Section 3-9

Name:

1. To rent a bicycle on the beach board walk, the initial cost is $10 plus an additional charge of $5 per hour. Create a linear function model and graph.

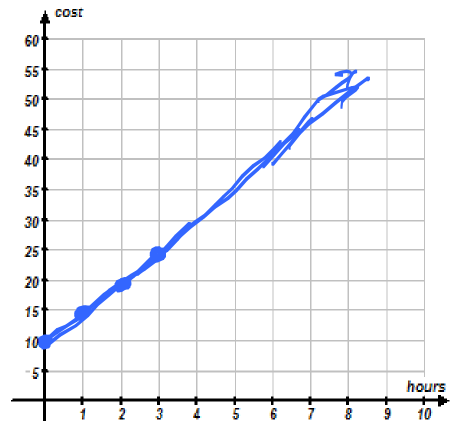
x = hours

$C(x) = 10 + 5x$

INITIAL START UP IS CONSTANT

"per" SUGGESTS A RATE OF DOLLARS PER HOUR

0 Hours, $10
1 Hour, $15
2 Hours, $20
3 Hours, $25



2. Let $h(x)$ be the number of person-hours it takes to assemble x engines in a factory. The company's accountant determines that the time it takes depends on start-up time and the number of engines to be completed. It takes 6.5 hours to set up the machinery to make the engines and about 5.25 hours to completely assemble one. Create the function $h(x)$.

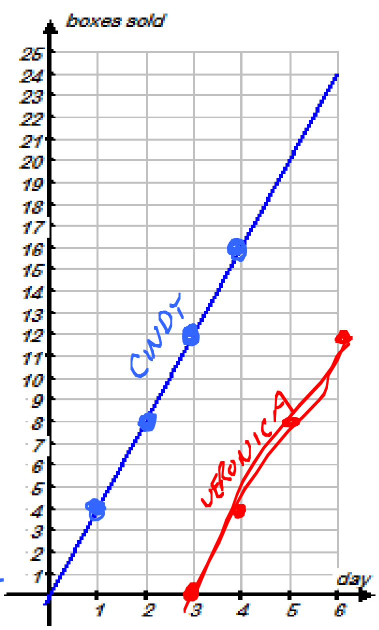
x = number of engines

$h(x) = 6.5 + 5.25x$

INITIAL START-UP ONLY HAPPENS ONCE AND IS CONSTANT

RATE OF 5.25 HOURS PER ENGINE

3. Two students were selling cookies for a fundraiser. They both started on the first day of the month. The graph shows how many boxes Cindy sold in total after each day. If Veronica hadn't sold any boxes by the 3rd day of the month but then started selling cookies at the exact same rate, how many cookie boxes will Veronica have sold by the 12th day of the month?



X = NUMBER OF DAYS

VERONICA: $y = mx + b$

$y = 4x + b$

USE THE POINT (3,0)

$0 = 4(3) + b$

$0 = 12 + b$

$-12 \quad -12$

$-12 = b$

$\rightarrow y = 4x - 12$

COOKIE BOXES ↑ DAY ↑

$y = 4(12) - 12$

$= 48 - 12$

$= 36$ BOXES BY DAY 12

CINDY:

$y = mx + b$

$y = 4x + 0$

$y = 4(12)$

$y = 48$

CINDY SELLS 48 BOXES BY DAY 12

4. A babysitter charges parents $10 for coming to their house and then $6 for every hour she babysits. Create function c(x), where x = the number of hours and c(x) represents the amount the babysitter charges.

X = NUMBER OF HOURS WORKED

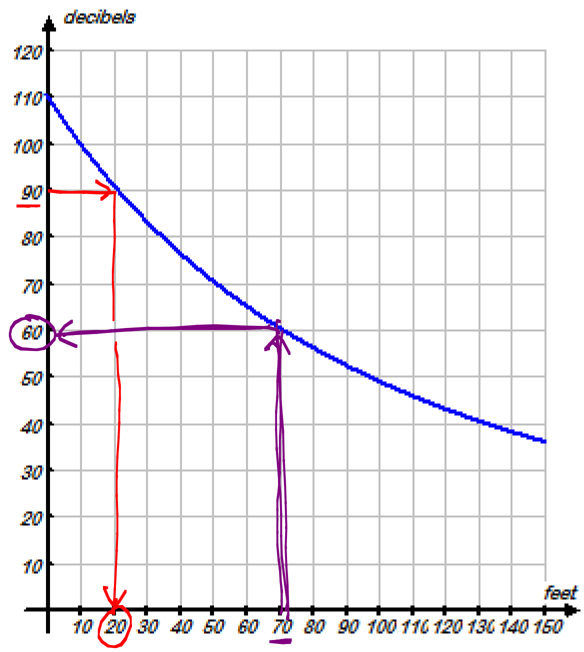
$C(x) = 10 + 6x$

FLAT CHARGE

RATE CHARGE

$6 PER HOUR

5. The function graphed shows the decibel level a car horn makes at varying distances away from the horn.



a. At prolonged period of listening anything above 90 decibels can cause permanent ear damage. How far must you be away from the horn to prevent potential ear damage?

20 ft

b. How many decibels would the car horn be at 70 feet away?

60 DECIBELS

6. Bonnie is renting space at a local private school to offer math tutoring. The school charges her a monthly fee to use classrooms after school and she charges the students a flat rate per hour. She models her profit using the function: $p(x) = c \cdot x - k$.
Explain what you think the variable x and the parameters 'c' and 'k' should each represent.

$P(x) = c \cdot x - k$

THE RATE BONNIE CHARGES PER HOUR

\# OF HOURS

PROBABLY THE AMOUNT BONNIE IS CHARGED BY THE SCHOOL.

7. (Review) A pair of shoes cost $135 and has been discounted 38%. What is the sale price of the shoes?

METHOD #1

$135 * 0.38 = 51.30

$135 - 51.30 = $83.70

METHOD #2

100% - 38% = 62%

WE STILL HAVE TO PAY 62% OF THE PRICE

$135 * 0.62 = $83.70

100-38
135*.62 62
83.7

8. (Review) A person paid their electricity bill late. The bill is $78. The electric company charges a 12% late charge. What is the total cost of the bill after paying it late?

METHOD #1

$78 * 0.12 = 9.36

$78 + 9.36 = $87.36

METHOD #2

100% + 12% = 112%

WE HAVE TO PAY 112% OF THE BILL.

$78 * 1.12 = $87.36

78*1.12
87.36

9. If a store has marked down all of its products 20%, create a function that would represent the new cost after the discount, d(x), where *x* is the original price of the item before the discount.

100% - 20% = 80%

WE STILL MUST PAY 80% OF THE PRICE

$d(x) = 0.80x$

10. If a furniture store buys furniture at wholesale cost of *x* and marks up the furniture by 95% to sell on their showroom floor, create a function p(x) that represents the price of the item in the store.

100% + 95% = 195%

THE PRICE IS 195% OF THE WHOLE SALE COST.

$P(x) = 1.95x$

WHERE x IS THE WHOLESALE COST.

11. A manager at a jewelry store buys jewelry at whole sale cost of *x*. To set a price on the item in the store she first adds $25 and she calls this function a(x). Then, she increases by 80% and calls this combined price increase $p(a(x))$. Create a function model that expresses the overall increase in price.

FIRST ADD $25 $a(x) = x + 25$

INCREASE THAT AMOUNT BY 80%. 100% + 80% = 180%

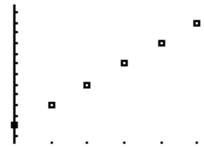
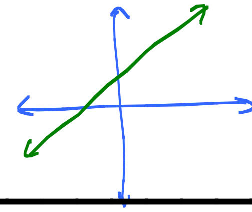
$P(a(x)) = 1.80(x+25)$

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.

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

LINEAR

2 2 2 2 2 ← FIRST DIFFERENCE CONSTANT

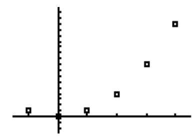
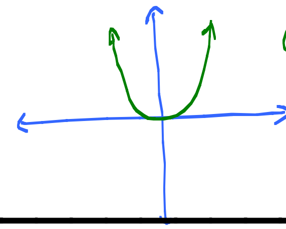



x	−1	0	1	2	3	4	....
g(x)	1	0	1	4	9	16	....

QUADRATIC

−1 1 3 5 7

2 2 2 2 ← SECOND DIFFERENCE CONSTANT

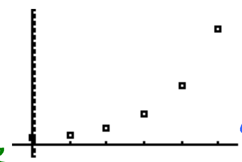
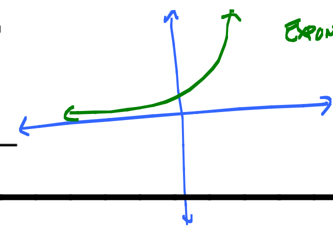



x	0	1	2	3	4	5	....
h(x)	2	3	5	9	17	33	....

EXPONENTIAL

1 2 4 8 16 ← DIFFERENCE ARE SAME MULTIPLE OF EACH OTHER (GEOMETRIC)

1 2 4 8

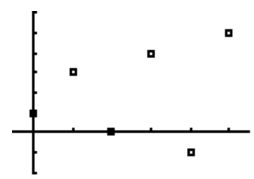
x	0	1	2	3	4	5	....
t(x)	1	3	0	4	− 1	5	....

NONE OF THESE

2 −3 4 −5 6

−5 7 −9 11

← NO RECOGNIZABLE PATTERN →



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

QUADRATIC

−6 −2 2 6 10

4 4 4 4 ← SECOND DIFFERENCE CONSISTENT

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

LINEAR

0.5 0.5 0.5 0.5 0.5 ← FIRST DIFFERENCE CONSTANT

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

NONE OF THESE

1 2 5 26 677

1 3 21 651

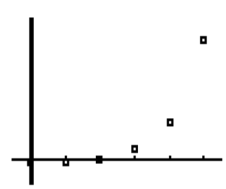
x	0	1	2	3	4	5	....
p(x)	− 4	− 2	4	22	76	238	....

EXPONENTIAL

2 6 18 54 162

4 12 36 108

COMMON RATIO = 3



$P(x) = 3^x - 5$

$P(2) = 3^2 - 5 = 9 - 5 = 4$

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

1 2 3 4 5

The Sequence: {4, 12, 36, 108, 324, … }

8 24 72 216

16 48 144

COMMON RATIO IS 3

EXPONENTIAL

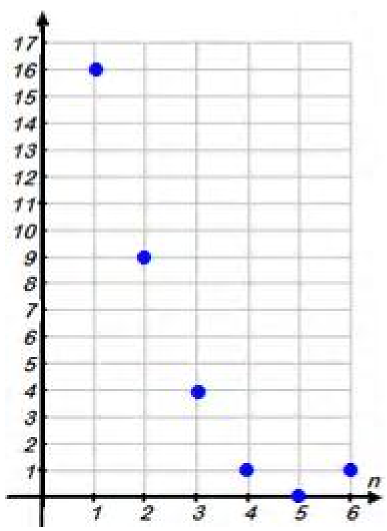
1 2 3 4 5 6

The Sequence: {3, 9, 15, 21, 27, 33, … }

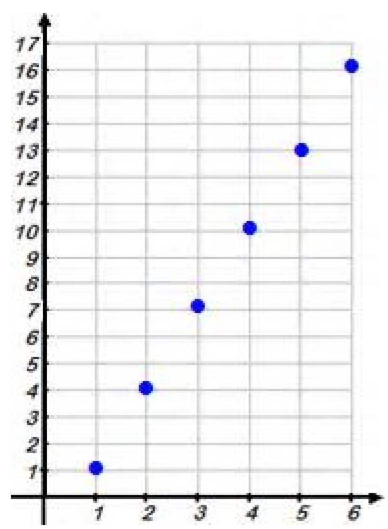
6 6 6 6 6

FIRST DIFFERENCE IS CONSTANT

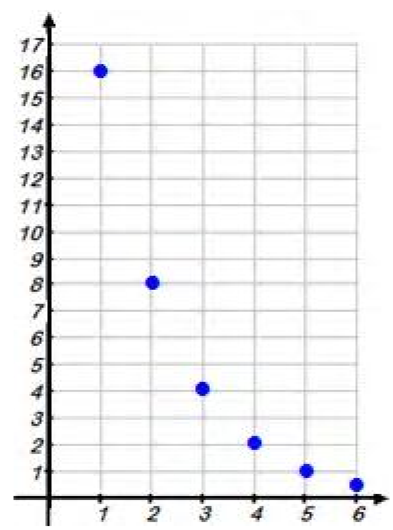
LINEAR



QUADRATIC



LINEAR



EXPONENTIAL