F.LE.A.1: Families of Functions

1 One characteristic of all linear functions is that they change by
1) equal factors over equal intervals
2) unequal factors over equal intervals
3) equal differences over equal intervals
4) unequal differences over equal intervals

2 Which situation could be modeled by using a linear function?
1) a bank account balance that grows at a rate of 5% per year, compounded annually
2) a population of bacteria that doubles every 4.5 hours
3) the cost of cell phone service that charges a base amount plus 20 cents per minute
4) the concentration of medicine in a person's body that decays by a factor of one-third every hour

3 Grisham is considering the three situations below.
I. For the first 28 days, a sunflower grows at a rate of 3.5 cm per day.
II. The value of a car depreciates at a rate of 15% per year after it is purchased.
III. The amount of bacteria in a culture triples every two days during an experiment.
Which of the statements describes a situation with an equal difference over an equal interval?
1) I, only
2) II, only
3) I and III
4) II and III

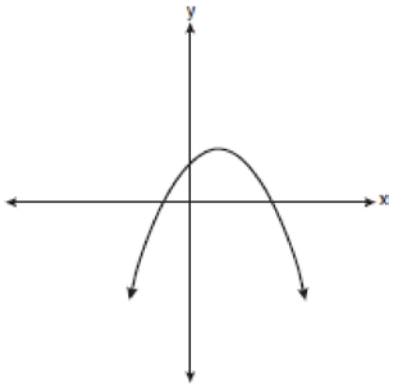
4 Which scenario represents exponential growth?
1) A water tank is filled at a rate of 2 gallons/minute.
2) A vine grows 6 inches every week.
3) A species of fly doubles its population every month during the summer.
4) A car increases its distance from a garage as it travels at a constant speed of 25 miles per hour.

5 Ian is saving up to buy a new baseball glove. Every month he puts $10 into a jar. Which type of function best models the total amount of money in the jar after a given number of months?
1) linear
2) exponential
3) quadratic
4) square root

6 The highest possible grade for a book report is 100. The teacher deducts 10 points for each day the report is late. Which kind of function describes this situation?
1) linear
2) quadratic
3) exponential growth
4) exponential decay

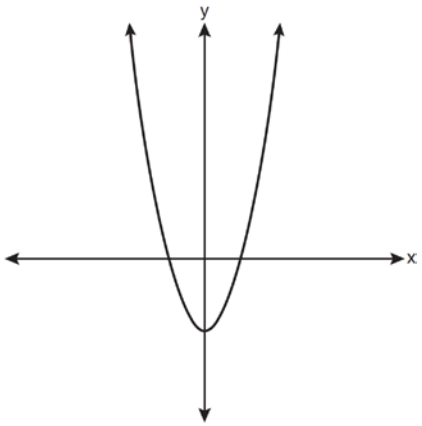
7 Sara was asked to solve this word problem: "The product of two consecutive integers is 156. What are the integers?" What type of equation should she create to solve this problem?
1) linear
2) quadratic
3) exponential
4) absolute value

8 Which type of graph is shown in the diagram below?



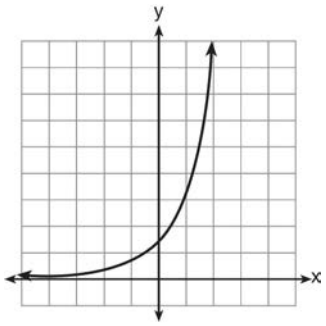
1) absolute value
2) exponential
3) linear
4) quadratic

9 Which type of function is represented by the graph shown below?



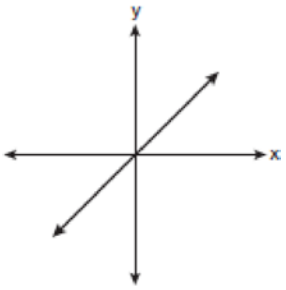
1) absolute value
2) exponential
3) linear
4) quadratic

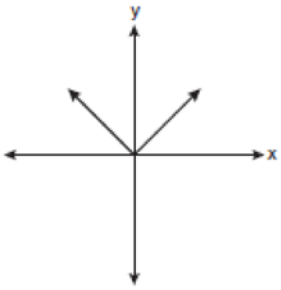
10 Which type of function is graphed below?

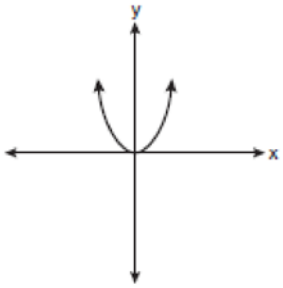


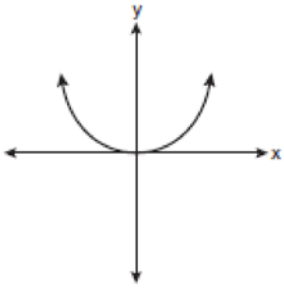
1) linear
2) quadratic
3) exponential
4) absolute value

11 Which graph represents a linear function?

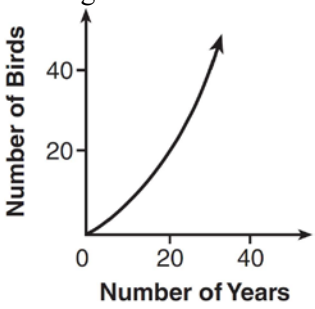
1) 

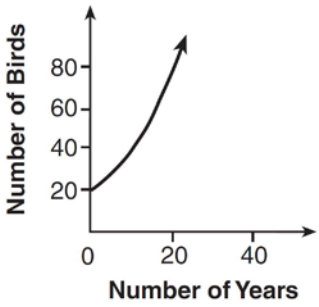
3) 

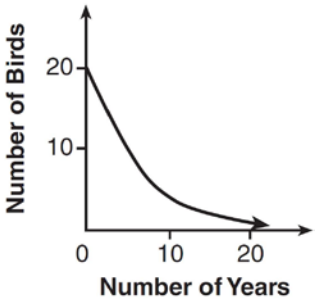
2) 

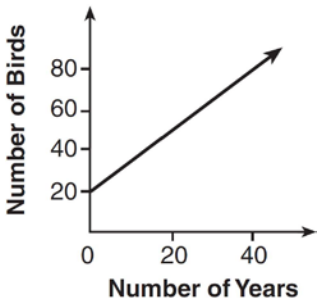
4) 

12 A population that initially has 20 birds approximately doubles every 10 years. Which graph represents this population growth?

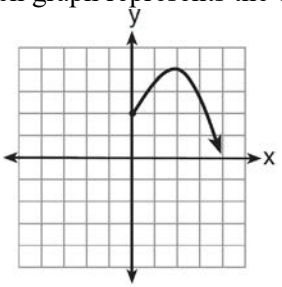
1) 

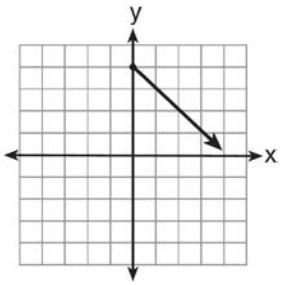
3) 

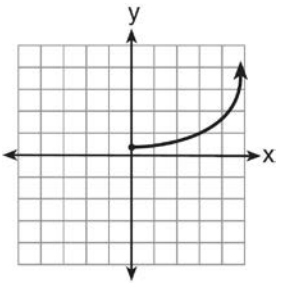
2) 

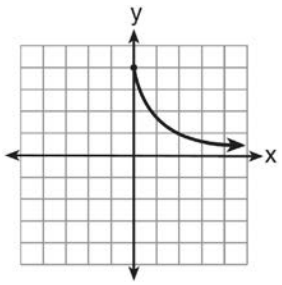
4) 

13 Which graph represents the exponential decay of a radioactive element?

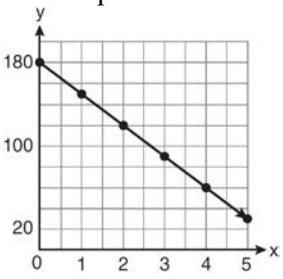
1) 

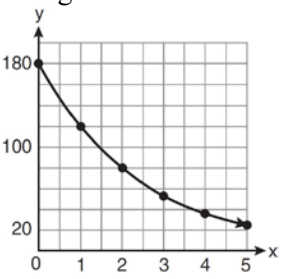
3) 

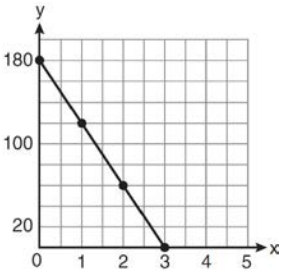
2) 

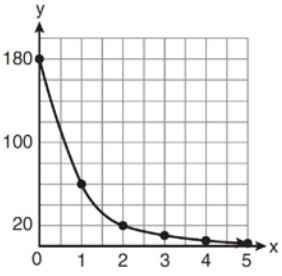
4) 

14 On January 1, a share of a certain stock cost $180. Each month thereafter, the cost of a share of this stock decreased by one-third. If x represents the time, in months, and y represents the cost of the stock, in dollars, which graph best represents the cost of a share over the following 5 months?

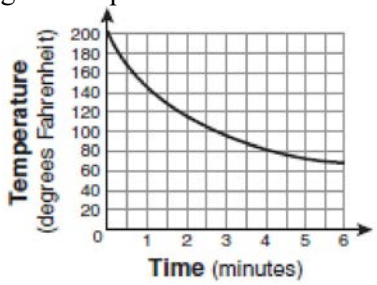
1) 

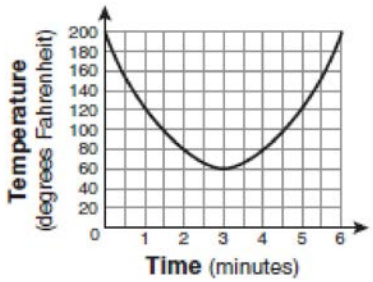
3) 

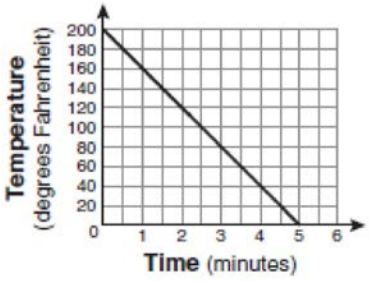
2) 

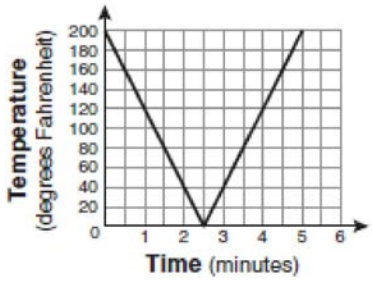
4) 

15 Antwaan leaves a cup of hot chocolate on the counter in his kitchen. Which graph is the best representation of the change in temperature of his hot chocolate over time?

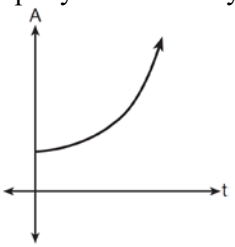
1) 

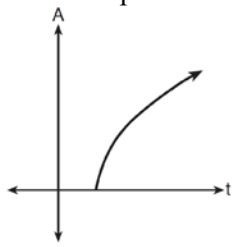
3) 

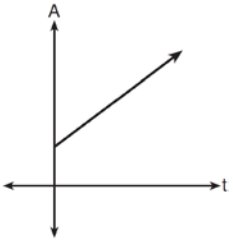
2) 

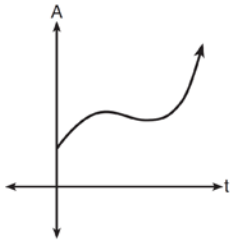
4) 

16 An investment is earning 5% interest compounded quarterly. The equation represents the total amount of money, *A,* where *P* is the original investment, *r* is the interest rate, *t* is the number of years, and *n* represents the number of times per year the money earns interest. Which graph could represent this investment over at least 50 years?

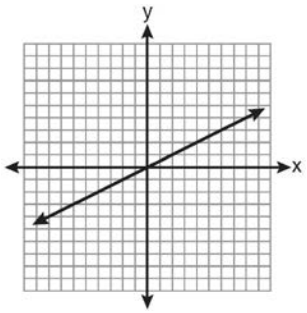
1) 

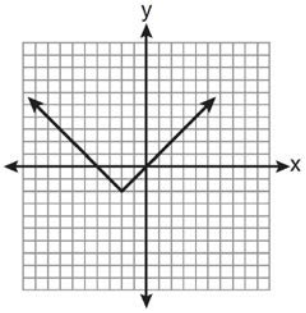
3) 

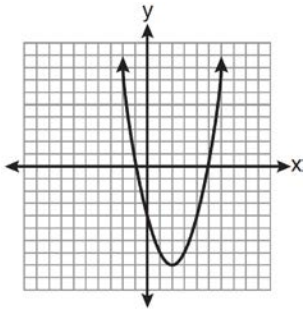
2) 

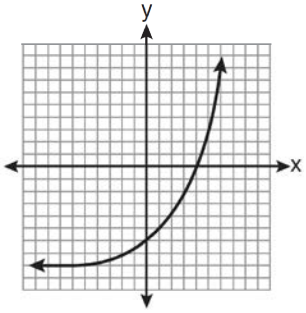
4) 

17 Which graph represents an exponential equation?

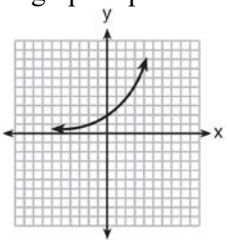
1) 

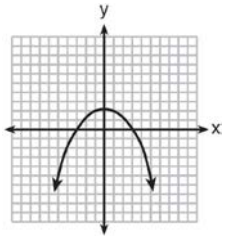
3) 

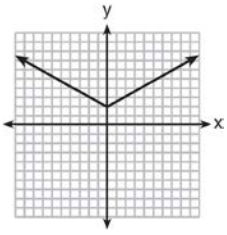
2) 

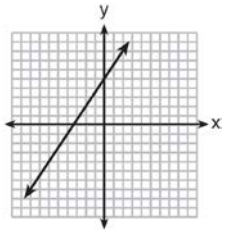
4) 

18 Which graph represents an absolute value equation?

1) 

3) 

2) 

4) 

19 The tables below show the values of four different functions for given values of x.

x	f(x)
1	12
2	19
3	26
4	33

x	g(x)
1	–1
2	1
3	5
4	13

x	h(x)
1	9
2	12
3	17
4	24

x	k(x)
1	–2
2	4
3	14
4	28

Which table represents a linear function?

1) $f(x)$
2) $g(x)$
3) $h(x)$
4) $k(x)$

20 Which table of values represents a linear relationship?

1)

x	f(x)
−1	−3
0	−2
1	1
2	6
3	13

2)

x	f(x)
−1	$\frac{1}{2}$
0	1
1	2
2	4
3	8

3)

x	f(x)
−1	−3
0	−1
1	1
2	3
3	5

4)

x	f(x)
−1	−1
0	0
1	1
2	8
3	27

21 The table below shows the average yearly balance in a savings account where interest is compounded annually. No money is deposited or withdrawn after the initial amount is deposited.

Year	Balance, in Dollars
0	380.00
10	562.49
20	832.63
30	1232.49
40	1824.39
50	2700.54

Which type of function best models the given data?

1) linear function with a negative rate of change
2) linear function with a positive rate of change
3) exponential decay function
4) exponential growth function

22 The function, $t(x)$, is shown in the table below.

x	t(x)
–3	10
–1	7.5
1	5
3	2.5
5	0

Determine whether $t(x)$ is linear or exponential. Explain your answer.

23 Consider the pattern of squares shown below:

Which type of model, linear or exponential, should be used to determine how many squares are in the nth pattern? Explain your answer.

24 Rachel and Marc were given the information shown below about the bacteria growing in a Petri dish in their biology class.

Number of Hours, x	1	2	3	4	5	6	7	8	9	10
Number of Bacteria, $B(x)$	220	280	350	440	550	690	860	1070	1340	1680

Rachel wants to model this information with a linear function. Marc wants to use an exponential function. Which model is the better choice? Explain why you chose this model.

F.LE.A.1: Families of Functions
Answer Section

1 ANS: 3 REF: 061721ai
2 ANS: 3 REF: 081412ai
3 ANS: 1 REF: 011623ai
4 ANS: 3 REF: 011711ai
5 ANS: 1 REF: 011805ai
6 ANS: 1 REF: 081717ai
7 ANS: 2 REF: 061624ai
8 ANS: 4 REF: fall0717ia
9 ANS: 4 REF: 061111ia
10 ANS: 3 REF: 061318ia
11 ANS: 1 REF: 060801ia
12 ANS: 3 REF: 081410ai
13 ANS: 4 REF: 011423ia
14 ANS: 3 REF: 011119a2
15 ANS: 1 REF: 010905ia
16 ANS: 1 REF: 011505a2
17 ANS: 4 REF: 081025ia
18 ANS: 2 REF: 061423ia
19 ANS: 1 REF: 061606ai
20 ANS: 3 REF: 011505ai
21 ANS: 4 REF: 061406ai
22 ANS:
Linear, because the function has a constant rate of change.

REF: 011625ai
23 ANS:
Exponential, because the function does not have a constant rate of change.

REF: 081627ai
24 ANS:
Exponential, because the function does not grow at a constant rate.

REF: 081527ai