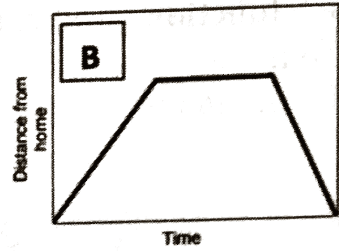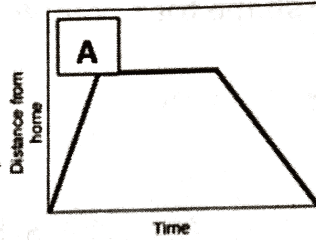# Station 1: Graphing Stories   Key

Match the situations to the graphs.

1) Derman left his home and hiked slowly up a hill. He walked normally across the top, then ran quickly down the other side. (D)

2) Derman ran to his friend's house. He hung out with his friend for a while, then walked home again. (A)

3) Derman walked to the gas station to buy a candy bar. After he bought it, he saw a ferocious lion. Scared, he ran all the way home. (B)
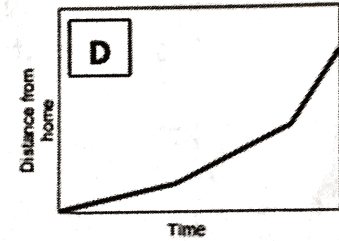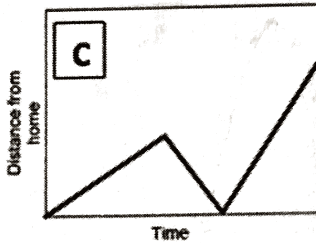
4) Derman was walking to a birthday party. When he was halfway there, he realized he'd forgotten to bring the present, so he went home to go get it. Once he got the present, he thought he might be late, so he ran all the way to the party. (C)

5) You are driving through town at a constant rate of about 30 miles per hour. You then get on the highway, and drive at a constant rate of about 55 miles per hour. You then stop at a rest stop.

**x-axis: time   y-axis: distance driven**
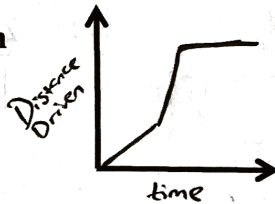
6) You are driving through town at a constant rate of about 30 miles per hour. You then get on the highway, and drive at a constant rate of about 55 miles per hour. You then stop at a rest stop.

x-:axis: time   y-axis: speed of the car

7) A wholesale t-shirt manufacturer charges the following prices for T-shirts:
- $20 per shirt for shirt orders up to 20 shirts
- $15 per shirt for shirt orders between 21 and 40 shirts
- $10 per shirt for shirt orders between 41 and 80 shirts
- $5 per shirt for shirt orders over 80 shirts
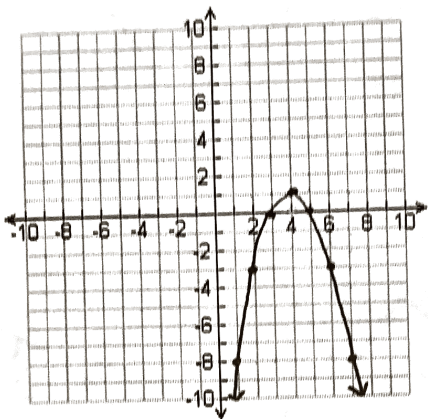

Cost of T-shirts
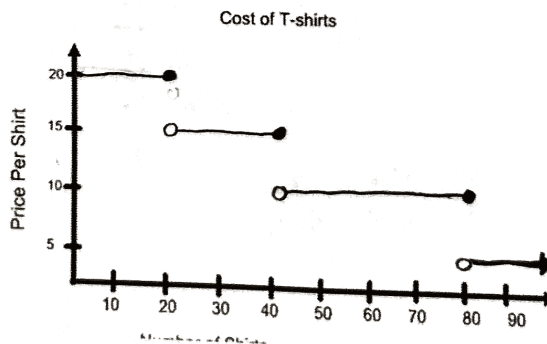
Station 2: Graphing Functions on a Coordinate Plane

For each function, predict the shape then complete the table (pick your own inputs) and use it to make the graph.

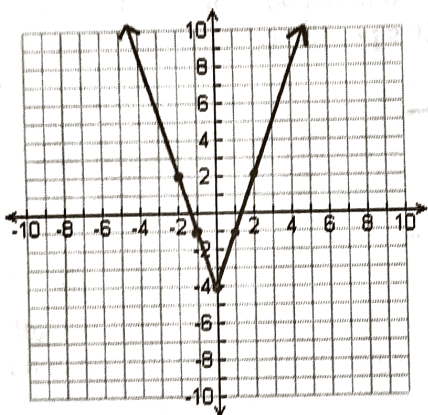Hint: If you do not see the shape you predicted, try picking more inputs!

1)

x	a(x)
1	-8
2	-3
3	0
4	1
5	0
6	-3
7	-8

$$a(x) = -(x-4)^2 + 1$$

2)

x	b(x)
-3	5
-2	2
-1	-1
0	-4
1	-1
2	2
3	5

$$b(x) = |3x| - 4$$

3)
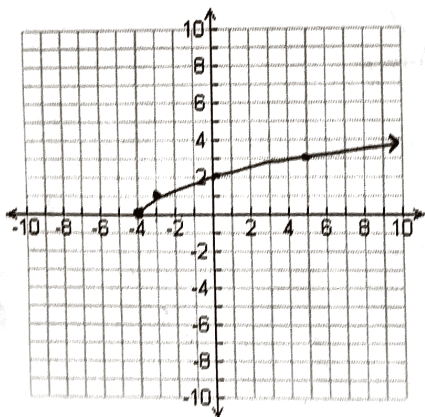
x	c(x)
-4	0
-3	1
0	2
5	3

$$c(x) = \sqrt{x+4}$$

Station 3: Key Features

1)

$y = x^2 - 2x - 3$
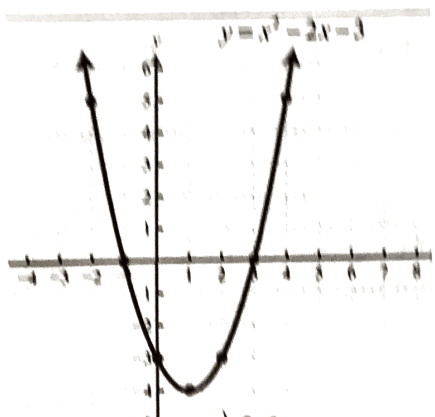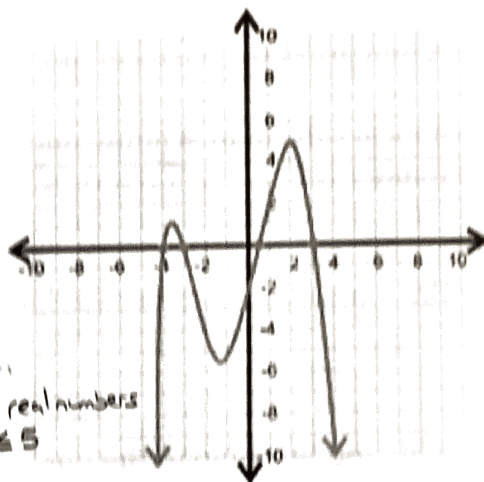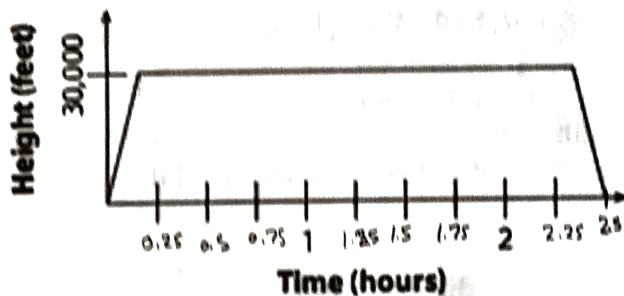
Domain: all real numbers
Range: $y \geq -4$
Increasing Interval(s): $x > 1$
Decreasing Interval(s): $x < 1$

2)

Domain: all real numbers
Range: $y \leq 5$
Max: 5
Min: None
X intercept(s): $-4, -3, 0.5, 3$
Y intercept(s): -2

3) The following is a graph of a plane's height off of the ground.

Height (feet) 30,000 / Time (hours)

a. Domain: $0 \leq x \leq 2.5$

b. Range: $0 \leq y \leq 30,000$

c. Increasing interval(s). What does is mean in terms of the situation?
$\rightarrow 0 < x < 0.2$ gaining height

d. Decreasing interval(s). What does is mean in terms of the situation?

e. Constant interval(s). What does is mean in terms of the situation?

f. Maximum $30,000$ $0.2 < x < 2.3$ the plane is flying at a constant height

g. Minimum 0 $2.3 < x < 2.5$ the plane is landing

h. $f(0.25) = 30,000$

i. Find x when $f(x)=30,000$ $0.2 \leq x \leq 2.3$

Station 4: Continuous or Discrete

1) When graphing each situation, would you expect a continuous or discrete graph?

a. A local salesman is going door to door trying to sell vacuums. For every vacuum he sells, he makes $20. *Discrete*
b. a hot air balloon's distance from the ground during the flight *Continuous*
c. the volume of water in a swimming pool that is being drained *Continuous*
d. the number of cars in a parking lot each day for a month *Discrete*

2) Phil and Lil come to the fair with $19 total. Each ticket they buy for a ride costs $3.

a. Write a rule in function notation that would calculate how much money **they have left.**

$$f(x) = 19 - 3x$$

b. Find a reasonable domain. $\{0, 1, 2, 3, 4, 5, 6\}$

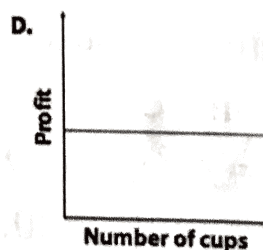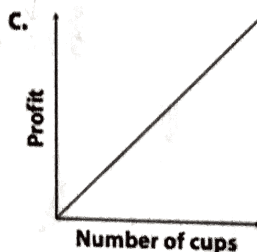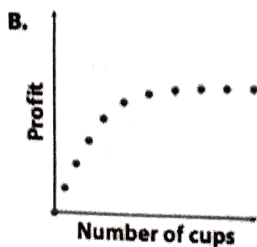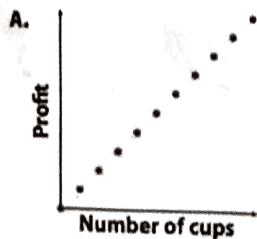c. Find a reasonable range. $\{1, 4, 7, 10, 13, 16, 19\}$

3) A perfect paper airplane begins its ascent (climb) from Tommy's hand which is 5 ft off the ground. It flies perfectly at a rate of 3 ft per second until it gets stuck in a tree that is 20 ft off of the ground.

a. Write a rule in function notation for the situation. $f(x) = 5 + 3x$

b. Find a reasonable domain. $0 \le x \le 5$

c. Find a reasonable range. $5 \le y \le 20$

4) Two children are selling lemonade. They are charging $1 for a cup. They only sell 10 cups. Consider the graphs shown.
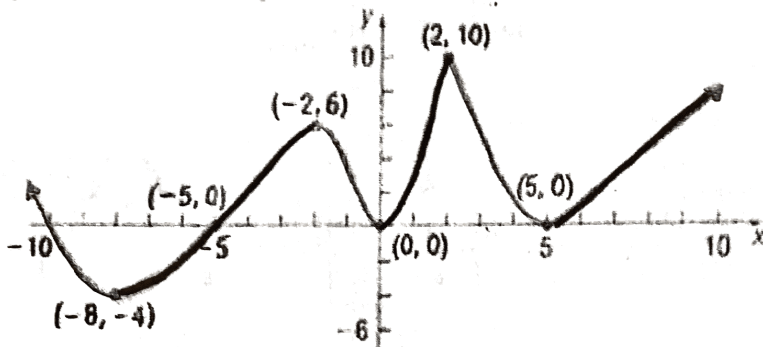
A. Profit / Number of cups
B. Profit / Number of cups
C. Profit / Number of cups
D. Profit / Number of cups

Which graph best represents the situation? Justify your answer.

(A) It needs to be discrete because you can't sell half of a cup of lemonade. It goes up at a steady rate.

Key

Max: None

Min: -4

Increasing: $-8 < x < -2$ $0 < x < 2$ $x > 5$

Decreasing: $x < -8$ $-2 < x < 0$ $2 < x < 5$

Constant: None

X-intercepts: $-10, -5, 0, 5$

Y-intercepts: 0

Domain: all real numbers

Range: $y \geq -4$

An engraver charges a $10 fee plus $6 for each line of engraving. You can buy up to 8 lines of engraving. Write a function to describe the situation. Then find a reasonable domain and range.

$f(x) = 10 + 6x$

D: $\{0, 1, 2, 3, 4, 5, 6, 7, 8\}$

R: $\{10, 16, 22, 28, 34, 40, 46, 52, 58\}$

A cross country runner runs 0.2 miles every minute. He runs for 2 hours. Write a function to describe the situation. Then find a reasonable domain and range.

120 min

$f(x) = 0.2x$

D: $0 \leq x \leq 120$

R: $0 \leq y \leq 24$

$\begin{array}{r} 120 \\ \times\ .2 \\ \hline 24.0 \end{array}$

Mr. Allen goes to the grocery store with $30. He finds a sale where it is $4 for every box of Diet Coke. Write a function to describe how much money he would have left after buying x number of boxes. Then find a reasonable domain and range.
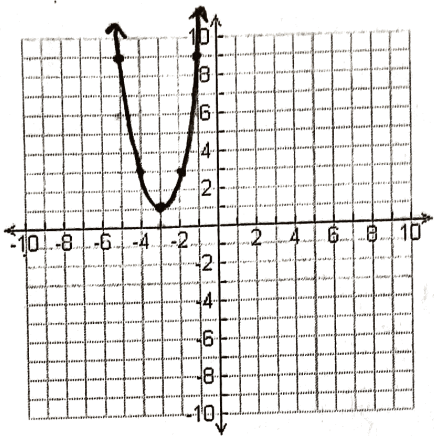
$f(x) = 30 - 4x$

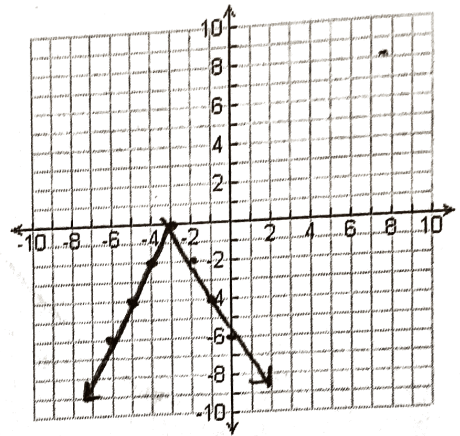D: $\{0, 1, 2, 3, 4, 5, 6, 7\}$

R: $\{2, 6, 10, 14, 18, 22, 26, 30\}$

$c(x) = 2(x + 3)^2 + 1$

x	c(x)
-4	3
-3	1
-2	3
-1	9
0	19
1	33
2	51

$b(x) = -2|x + 3|$

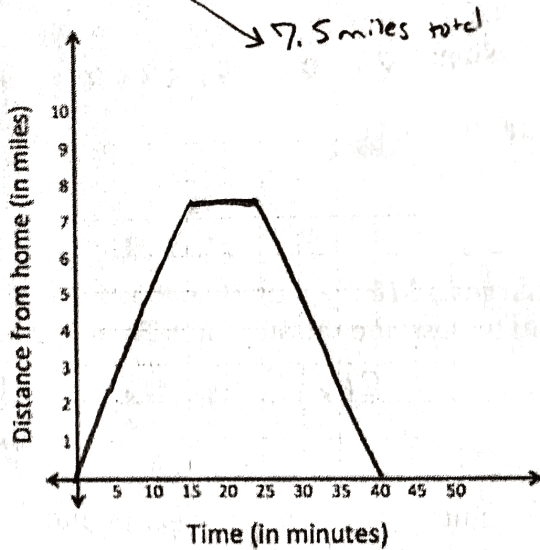| x	b(x)
-6	-6
-5	-4
-4	-2
-3	0
-2	-2
-1	-4
0	-6

1. It takes Fran 16 min to walk east to the bus stop one mile away. Fran immediately got onto the bus and it continued in the same direction for 17 minutes for 8 miles to get to her grandparent's house.
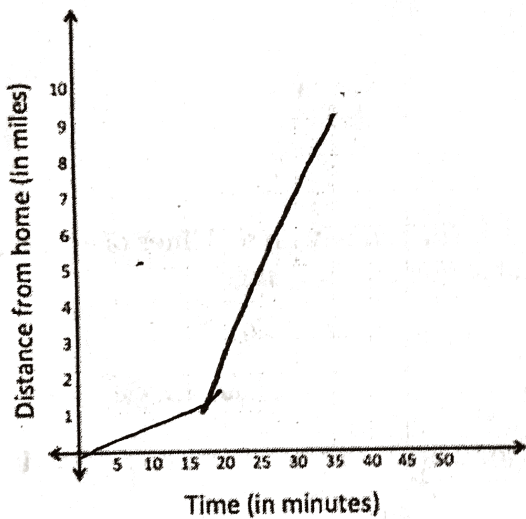
2. Joey drove to his friend's house at a constant rate of 30 mph. It took him 15 minutes to get there. He stayed for 10 minutes and then drove home at the same speed.

7.5 miles total

Make up your own story!