Station 1
Linear, Quadratic Exponential Identifications from a Graph

MULTIPLE CHOICE

1. Which scatter plot BEST represents a model of **linear** growth?

a.

c.

b.
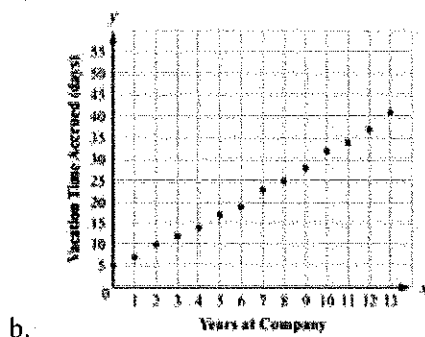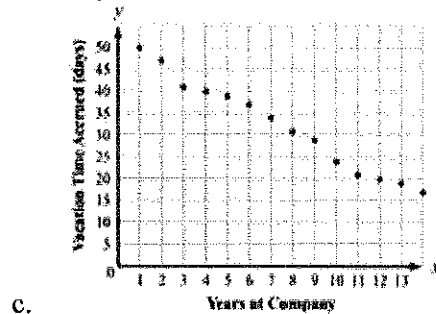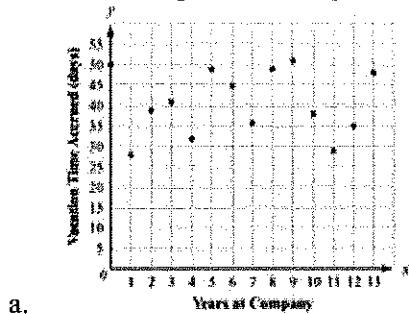
2. Which scatter plot BEST represents a model of **exponential** growth?

a.

c.

b.

d.

1
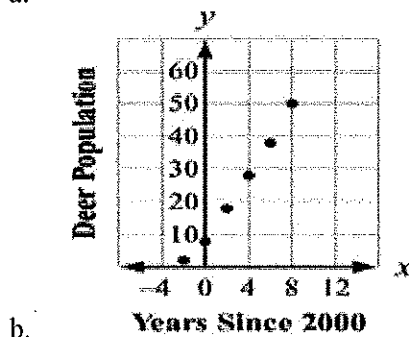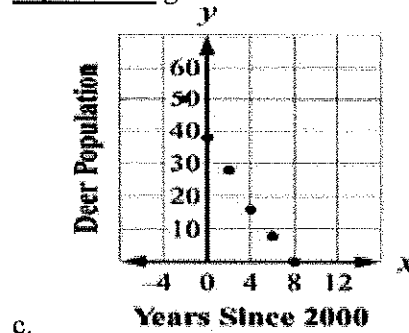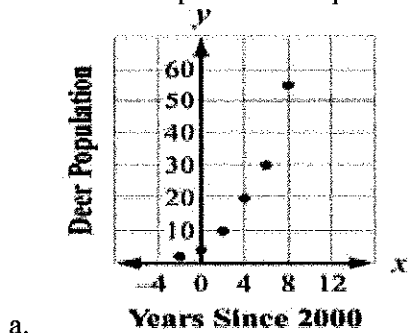
3.
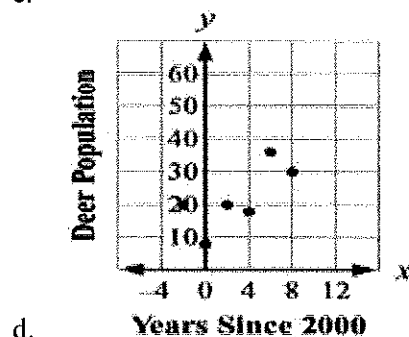
Which function model would best represent the scatter plot shown at the right?
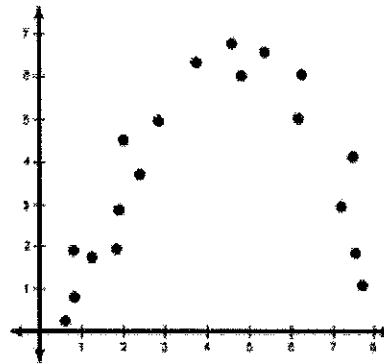
a. Linear Function
b. Quadratic Function
c. Exponential Function

4. Which function graphed below represents an **exponential** function that is always **decreasing**?

a.

c.

b.

d.
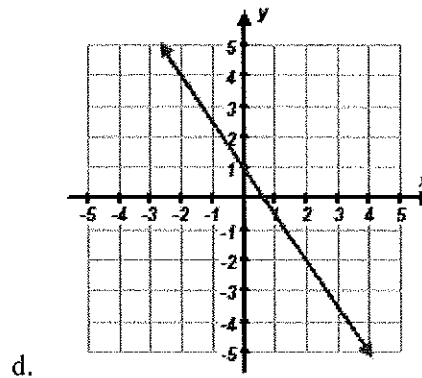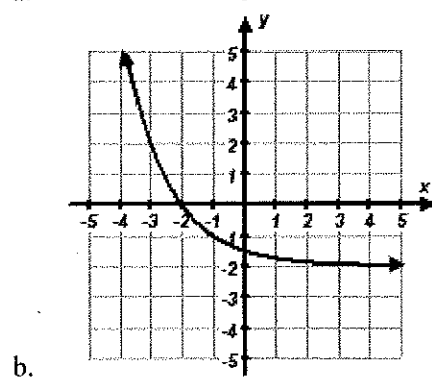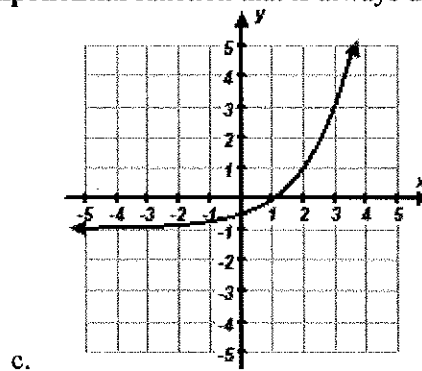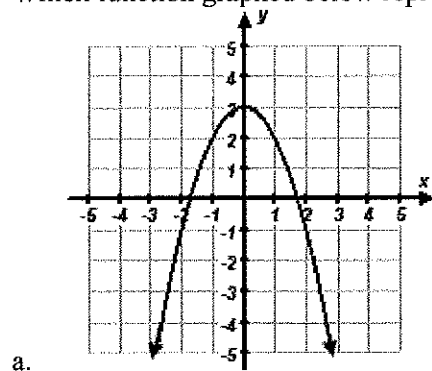
5. Which function graphed below represents an **linear** function that is always **decreasing**?
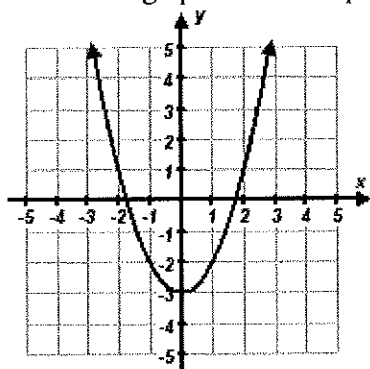
a.
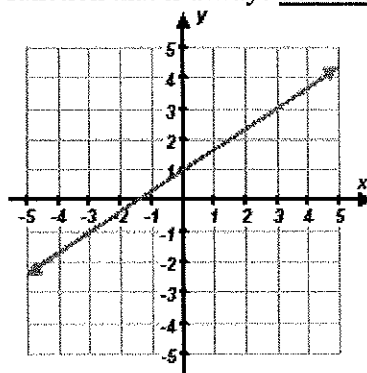
c.
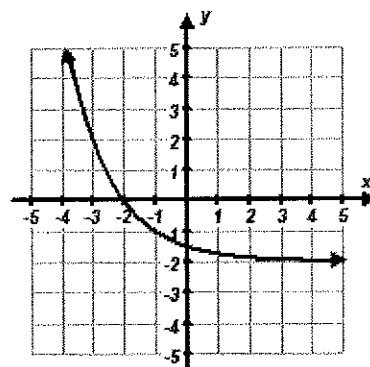
b.
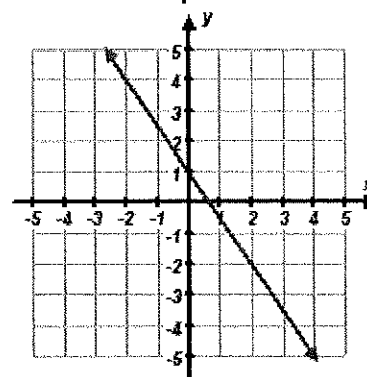
d.

6. Which function graphed below represents an **quadratic** function that has a **local minimum**?
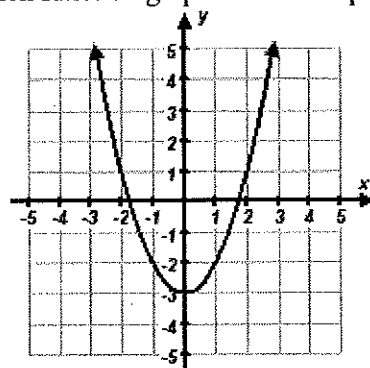
a.
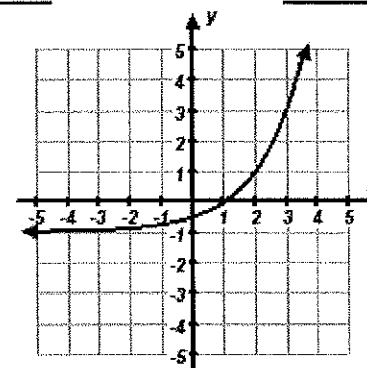
c.
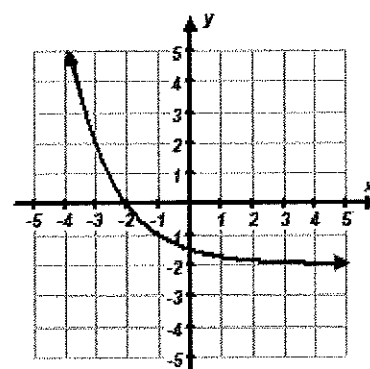
b.
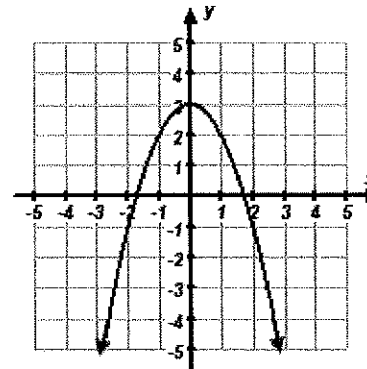
d.

7. Which type of function below can have a **local maximum**?
   a. Linear Function
   b. Quadratic Function
   c. Exponential function

3

8. Which type of function below has an **asymptote**?
   a. Linear Function
   b. Quadratic Function
   c. Exponential function

STATION 2
IDENTIFY BY EQUATION

MULTIPLE CHOICE

1. Which function below is considered an **exponential** function?
   a. $a(x) = x^2 + 2x$
   b. $b(x) = 3x - 2^2$
   c. $c(x) = 4 + 3 \cdot 2^{x-1}$
   d. $d(x) = \dfrac{2}{x}$

2. Which function below is considered an **quadratic** function?
   a. $a(x) = x^2 + 2x$
   b. $b(x) = 3x - 2^2$
   c. $c(x) = 4 + 3 \cdot 2^{x-1}$
   d. $d(x) = \dfrac{2}{x}$

3. Which function below is considered an **linear** function?
   a. $a(x) = x^2 + 2x$
   b. $b(x) = 3x - 2^2$
   c. $c(x) = 4 + 3 \cdot 2^{x-1}$
   d. $d(x) = \dfrac{2}{x}$

4. Consider the function:

   $$f(x) = 2x(x + 3)$$

   What would be the best description of *f(x)*?

   a. Linear Function
   b. Quadratic Function
   c. Exponential Function

5. Consider the function:

$$g(x) = 2(x+3) - 5x + 1$$

What would be the best description of *g(x)*?

a. Linear Function
b. Quadratic Function
c. Exponential Function

6. Consider the function:

$$h(x) = 2\left(3^{2x}\right) - 6$$

What would be the best description of *h(x)*?

a. Linear Function
b. Quadratic Function
c. Exponential Function

STATION 3
IDENTIFY BY TABLE

MULTIPLE CHOICE

1. Which table of values BEST represents a model of **exponential** growth?

a.

x	0	1	2	3	4
y	5	6	7	8	9

b.

x	0	1	2	3	4
y	0	3	9	27	81

c.

x	0	1	2	3	4
y	5	13	21	29	37

d.

x	0	1	2	3	4
y	0	22	44	66	88

PTS: 1

2. Which table of values BEST represents a model of **exponential** decay?

a.

x	−1	0	1	2	3	4
a(x)	2	1	2	5	10	17

b.

x	−1	0	1	2	3	4
b(x)	9	7	5	3	1	−1

c.

x	−1	0	1	2	3	4
c(x)	3	4	6	10	18	34

d.

x	−1	0	1	2	3	4
d(x)	191	95	47	23	11	5

PTS: 1

1

3. Which function is modeled in this table?

x	f(x)
1	8
2	40
3	200
4	1,000

a. $a(x) = x + 7$

b. $b(x) = 2x^2 + 6$

c. $c(x) = (8)^x$

d. $d(x) = \dfrac{8}{5}(5)^x$

PTS: 1

4. Determine which type of function would best describe the partial set of values shown in the table below.

x	−1	0	1	2	3	4
f(x)	6	1	0	3	10	21

a. f(x) is a linear function
b. f(x) is a quadratic function
c. f(x) is a exponential function

PTS: 1

5. Determine which type of function would best describe the partial set of values shown in the table below.

x	−1	0	1	2	3	4
g(x)	−2	1	4	7	10	13

a. f(x) is a linear function
b. f(x) is a quadratic function
c. f(x) is a exponential function

PTS: 1

6. Determine which type of function would best describe the partial set of values shown in the table below.

x	−1	0	1	2	3	4
h(x)	2	4	10	28	82	244

a. f(x) is a linear function
b. f(x) is a quadratic function
c. f(x) is a exponential function

PTS: 1

3

12. Describe each of the following as examples of relationships that could be modeled by:
LINEAER functions, QUADRATIC functions, EXPONENTIAL functions, or NONE OF THESE.

STATION 4

x	0	1	2	3	4	5	....
f(x)	5	7	9	11	13	15	....

x	−1	0	1	2	3	4	....
g(x)	1	0	1	4	9	16	....

x	0	1	2	3	4	5	....
h(x)	2	3	5	9	17	33	....

x	0	1	2	3	4	5	....
t(x)	1	3	0	4	−1	5	....

x	0	1	2	3	4	5	....
w(x)	5	−1	−3	−1	5	15	....

x	0	1	2	3	4	5	....
m(x)	1	1.5	2	2.5	3	3.5	....

x	0	1	2	3	4	5	....
b(x)	1	2	4	9	35	712	....

x	0	1	2	3	4	5	....
p(x)	−4	−2	4	22	76	238	....

STATION 5
LINEAR, QUAD, EXPONENTIAL IN CONTEXT

MULTIPLE CHOICE

1. Initially a kiln oven is turned on and heat increases by 50% every minute for the first 6 minutes. Below shows the temperature of the kiln t minutes after it was turned on.

Time (min.)	0	1	2	3	4
Temp. (°F)	80°	120°	180°	270°	405°

   Which type of model would be the best model to describe the relationship between the time and temperature for at least the first 6 minutes?
   a. Linear Model
   b. Quadratic Model
   c. Exponential Model

   PTS: 1

2. An ant colony is growing and doubles in population every 2 months. On the initial day of study the colony had 48 ants. The table shows the ant population of the colony at the end of the first few months.

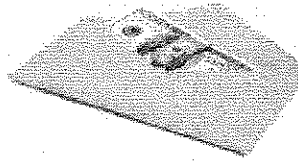| Time (months)	0	1	2	3	4
Ant Population	48	72	108	162	243

   Which type of model would be the best model to describe the relationship of the ant colony population over time?

   a. Linear Model
   b. Quadratic Model
   c. Exponential Model

   PTS: 1

3.

A high school student started saving for a
car. He had $500 to start with and started a
part time job in which he was able to save an
additional $200 each month. He kept the
money in an envelope at home.

Which type of model would be the best model to describe the relationship of the amount of money
saved over time?

a. Linear Model
b. Quadratic Model
c. Exponential Model

PTS: 1

4. A researches was testing a new vehicle's braking distances at different speeds. She recorded the
following data for the braking distances.

Speed (mph)	10	20	30	40	50
Stopping Distance (feet)	7	22	47	82	127

Which type of model would be the best model to describe the relationship of the car's speed to its
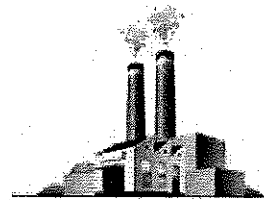stopping distance?

a. Linear Model
b. Quadratic Model
c. Exponential Model

PTS: 1

5.

One of the more common isotopes leaking from the disabled
Fukushima power plant is Iodine-131 which has a half life of 8
days. A researcher was examining 48 grams of isotope and is
measuring the amount that is still radioactive each day.

Time (days)	0	8	16	24	32	40
Iodine-131 (grams)	48	24	12	6	3	1.5

Which type of model would be the best model to describe the relationship of the number of days and
the amount of radioactive material?

a. Linear Model
b. Quadratic Model
c. Exponential Model

PTS: 1

2

6.

A taxi-cab company charges its customers an initial fee of $4.00 and then an additional $0.60 for each mile they drive the customer.

Which type of model would be the best model to describe the relationship between the number of miles driven and how much the customer is charged?

a. Linear Model
b. Quadratic Model
c. Exponential Model

PTS: 1

7. A bomb is dropped from a military plane during a practice exercise by the Air Force and the height of the bomb is recorded each second after it was dropped.

| Time (seconds)	0	5	10	15	20	25
Bomb Height (feet)	10000	9600	8400	6400	3600	0

Which type of model would be the best model to describe the bomb's height as a function of time?

a. Linear Function
b. Quadratic Function
c. Exponential Function

PTS: 1

8.

A person purchased a house for $180,000 in a nice area. The value of the houses in the area increasing each year by 9% (i.e. growing by a growth factor of 1.09)
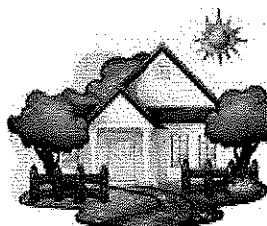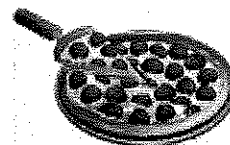
Which type of model would be the best model to describe the relationship between the number of years after the house was purchased and the value of the house?

a. Linear Model
b. Quadratic Model
c. Exponential Model

PTS: 1

3

9.

A pizza delivery restaurant, Pizza Shack, charges $15 for the first large pizza and then $6 for each large pizza after the first.

Which type of model would be the best model to describe the price of the order as a function of the number of pizzas ordered?

a. Linear Function
b. Quadratic Function
c. Exponential Function

PTS: 1

10.

A local community college charges $950 for associated student fees and then an additional $150 for every credit hour of classes taken.

Which type of model would be the best model to describe the cost of paying tuition for college as a function of the number of credit hours?

a. Linear Function
b. Quadratic Function
c. Exponential Function

PTS: 1

11.

A person is hanging their hand out the window at different speeds and notices the force of air resistance or drag pushing back on his hand. He recorded the following values of force on his hand at varying speeds.

Speed (mph)	20	30	40	50	60	70
Wind Force (pounds)	0.3	0.8	1.5	2.4	3.5	4.8

Which type of model would be the best model to describe the force on his hand as a function of speed?

a. Linear Function
b. Quadratic Function
c. Exponential Function

PTS: 1

4

12. A student works at a local grocery store and makes $8.00 per hour. At the end of the week she is able to determine the amount of her weekly paycheck based on the hours she worked.

Which type of model would be the best model to describe her paycheck as a function of the hour she worked?

a. Linear Function
b. Quadratic Function
c. Exponential Function

PTS: 1

13. Terri finds that the number of flower bulbs increase each year. She started with just 24 tulip plants. After one year she had 72 plants. Two years later she had 120.

Years	0	1	2	3	4
Flower Bulbs	24	72	120	168	216

Which type of model would be the best model to describe the relationship between the time and the number of flowers?
a. Linear Model
b. Quadratic Model
c. Exponential Model
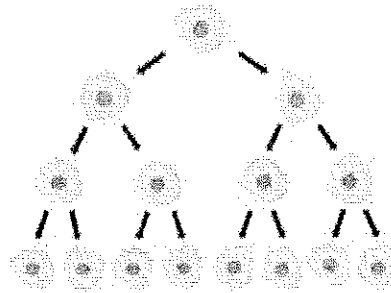
PTS: 1

STATION 6
PARAMETER IDENTIFICATIONS

MULTIPLE CHOICE

1.

Consider this function for cell duplication.
The cells duplicate every minute. The
function describes the number cells t minutes
after the study began.

$$f(t) = 75(2)^t$$

Which correctly describes one of the
parameters of this function?

   a.   There are initially 2 cells at the start of the study.
   b.   There are initially 75 cells at the start of the study.
   c.   There are initially 150 cells at the start of the study.
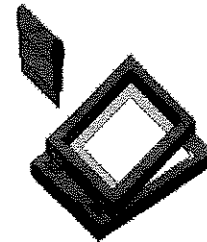   d.   There are initially 200 cells at the start of the study.

PTS: 1

2.

Jessica is making silk screen tee-shirts for her school. Her school's
football team made the playoffs. She will have to first purchase supplies
but then she will make a certain amount for each tee-shirt she sells. She
created the following linear function that describes her profit in dollars.

$$p(x) = 9 \cdot x - 180$$

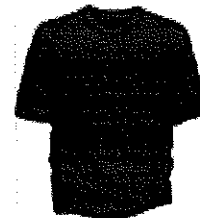What does the parameter 9 most likely represent in the function?

   a.   She will have to spend $9 on supplies
   b.   She will make a total of 9 tee-shirts.
   c.   She will earn $9 on each tee-shirt she sells.
   d.   She will spend $9 making each tee-shirt.

PTS: 1

3.
Jessica is making silk screen tee-shirts for her school. Her school's football team made the playoffs. She will have to first purchase supplies but then she will make a certain amount for each tee-shirt she sells. She created the following linear function that describes her profit in dollars.

$p(x) = 9 \cdot x - 180$

What does the parameter 180 most likely represent in the function?

a. She will have to spend $180 on supplies.
b. She will make a total of 180 tee-shirts.
c. She will earn $180 after selling all of her tee-shirts.
d. She needs to sell 180 tee-shirts to break even.

PTS: 1

4.
A collector purchased a pair of rare shoes that have steadily increased in value each year. The collector created a function that describes the value of the shoes after he purchased them.

$v(t) = 190(1.15)^t$

Which correctly describes one of the parameters of this function?
a. The shoes increase in value by 15% each year.
b. The shoes will be worth $190 in a few years after he purchased them.
c. The collector paid $218.50 for the shoes.
d. The shoes are initially worth $115.

PTS: 1

5.
An investor purchased an ounce of gold several years ago and realized that the value of gold has consistently increased in value over the last several years. The investor used the following model to approximate the value of the gold.

$v(t) = 212(1.1)^t$

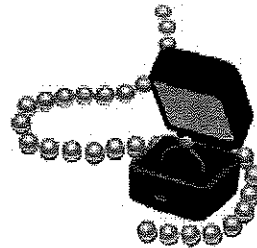Which correctly describes one of the parameters of this function?
a. The investor purchased 1.1 ounces of gold.
b. The investor's gold ounce increases by $212 each year.
c. The gold doubles in value every 1.1 years.
d. The initial value of the gold was $212.

PTS: 1

6.

A sales person at a jewelry store is paid a base amount each week plus a commission of sales. She can determine her weekly paycheck by knowing her total sales amount and using the function below.

$p(x) = 200 + 0.03x$

Which correctly describes one of the parameters of this function?
a. The base amount of pay of the salesperson is $200 per week.
b. The base amount of pay of the salesperson is $60 per week.
c. The salesperson earns a 2% commission.
d. The salesperson earns a 20% commission.

PTS: 1

7.

A sales person at a jewelry store is paid a base amount each week plus a commission of sales. She can determine her weekly paycheck by knowing her total sales amount and using the function below.

$p(x) = 200 + 0.03x$

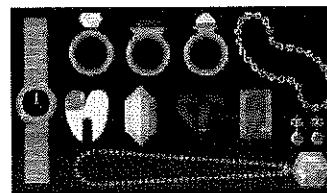Which correctly describes one of the parameters of this function?
a. The base amount of pay of the salesperson is $260 per week.
b. The base amount of pay of the salesperson is $60 per week.
c. The salesperson earns a 2% commission.
d. The salesperson earns a 3% commission.

PTS: 1

8.

A new highly contagious strain of the flu is going around a high school after coming back from winter break. The number of students that have contracted the flu doubles each week. The number infected follows the model shown below very closely for the first several weeks of school (time, t, is measure in weeks after coming back to school).

$s(t) = 3 \cdot 2^t$

Which correctly describes one of the parameters of this function?
a. There were initially 2 students that were sick.
b. There were initially 3 students that were sick.
c. There were initially 6 students that were sick.
d. There were initially 9 students that were sick.

PTS: 1

9.

A football is punted and the height of the football in feet could be described using the following function model (where t is in seconds after the ball was punted):

$h(t) = -16(t-2)^2 + 55$

Which correctly describes one of the parameters of this function?
a. The ball was in the air for a total of 2 seconds.
b. The ball had a maximum height of 55 feet.
c. The ball was in the air a total of 16 seconds
d. The ball landed 55 feet away from the kicker.

PTS: 1

10.

A street vendor is selling pretzels. The vendor realized that for the most part the price determined how many pretzels he would sell each day. The following shows a model that determines the number he will sell based on the price, p in dollars.

$s(p) = -5(p-3)^2 + 74$
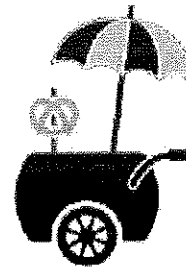
Which correctly describes one of the parameters of this function?
a. The vendor sells the most pretzels when he charges $5
b. The vendor sells the most pretzels when he charges $74
c. The vendor sells the most pretzels when he charges $3
d. The vendor sells the most pretzels when he charges $15

PTS: 1

11.

A street vendor is selling hotdogs. The vendor realized that for the most part the price determined how many hot dogs he would sell each day. The following shows a model that determines the number he will sell based on the price, p in dollars.

$s(p) = -6(p-4)^2 + 94$

Which correctly describes one of the parameters of this function?
a. Based on model, he will sell at most 10 hot dogs
b. Based on model, he will sell at most 24 hot dogs
c. Based on model, he will sell at most 70 hot dogs
d. Based on model, he will sell at most 94 hot dogs

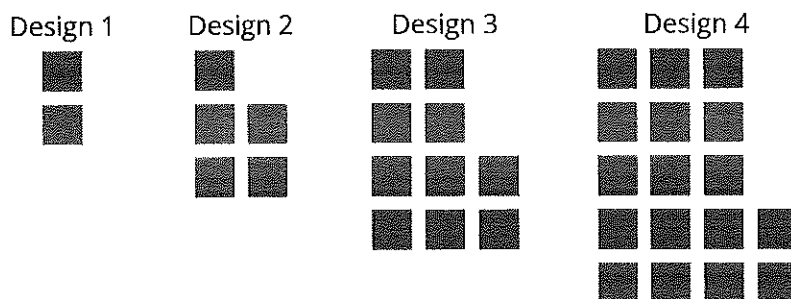PTS: 1

4

Post-test   STATION 7

Name _____ Date _____

1. The diagrams shows different designs a child is making by stacking blocks.

Design 1   Design 2   Design 3   Design 4

   a. Let *n* represent the number of blocks. Identify two algebraic expressions that represent the pattern of blocks in the designs.

   b. Describe the expression as linear, quadratic, exponential, or none of these. Explain your reasoning.

   c. Algebraically prove your expressions are equivalent.

   d. How many blocks would the artist have to make for Design 9? Explain your reasoning.

2. Which equation does the graph represent? Explain how you know.

   $y = 3^x$ $y = 6x - 4$ $y = 3x^2$