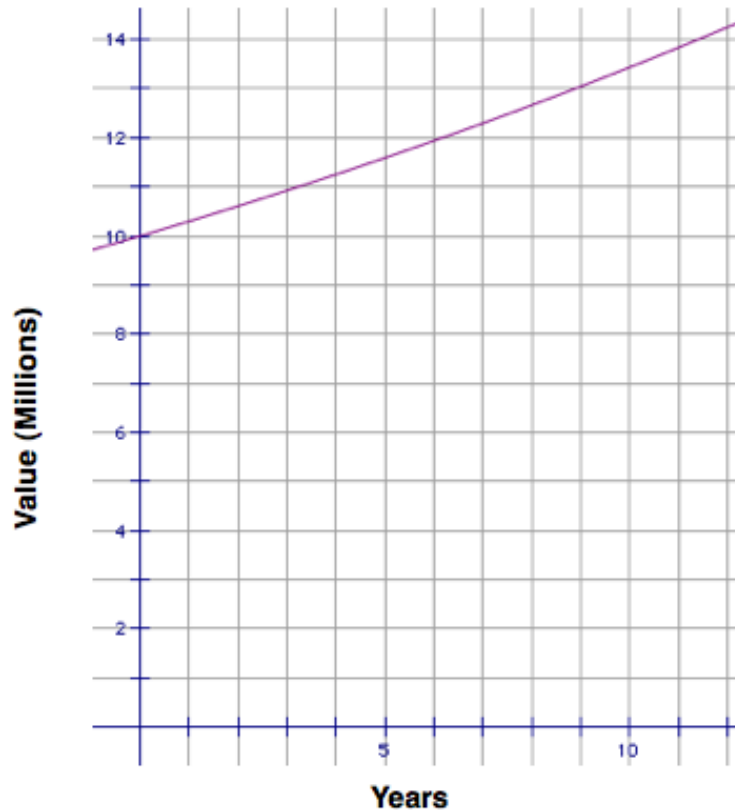
Years

Jonathan and Sarah purchased a beach house for $10,000,000. The home appreciates at a rate of 3% per year. The appreciation of the house is shown in the graph. The value of the home after 6 years is

- A)   exactly 11 million dollars.
- B)   approximately 13 million dollars.
- C)   slightly more than 12 million dollars.
- **D)   slightly less than 12 million dollars.**

Explanation:
The solution is **slightly less than 12 million dollars** . We can determine this by looking at the graph or calculating the amount as shown here.

$V = 10,000,000(1.03)^6$
$V = \$11,940,522.97$

21) Joe bought a house for $200,000. The value of the house can be represented by the formula $V = 200,000(1.035)^t$ where t represents the number of years since Joe purchased the home. About how many years will it take for the value of the home to be worth more than twice its purchase price?

- A)   19
- B)   20
- **C)   21**
- D)   22

Explanation:
The solution is **21** years. The value of the home after 21 years is $200,000(1.035)^{21} = 411,886.29$. This is more than twice the purchase price.

22) Which table shows values representing an exponential function?

A		B		C		D	
x	y	x	y	x	y	x	y

0	5
1	6
2	9
3	14
4	21

0	5
1	13
2	21
3	29
4	37

0	5
1	10
2	20
3	40
4	80

0	5
1	6
2	21
3	86
4	261

A)   A
B)   B
C)   C
D)   D

Explanation:
C is correct. This table represents the exponential function $y = 5(2^x)$. Table A is $y = x^2$, B is $y = 8x + 5$, and D is $y = x^4 + 5$.

23) Scientists have determined that a certain bacteria, with an initial population of 200, triples every hour. Which table effectively models this situation?

A)

Time (hours)	Bacteria (hundreds)
2	1800
4	16200
6	145800
8	1312200
10	11809800

B)

Time (hours)	Bacteria (hundreds)
2	1600
4	12800
6	43200
8	102400
10	200000

C)

Time (hours)	Bacteria (hundreds)
2	3200
4	51200
6	819200
8	13107200
10	11809800

D)

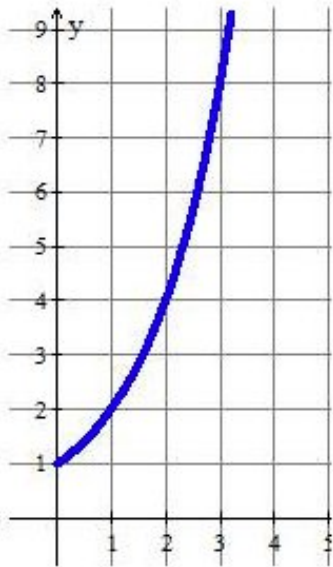| Time (hours)	Bacteria (hundreds)
2	800
4	3200
6	12800
8	51200
10	204800

Explanation:
The correct answer is table **A**. This is an exponential growth problem. The equation would be y = 200*3^x, which is modeled by table A
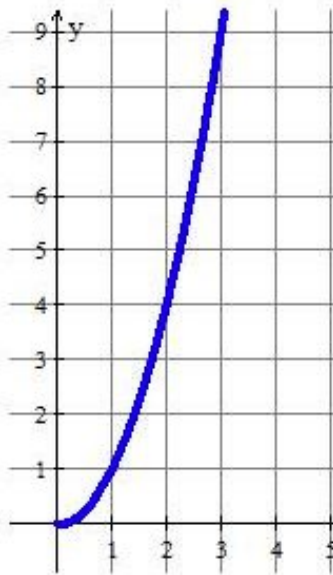
24)

2,4,8,16...

Which graph matches the given geometric sequence?
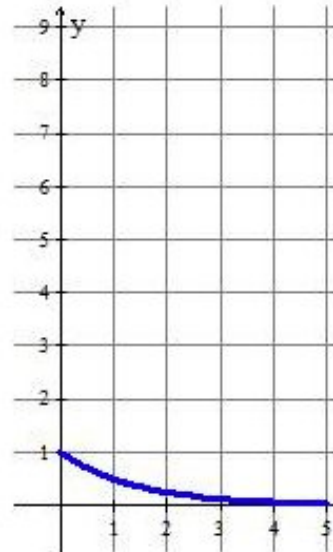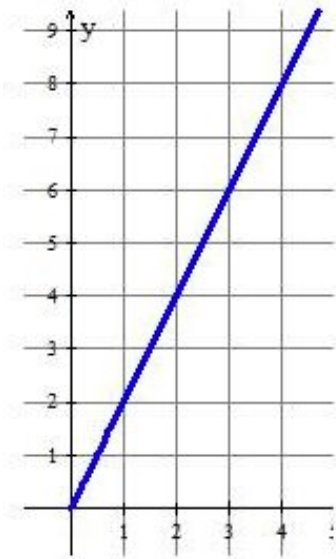
A)

B)

C)

D)

Explanation:
The domain of this function is the term number and the range is the actual term. For example, 2 is the first term and it corresponds to the coordinate point (1,2). Followin this pattern, we have the points (2,4),(3,8), and (4,16). The correct answer is graph **A**.

25) In 2007 the population of the town of Cartersville was 24,455. The population growth can be represented by the formula P = 24,455(1.03)^x, where x represents the number of years after 2007. When will the population of the town first exceed 30,000?
- A)   2011
- B)   2012
- C)   2013
- **D)   2014**

Explanation:
The solution is **2014**. The steps for solving the problem are shown.

$30,000 = 24,455(1.03)^x$

$\log(\dfrac{30,000}{24,455}) = x \log(1.03)$

x = 6.9 or approximately 7 years.

26) Sarah is training for a marathon. She currently runs 3 miles a dayand is increasing her distance by $\frac{1}{4}$ of a mile each day. This can

be modeled by the function f(x) = $\frac{1}{4}$ x + 3, where x is the number of days she has been training.

Her goal is to be able to run 13 miles in one month (30 days).

What must she change in the function to reach this goal?
- A)   She should start out running 7 miles a day.
- B)   She will reach her goal with her current plan.
- C)   Change how much she runs each day to $\frac{1}{4}$ mile.
- **D)   Change how much she runs each day to $\frac{1}{3}$ mile.**

Explanation:

When you use $\frac{1}{3}$ as the slope and plug 30 into x, f(x) is 13 miles. So, **She needs to change how much farther she runs each day to $\frac{1}{3}$ mile.**

27)
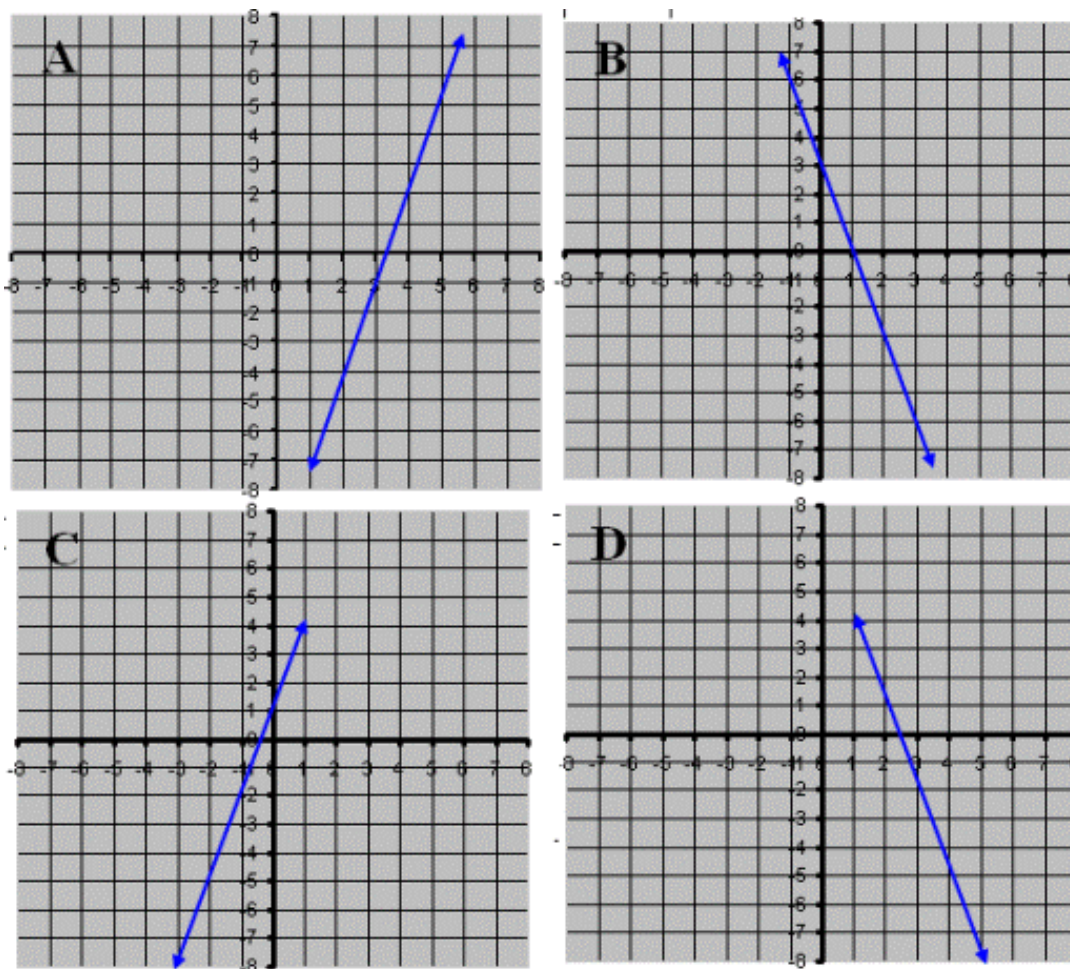
Jennifer sells paper by the pound. It costs Jennifer $10.00 to ship any package of paper. For every pound of paper Jennifer sell she earns a profit of $3.00. Which graph could Jennifer use to calculate her total profit from selling and shipping any package? The x-axis represents the weight of any package (in pounds) and the y-axis represents Jennifer's total profit (in dollars).
- **A)**
- B)
- C)

D)

Explanation:
A
It costs Jeniffer $10 for each package. She earn $3 in profit for each package. Jennifer could use the equation $y = 3x - 10$ to model her total profit. Graph A shows this linear equation.

28) Choose the situation which would best be modeled by an exponential decay function.
   **A)**   **An island is being eroded away and loses 10% of its beachfront every year.**
    B)   A player's batting average decreases by .025 for each year he is in the major leagues.
    C)   A bank account has fallen below a minimum balance and is being charged $1.50 per day in fees.
    D)   A machine depreciates (loses value) by $1000 in its first year, by $2000 in its second, $3000 in its third, etc.

Explanation:
An island is being eroded away and loses 10% of its beachfront every year. This is correct because the decrease depends on the amount of beachfront remaining. The equation would be $y = a(.9)^x$, where a is the initial amount of beachfront.

29)

Pizza Toppings vs. Price
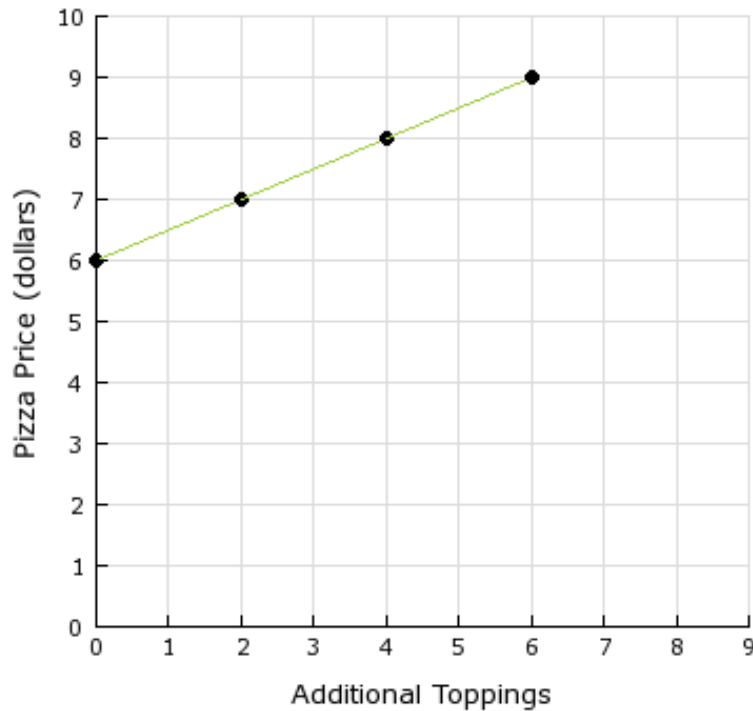
A pizza parlor sells a basic cheese pizza and there is a charge to add additional toppings. To determine the base price of a pizza we should determine the _____ for the graph.

- A)   slope
- B)   rate of change
- **C)   *y*-intercept**
- D)   *x*-intercept

Explanation:

To determine the base price of a pizza we should determine the ***y*-intercept** for the graph. This represents the base price of $6 for a cheese pizza.

30) A sequence is defined that the first term is 4 and each term after the first term is found by adding $\frac{4}{5}$ to the preceding term.

What is the 8th term of the sequence?

- A)   7.6
- B)   8.8
- **C)   9.6**
- D)   10.4

Explanation:

The sequence goes as follows: 4, 4.8, 5.6, 6.4, 7.2, 8, 8.8, 9.6, 10.4... So the 8th term is **9.6**.