# Diagnostic Test

L. Hales
4th Period Secondary 1 Honors
San Rafael Junior High School          **Form Number 236858**          **Emelyn Oliverson**

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**Objectives: (7 of 7 listed)**
32.      Interpret a statement that uses function notation
33.      WP: Determine the graph of a linear function that represents a situation
34.      WP: Determine the sketch of an exponential function that represents a situation
35.      WP: Determine the domain of a linear or exponential function given a representative graph
36.      WP: Determine a reasonable domain for a linear or exponential function in a given situation
37.      WP: Calculate the rate of change of a linear function given a table
38.      WP: Calculate the average rate of change of an exponential function over a specified interval given a table or an
equation

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**1.** An antibiotic kills half of a population of bacteria every 12 hours. The original number of bacteria in the population was about 2 million. One of the graphs models the remaining number of bacteria as time passes. Which graph is it?

[A]

[B]

[C]

[D]
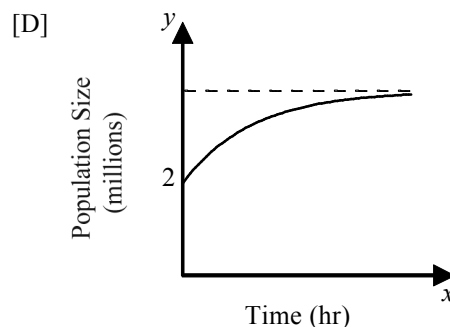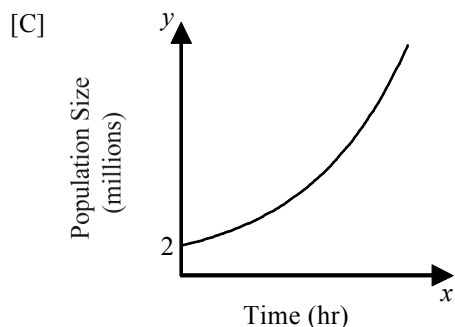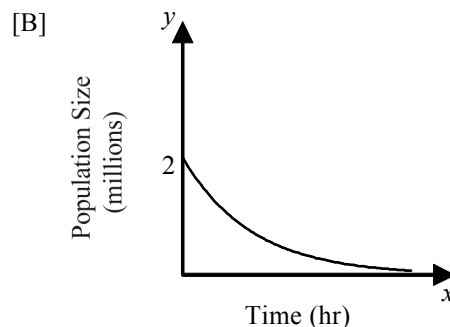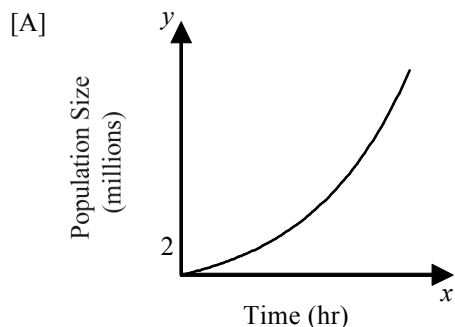
**2.** Let $g(w)$ be the amount of tension on a kite string in wind blowing $w$ miles per hour. What does $g(15)$ represent?

[A]   the number of kite strings that break in a 15 mph wind

[B]   the speed of the wind when the tension on the string is 15 pounds

[C]   the wind speed that can hold 15 kites aloft      [D]   the amount of tension on the string when the wind is 15 mph

**3.** The half-life of a radioactive substance is 1 day. A 48.5 g sample of this substance is monitored in a laboratory for exactly 7 half-lives. The function $m(t) = (48.5)\left(\dfrac{1}{2}\right)^t$ models the decay of the sample. In the function, $m(t)$ represents the amount of the sample remaining after $t$ days. What is a reasonable domain for the function for the time the substance is monitored?

[A]   $0 \le t \le 48.5$          [B]   $0.379 \le t \le 48.5$          [C]   $1 \le t \le 14$          [D]   $0 \le t \le 7$

# Diagnostic Test

Accelerated Math™: Thursday, November 17, 2016, 1:58 PM

2 of 14

4th Period Secondary 1 Honors

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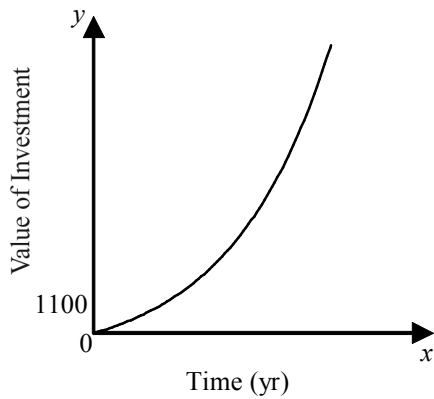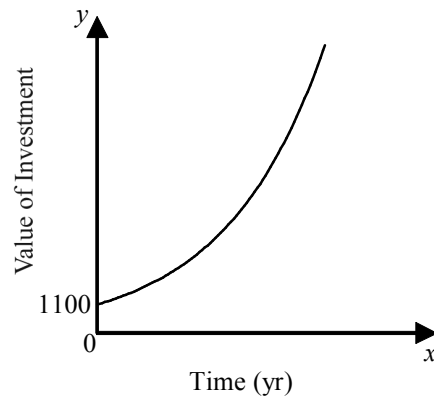**Emelyn Oliverson**

4. A banker invests a sum of $1100 for her grandchildren. The account yields an interest rate of 6% and is compounded annually. One of the graphs models the value of the investment over time. Which graph is it?
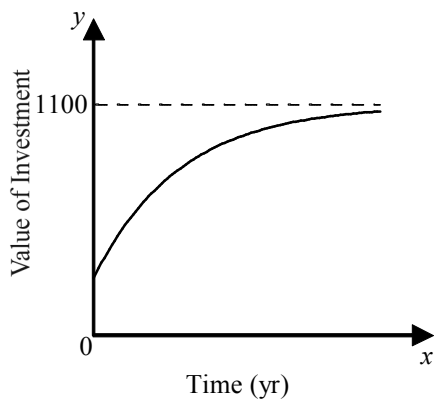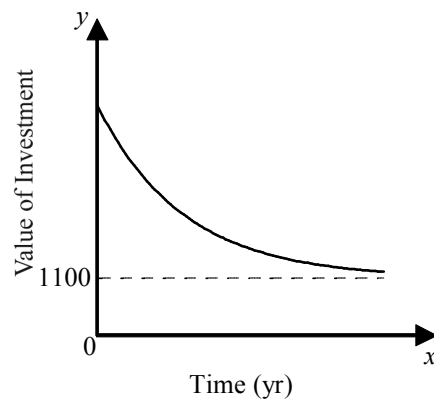
[A]



[B]



[C]



[D]



5. Hailey opened a savings account and deposited some money she had received from her grandfather. One week later she deposited part of her paycheck. She continued to deposit the same amount from her paycheck every week. In the table, the number of weeks since she opened her savings account is represented by $t$. The amount of money in her account in dollars at time $t$ is represented by $f(t)$. At what rate does the amount in her account increase?

| $t$ | 4 | 10 | 15 | 20 |
|------|-----|-----|-----|-----|
| $f(t)$ | 105 | 177 | 237 | 297 |

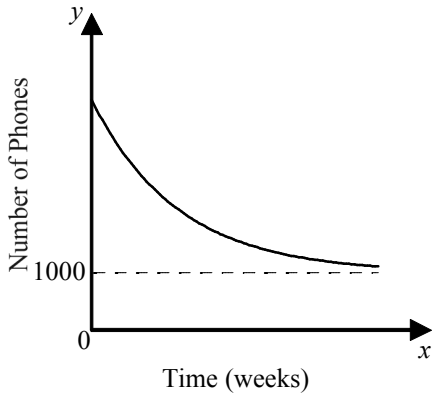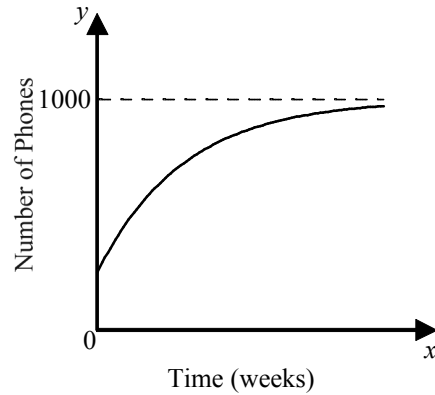[A] $26.25/week          [B] $14.85/week          [C] $12.00/week          [D] $72.00/week

**6.** A new type of cell phone is released for public use. In the first week, 1000 people buy the new phone. After that, the number of people who buy the phone grows by approximately 23% each week. One of the graphs models the number of phones bought since the first week. Which graph is it?
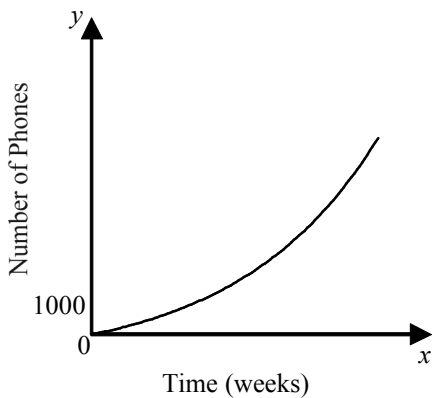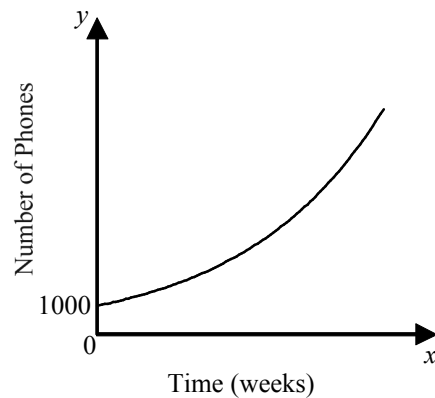
[A]



[B]



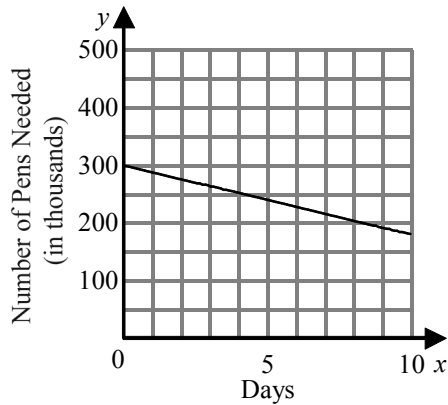[C]



[D]



**7.** A pen factory receives an order for 300,000 pens. The factory manufactures an average of 25,000 pens every day. Which graph represents the number of pens needed to fill the order after $x$ days?

[A]

[B]



[C]



[D]



(7.)

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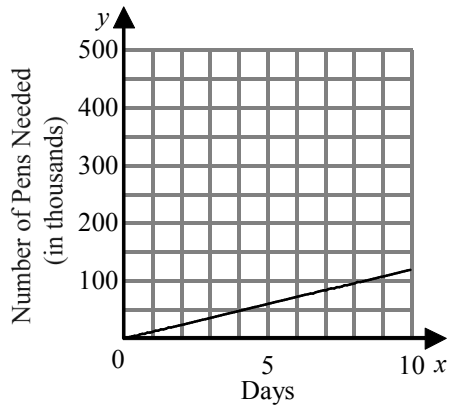
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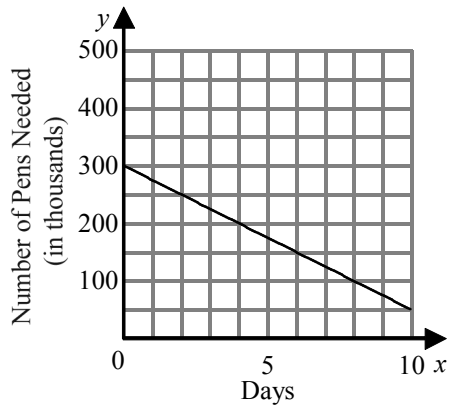
5 of 14

4th Period Secondary 1 Honors
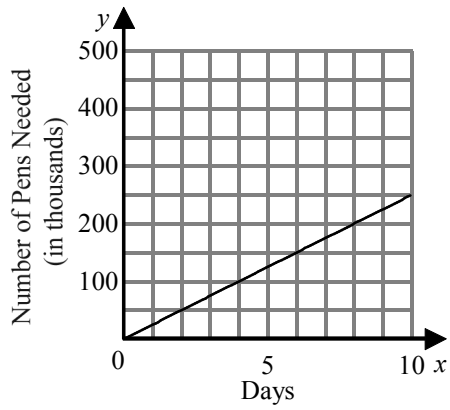
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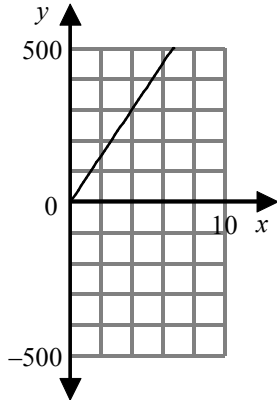**8.** At the start of June, Pia's grandmother loaned her \$450 to help her buy a car. Pia paid back her grandmother at the rate of \$75 every week. Once she had paid off the loan, Pia started saving \$75 every week. Let $y$ represent Pia's balance and $x$ represent the number of weeks since receiving the loan. One of the graphs models this situation. Which graph is it?

[A]

[B]
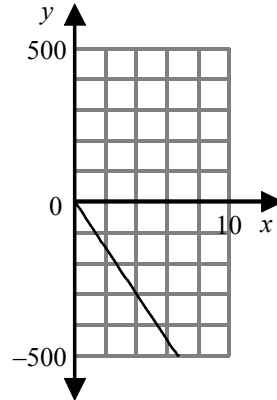
[C]
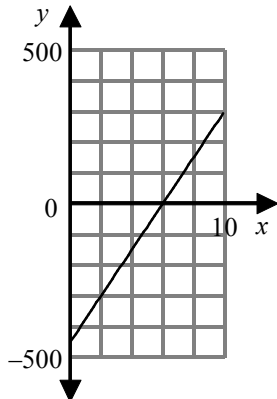
[D]
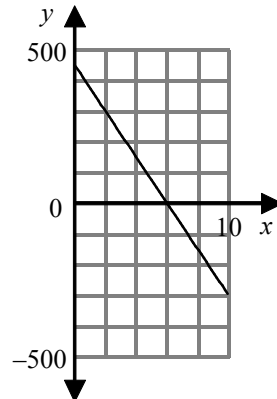
**9.** For the last few centuries, the human population has been rapidly increasing. This increase can be modeled by an exponential function for the period shown. What is the domain of this function?
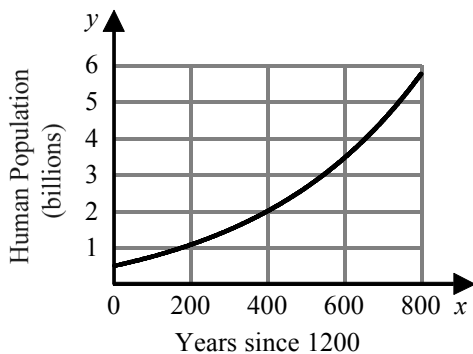
[A]  $500{,}000{,}000 \le x \le 6{,}000{,}000{,}000$    [B]  $0 \le x \le 2000$    [C]  $0 \le x \le 800$    [D]  any real number

10. Mr. Chang has $10,000 in a savings account. He wants to pay off a $4500 credit card purchase. He withdraws $500 each month from his savings account until the balance is paid off. No interest will be charged for the first year. The amount remaining in his savings account is modeled by the function graphed below. What is the domain of this function?
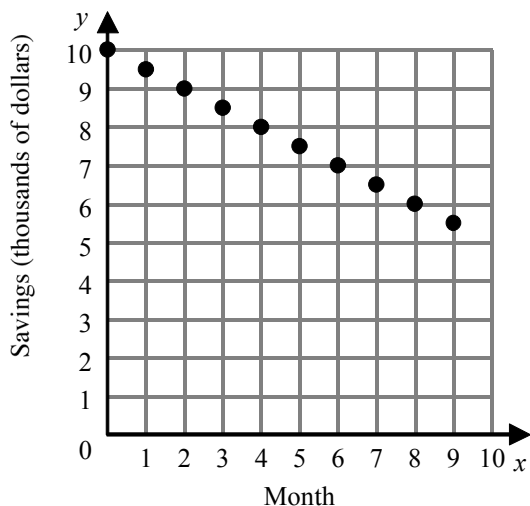


[A] all whole numbers $x$ such that $0 \le x \le 9$      [B] all whole numbers $x$ such that $1 \le x \le 10$

[C] all real numbers $x$ such that $0 \le x \le 9$      [D] all real numbers

11. A biology experiment begins with 7 cells. The number of cells doubles every day. The number of cells present after $t$ days is given by the function $f(t) = 7\left(2^t\right)$. A researcher checks the number of cells after day 2 and after day 4. What is the average rate of change of the number of cells between those days?

[A] 28 cells/day      [B] $65\frac{1}{3}$ cells/day      [C] 42 cells/day      [D] 84 cells/day

12. The number of emperor penguins in the wild is projected to decline in the coming decades. For the period shown in the graph, the projected decline can be modeled by an exponential function. What is the domain of this function?



[A] $0 \le x \le 2500$      [B] $0 \le x \le 50$      [C] $0 \le x \le 2060$      [D] any real number

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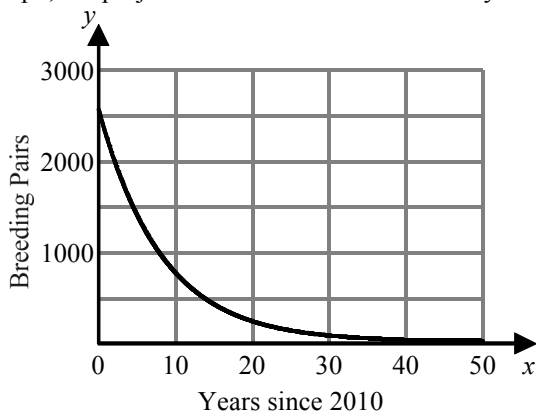7 of 14
4th Period Secondary 1 Honors
**Form Number 236858**
**Emelyn Oliverson**

**13.** A theater's maximum capacity is 250 people. The price of admission to a play at the theater is $18. The function $R(n) = 18n$ describes the relationship between the revenue and $n$, the number of tickets sold. What values of $n$ represent a reasonable domain for this function?

[A] any whole number $n$, such that $0 \le n \le 4500$      [B] any whole number $n$, such that $0 \le n \le 250$

[C] any real number $n$, such that $0 \le n \le 250$      [D] any real number

**14.** A loaf of bread is left out on a table. As the bread begins to spoil it is regularly checked for mold. When mold is first spotted, there are 10 $\text{mm}^2$ of mold on the bread. After that, the area of the mold doubles approximately every day. One of the graphs models the growth of the mold since it was first spotted. Which graph is it?

[A]



[B]



[C]



[D]
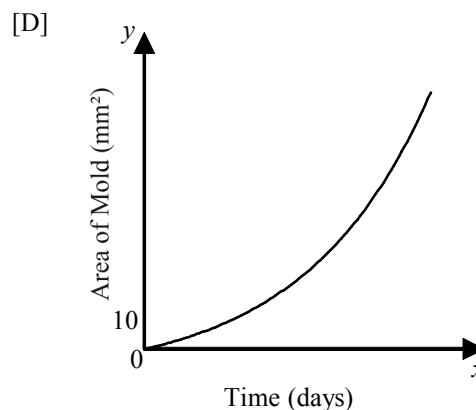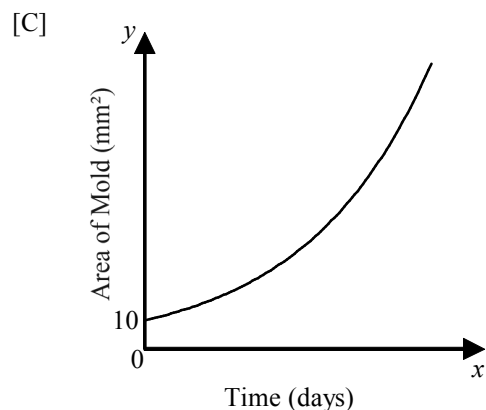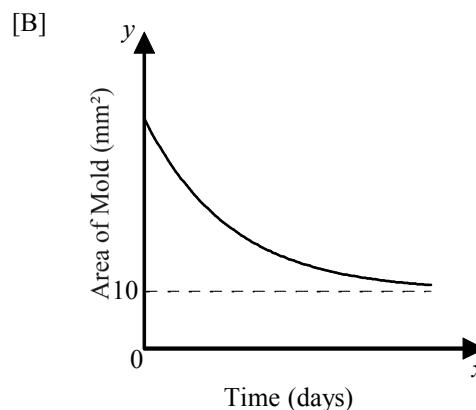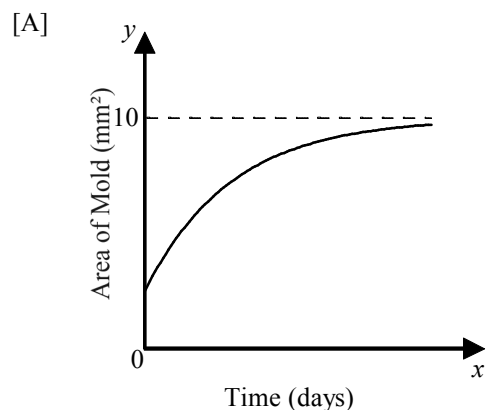


**15.** Mr. Hawkins invests $3000 in an account in which interest is compounded annually. The table shows $f(t)$, the value of his investment in dollars after $t$ years. What is the average growth of his investment from year 10 to year 13?

| $t$ | 3 | 10 | 13 | 18 |
|---|---|---|---|---|
| $f(t)$ | 3374.59 | 4440.73 | 4995.22 | 6077.45 |

[A] $152.31/yr      [B] $184.83/yr      [C] $554.49/yr      [D] $384.25/yr

# Diagnostic Test

Accelerated Math™: Thursday, November 17, 2016, 1:58 PM

8 of 14

4th Period Secondary 1 Honors

**Form Number 236858**

**Emelyn Oliverson**

**16.** For every hour a candle burns, the height of the candle decreases. The function $g(t)$ represents the height of the candle in inches after the candle has burned $t$ hours. What is the meaning of $g(2) = 7$?

[A] The candle's height decreases at the rate of $7$ in./hr.

[B] The candle's height decreases at the rate of $2$ in./hr.

[C] The height of the candle is 2 inches after burning for 7 hours.

[D] The height of the candle is 7 inches after burning for 2 hours.

**17.** For every second an object falls, the distance it has fallen increases. The function $f(t)$ represents the distance in meters an object has fallen in $t$ seconds. What is the meaning of $f(3) = 12$?

[A] After 3 seconds, the object is falling at a rate of $12$ m/s.          [B] The object fell 3 m in 12 seconds.

[C] The object fell 12 m in 3 seconds.          [D] After 12 seconds, the object is falling at a rate of $3$ m/s.

**18.** A radioactive substance decays at a rate of 8.23% per day. There were 100 g of the substance present at the start of an experiment. One of the graphs models the decay of this substance as time passes. Which graph is it?

[A]

[B]

[C]

[D]
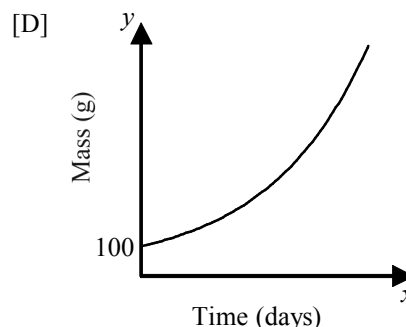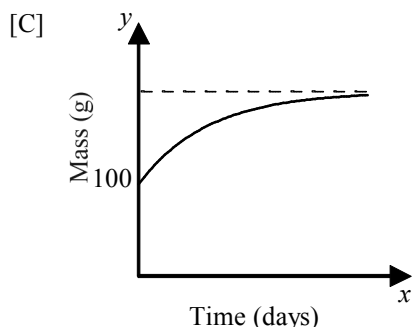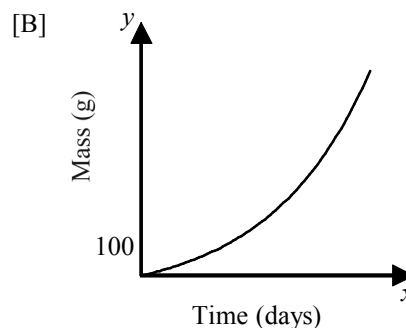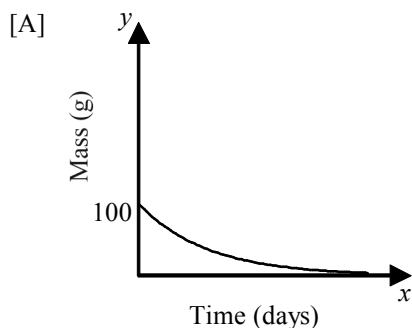
**19.** An initial investment of $17,500 is placed in a bank account that earns 3.38% interest, compounded annually. At the end of 8 years the money is withdrawn from the bank. The function $A(t) = 17,500(1.0338)^t$ models the value of the investment. The variable $t$ represents the length of the investment in years. What is a reasonable domain for the function given this situation?

[A] any whole number $t$, such that $17,500 \le t \le 22,831$          [B] any rational number $t$, such that $0 \le t \le 3.38$

[C] any whole number $t$, such that $0 \le t \le 8$          [D] any rational number $t$, such that $3.38 \le t \le 8$

**20.** As part of an experiment, a scientist places $n$ bacteria in a growth medium. The growth function $g(t) = n2^t$ gives the number of bacteria present in the growth medium after $t$ hours. The experiment started with 15,500 bacteria. The bacteria is then destroyed at the end of 6 hours. At the end of the 6 hours there were 992,000 bacteria. What is a reasonable domain for the function given this scenario?

[A]   $0 \le t \le 6$      [B]   $15,500 \le t \le 992,000$      [C]   $6 \le t \le 15,500$      [D]   $0 \le t \le 15,500$

**21.** Let $r(d)$ be a ball's rebound height, in centimeters, when dropped from $d$ cm. What does $r(57)$ represent?

[A]   the rebound height of a ball dropped from 57 cm      [B]   the ball was dropped 57 times

[C]   the ball bounced 57 times      [D]   the ball was dropped from 57 cm

**22.** A manager is buying tickets for his employees to attend a leadership seminar. The tickets cost \$15 each. There is also a booking fee of \$10 for the entire order. One of the graphs represents this situation. Which graph is it?

[A]

[B]

[C]

[D]
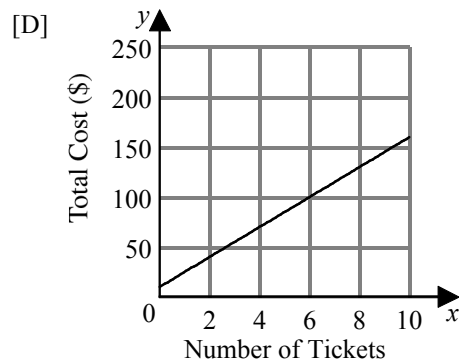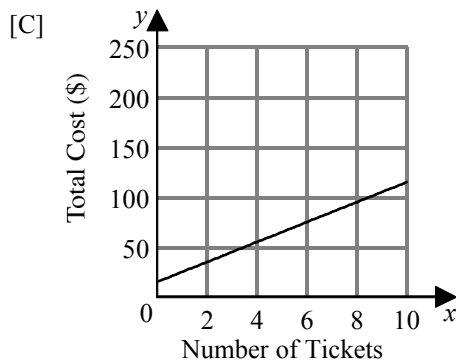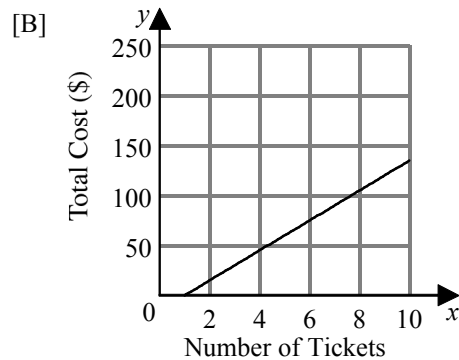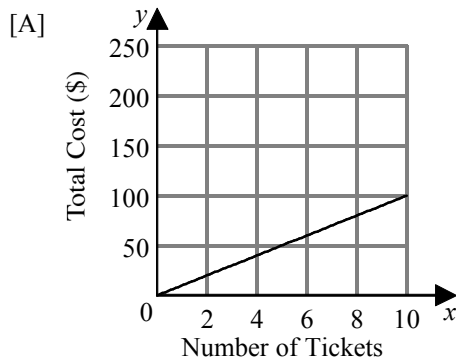
**23.** An experiment begins with 7 g of a radioactive material that decays exponentially. In the table, $f(t)$ represents the amount of the material remaining after $t$ hours, in grams. What is the average rate of change of the material from hour 1 to hour 4?

| $t$ | 1 | 4 | 10 | 15 |
|---|---|---|---|---|
| $f(t)$ | 5.7 | 3.0 | 0.8 | 0.3 |

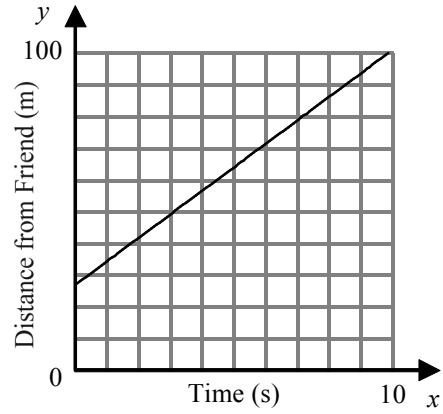[A]   $-2.7$ g/hr      [B]   $-2.5$ g/hr      [C]   $-0.9$ g/hr      [D]   $-1.35$ g/hr

**24.** Lisa is training for a 100-meter wheelchair race. Her friend stands at the starting line and times her with a stopwatch. It takes Lisa 27 seconds to complete a practice race. Which graph models the distance between the two friends for the first 10 seconds?
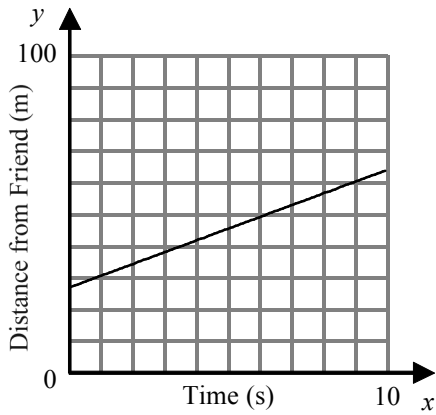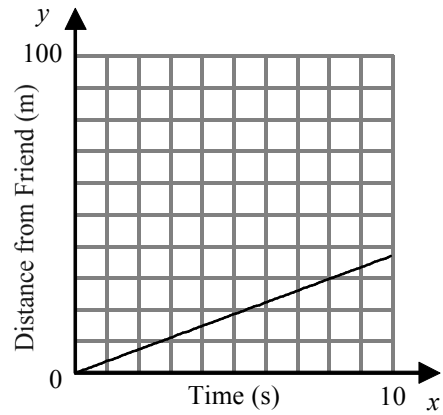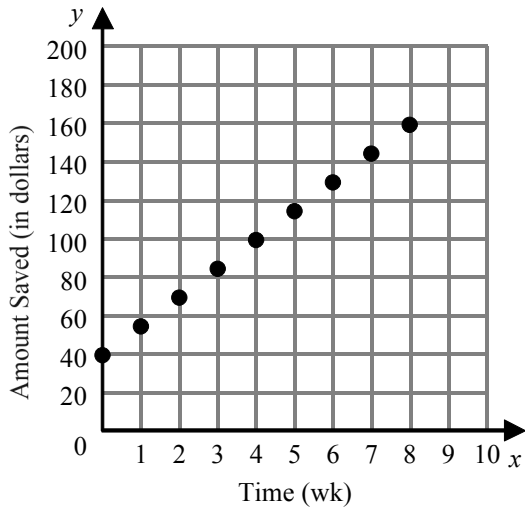
[A]



[B]



[C]



[D]

**Diagnostic Test**

Accelerated Math™: Thursday, November 17, 2016, 1:58 PM

11 of 14

4th Period Secondary 1 Honors

**Form Number 236858**

**Emelyn Oliverson**
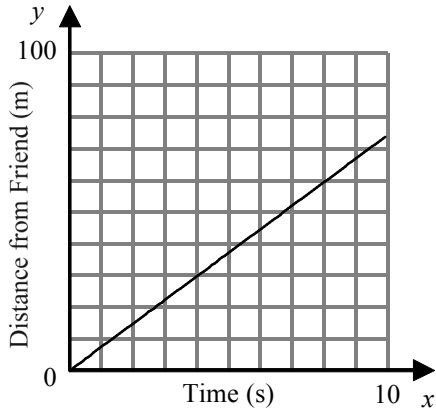
**25.** Maayan is saving to buy a phone that costs $159. She starts with $39 and adds $15 each week until she can buy the phone. The amount she has saved is modeled by the function graphed below. What is the domain of this function?



[A] all real numbers $x$ such that $0 \le x \le 8$

[B] all whole numbers $x$ such that $39 \le x \le 159$

[C] all whole numbers $x$ such that $0 \le x \le 8$

[D] all real numbers

**26.** A population of wild pigs increased exponentially after being introduced to a new area. The population $t$ years after the pigs were introduced is given by the function $f(t) = 20\left(1.2^t\right)$. What was the average rate of population growth from year 9 to year 12?

[A] 75 pigs/yr

[B] 25 pigs/yr

[C] 32 pigs/yr

[D] 81 pigs/yr

**27.** The time to finish homework depends on the number of problems worked. The function $p(t)$ represents the number of problems worked in $t$ minutes. What is the meaning of $p(20) = 15$?

[A] In one hour, 15 problems can be worked.

[B] It took 15 minutes to work 20 problems.

[C] In one hour, 20 problems can be worked.

[D] It took 20 minutes to work 15 problems.

**28.** A store that is open 6 days per week pays part-time employees $8.50 per hour. Part-time employees are allowed to work no more than 6 hours per day. The function, $w(h) = 8.50 h$, describes the relationship between the weekly hours $h$ worked and the wages earned. What is a reasonable domain for the function given this scenario?

[A] $0 \le h \le 6$

[B] $0 \le h \le 306$

[C] $0 \le h \le 36$

[D] $h \ge 0$

**29.** A helicopter is descending at a constant rate. In the table, $t$ represents the number of minutes since the helicopter began its descent. The helicopter's elevation in feet at time $t$ is represented by $f(t)$. At what rate does the helicopter's elevation change?

| $t$ | 1 | 4 | 6 | 9 |
|------|------|------|------|------|
| $f(t)$ | 5750 | 4850 | 4250 | 3350 |

[A] $-225$ ft/ min

[B] $-300$ ft/ min

[C] $-370$ ft/ min

[D] $-710$ ft/ min

**30.** A car is driving down a hill that is 90 feet tall. The height of the car from the base of the hill is modeled by the linear function graphed below. What is the domain of this function?
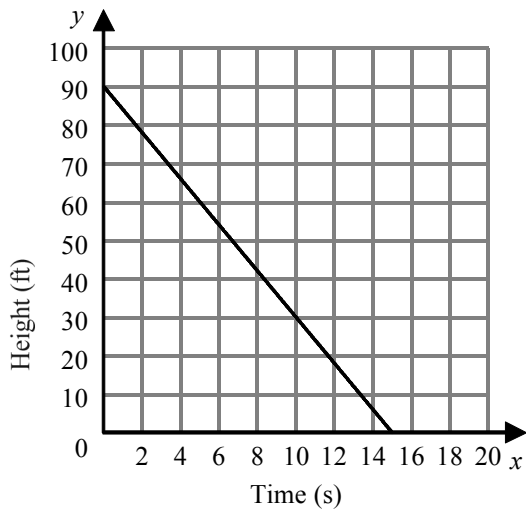


[A]   all real numbers $x$ such that $0 \leq x \leq 15$

[B]   all real numbers $x$ such that $0 \leq x \leq 90$

[C]   all real numbers $x$ such that $15 \leq x \leq 90$

[D]   all real numbers

**31.** Ms. Robertson bought a new car for $18,000. The value of the car depreciates exponentially every year. The table shows $f(t)$, the value of the car in dollars after $t$ years. What is the average rate of change of the car's value from year 12 to year 15?

| $t$ | 3 | 7 | 12 | 15 |
|---|---|---|---|---|
| $f(t)$ | 9924.62 | 4487.14 | 1663.56 | 917.23 |

[A]   $-$746.33/yr          [B]   $-$248.78/yr          [C]   $-$61.15/yr          [D]   $-$138.63/yr

**32.** A family is driving across the country during a vacation. They start with 16 gallons of fuel and use about 1 gallon every 15 miles. One of the graphs relates the distance the family drives to the amount of remaining fuel. Which graph is it?

[A]
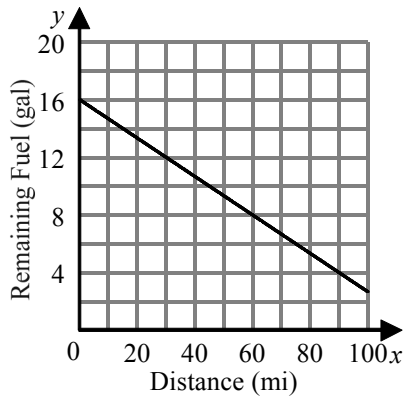
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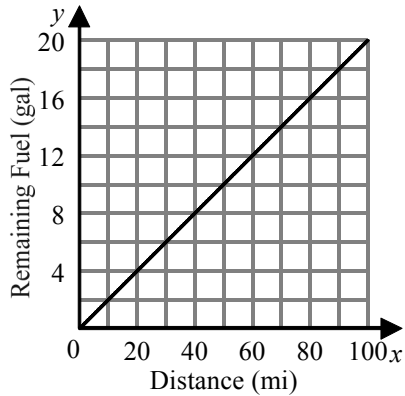Accelerated Math™: Thursday, November 17, 2016, 1:58 PM

13 of 14
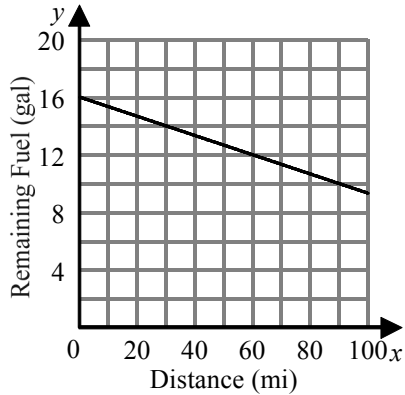
4th Period Secondary 1 Honors

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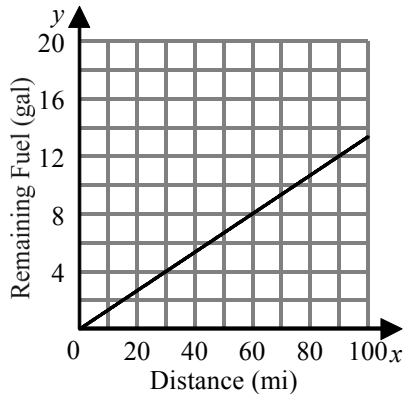**Emelyn Oliverson**

[B]



[C]



[D]



(32.)

**33.** A towing company charges a flat fee to tow a vehicle. The company also charges a constant rate for every mile the vehicle is towed. The total charge, $f(x)$, is a linear function of the number of miles the vehicle is towed, $x$. The table shows the total charge in dollars for towing a vehicle various distances. How much does the company charge per mile?

| $x$ | 11 | 15 | 19 | 24 |
|---|---|---|---|---|
| $f(x)$ | 123 | 135 | 147 | 162 |

[A]  $3.00/mi          [B]  $11.18/mi          [C]  $12.00/mi          [D]  $6.75/mi

# Diagnostic Test

Accelerated Math™: Thursday, November 17, 2016, 1:58 PM

14 of 14

4th Period Secondary 1 Honors

**Form Number 236858**

**Emelyn Oliverson**

**34.** A ferry charges a fare for each person in a vehicle. There is also a fare for the vehicle itself. The total fare for a vehicle with $n$ people is represented by $f(n)$ in the table. How much does the ferry charge per person?

| $n$ | 1 | 3 | 6 | 8 |
|------|------|------|------|------|
| $f(n)$ | $53 | $83 | $128 | $158 |

[A]  $11/person

[B]  $30/person

[C]  $20/person

[D]  $15/person

**35.** Mrs. Kelly is draining the water from her pool in order to have it refinished. The amount of water in the pool decreases at a constant rate as it is drained. In the table, $t$ represents the number of minutes that the pool has been drained. The total number of gallons of water in the pool at time $t$ is represented by $f(t)$. At what rate does the amount of water in the pool change?

| $t$ | 18 | 44 | 61 | 80 |
|------|------|------|------|------|
| $f(t)$ | 28,042 | 27,756 | 27,569 | 27,360 |

[A]  −6 gal/min

[B]  −9 gal/min

[C]  −18 gal/min

[D]  −11 gal/min

**End of Assignment**