

Pacing Tiger

(adapted from Transforming Functions to Fit Data)

Think of a tiger pacing back and forth in a large cage. He walks towards the bars and then turns and instantly walks away. You will imitate the tiger by walking toward the CBR and then backing away. The function that you will be investigating is the absolute value function.

Suggested tasks for group members:

- walking
- CBR & TI-Nspire
- recording any relevant distances
- recording any relevant times and gives the signal to change directions

Position the walker about 4-5 meters away from the CBR. When you are ready, give the signal to start walking towards the CBR at a steady pace. Now press **Enter**. Somewhere between 2 and 3 seconds give the signal for the walker to back away from the CBR at the same pace. The experiment will last for 5 seconds.

Turn the TI-Nspire on. Select New Document. Plug in the CBR, select Data & Statistics. Do the experiment and collect the data. Your data should look like a V .

Now you need to create 3 sliders.

Select: Menu >Action > Insert Slider

Use A, B, & C as the variables for the sliders.

Once the sliders have been created, you need to graph the function

$$y = A * |x - B| + C$$

Select: Menu > Analyze > Plot Function

Adjust the 3 sliders until the graph of the function closely matches your data.

Record your values of A, B and C and answer the following questions.

A=

B=

(Answers will vary.)

1. What are the units of

A m/sec B sec C m

2. How can the y-intercept be calculated using A, B and C?

$X=0 \text{ so } y\text{-int} = A*B+C$

3. Indicate the effect that **A** has on the graph and how it is observed in the actual experiment.

graph: A: Widens or narrows the V

experiment A: Speed of the walker

4. Indicate the effect that **B** has on the graph and how it is observed in the actual experiment.

graph: B: Translates the graph left or right

experiment B: The time that the walker changes directions

5. Indicate the effect that **C** has on the graph and how it is observed in the actual experiment.

graph: C: Translates the graph up or down

experiment C: How close the walker gets to the CBR

6. Look at the following graph and decide

a.) Which walker walked faster?

1

b) Which walker got the closest to the CBR?

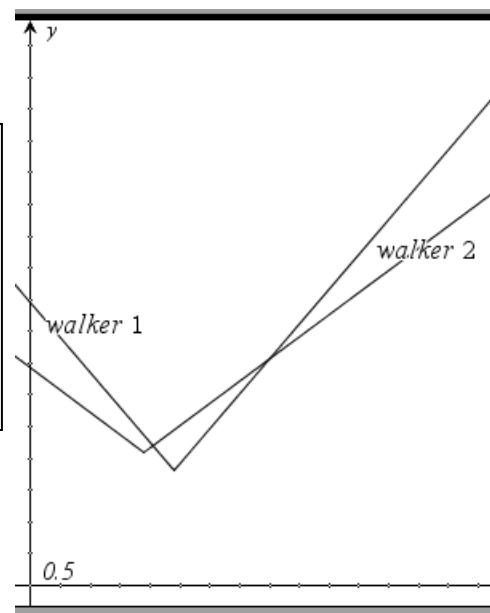
1

c) Which walker started the farthest away?

1

d) Which walker changed direction first?

2



7. Another set of walkers determined that these functions represented their walk.

Walker 3: $y = 2.3 \text{ abs}(x - 2.9) + 1.1$

Walker 4 : $y = 1.7 \text{ abs}(x - 1.5) + 2.8$

a) Which walker walked faster?

3

b) Which walker backed away sooner?

4

c) How far was walker 3 from the CBR at the start of the walk?

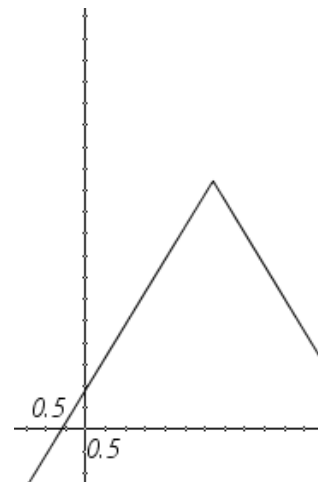
7.7m

d) Which walker got the closest to the CBR ?

3

8. One of the walkers produced the following graph. Take a look at the graph and explain what they did.

The walker started close the CBR and walked away. At @ 3 sec then started back towards the CBR



9. Given the following information, determine the values for A , B & C in the equation

$y = A * |x - B| + C$. The student started 4.5m away from the CBR and walked towards the CBR. The student changes direction at 2.5 sec. and walks away from the CBR. At that time the student was 1.7m away from the CBR.

B=2.5 C=1.7

Substitute x=0 and y=4.5 and solve for A

$4.5 = A * \text{abs}(0 - 2.5) + 1.7$ $A = 1.12$

$Y = 1.12 * \text{abs}(x - 2.5) + 1.7$