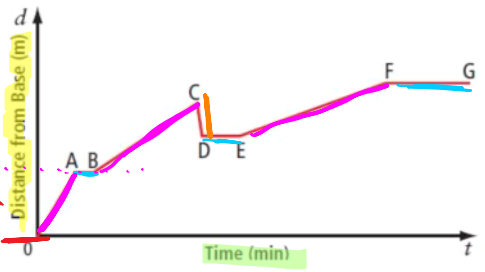
Lesson 1 Intro to Relations & Functions

November 14, 2018 3:26 PM

1) RELATIONS & FUNCTIONS: INTRODUCTION

1. Using the following graph, answer the questions below. The graph shows the distance a rock climber is from the base of the cliff as time passes.



a) Place each line segment in the appropriate section of the table. **OA, AB, BC, CD, DE, EF, FG.**

Climbing	Resting	Descending
OA	AB	CD
BC	DE	
EF	FG	

b) Describe one property a line segment has if the climber is climbing.

↗ distance (m) is increasing as time also increases.

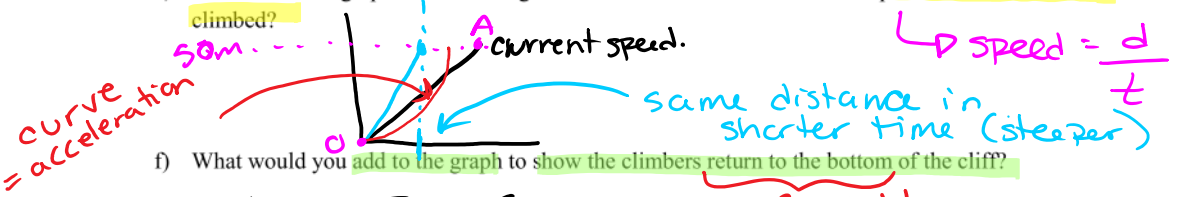
c) Describe one property a line segment has if the climber is resting.

— horizontal line => no change in distance (m) but time is increasing.

d) Describe one property a line segment has if the climber is descending.

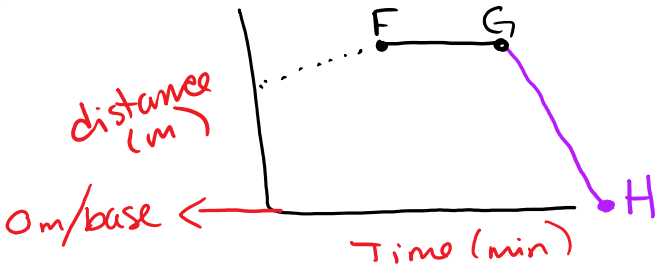
↘ distance decreases as time increases.

e) How would the graph of the line segment be different if he increased his speed for the first time he climbed?

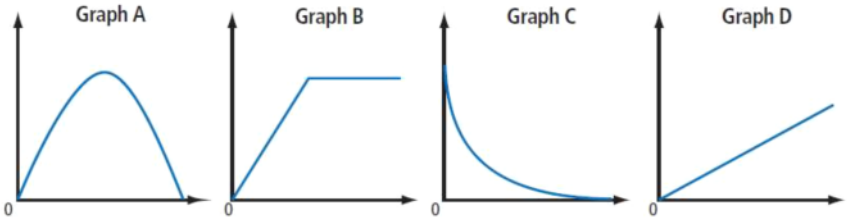


f) What would you add to the graph to show the climbers return to the bottom of the cliff?

G → H



2. Match each graph below with a situation from the list given. Then, draw each graph carefully labeling each axis to show the quantities being compared. (relation)



a) the temperature of a cup of hot chocolate over time

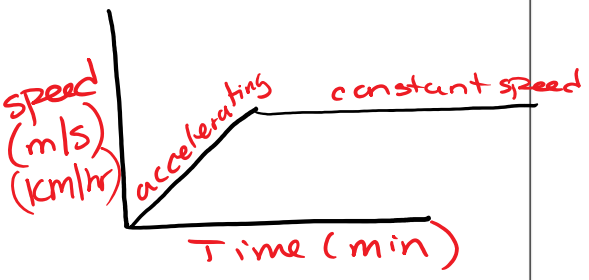
b) a car accelerating to a constant speed => $s = \frac{d}{t}$

c) the distance a person walks during a hike

d) the height of a soccer ball kicked across a field

a) Temp. of H.C. over time.

b) car accelerating to constant speed



c) distance walked on hike

d) height of a soccer ball kicked....

speed time

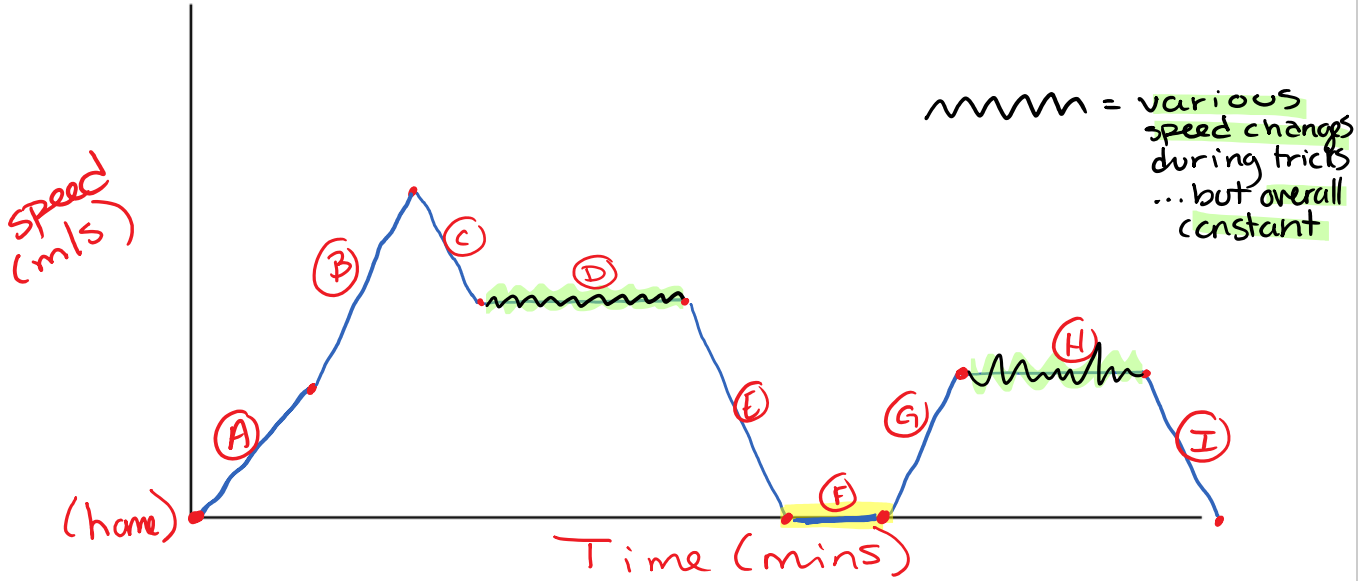
3. Create a speed-time graph for the following scenario. Label each section of your graph with capital letters, and write a description of what is happening at each line segment.

> Connor is riding his skateboard along a path. Almost immediately after leaving home, Connor travels down a short steep hill. At the bottom, the path makes a turn. The remainder of the trip is on relatively flat land. Connor kicks to keep moving. He then stops before a railway crossing. He also practises a few tricks along the way. He completes a basic "ollie" and performs a second ollie over a speed bump. Finally, after travelling at a constant rate for the last part of the trip, Connor arrives at his destination.

Graph:

(Time) x-axis (speed)

- *Hint:* make sure to graph the ***independent variable*** on the horizontal axis, and the ***dependent variable*** on the vertical axis. y-axis



Explanation:

(A) speeding up as he leaves house

(B) speeding up downhill (short time)

(C) slows down as path turns

(D) constant speed (flat land)

(E) slows down to stop

(F) stopped at crossing.

(G) speedup after stop

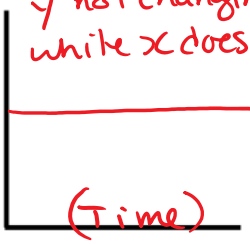
(H) constand speed (flat)

(I) slows down to stop (arrive @ destination)

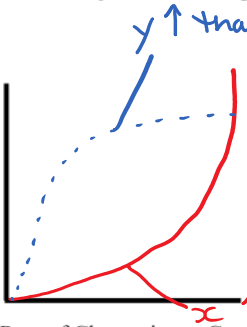
Summary Ideas:

- A graph represents the relationship between two quantities.
- Straight lines are used to indicate a constant rate of change.
- Horizontal lines are used if one quantity is NOT changing relative to the change in the other quantity.

Constant Rate of Change



No Rate of Change



Rate of Change is not Constant

- A steeper line indicates a faster rate of change. This line could represent either an increase or a decrease.
- A curve shows that the rate of change is NOT constant.

ASSIGNMENT # 1
pages 3-5, 39-40 Questions #1-6 & #171-176

Key Terms

Term	Definition	Example
Relation		
Function		
Ordered pair		
Coordinate Plane		
x-axis		
y-axis		
Domain		
Range		
Element		
Permissible values		
Dependent Variable		
Independent Variable		
Discrete Data		
Continuous Data		

Introduction to Relations

Relationships exist everywhere we look…

- There is a relationship between the lengths of lineups at the fair and how exciting the rides are.
- There is a relationship between the height of a ball and how long ago it was kicked.
- There is a relationship between traffic and the time of day.
- There is a relationship between distance travelled and the speed of the car.

Some relationships don't even seem to have a mathematical relationship but are connected in some other way.
For example: The students in your class all have a birth month and height. We could write a list matching each student's birth month and height.

As ***ordered pairs***…(3, 155), (5,138), (11, 162), (12, 135), (7, 142), …

(March, 155 cm tall)

Some notes here…

Challenge Question:

1. Give examples of <u>three</u> other relationships you see on an everyday basis:

2. Write a set of 3 **ordered pairs** for one of your relationships above.
   Explain what the ordered pair means.

Use the following information to answer questions below.

Consider the data given in following table:

Student	Height (cm)	Arm Span (cm)
Lulu	135	137
Bones	144	151
Phat Charlie	150	148
Lucky	150	156
Dizzy Dee	165	165
Crash	155	152
Anjohkinu	160	164
Sam	200	210
Talloola	125	127

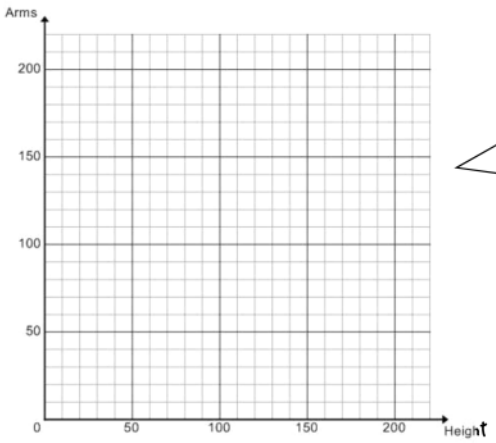
Written as ***ordered pairs***.

(135, 137)
(144, 151)
(150, 148)
(150, 156)
(165, 165)
(155, 152)
(160, 164)
(200, 210)
(125,127)

3. Why do you think the numbers in brackets are called "ordered pairs"?

4. The data above represents a relation between what two quantities?

5. Graph the data in the table above (Trouble graphing? See next page).



Graphs help to show if there is a pattern in the data.

If there is a pattern, a graph will show us what type of

6. Describe the relationship you see on the graph above.
(What does it look like? What shape is it?)

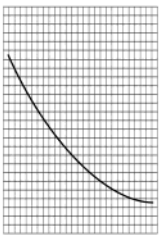
General relations

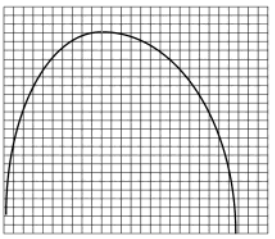
When considering some relationships, it is solely the pattern or trend that we are interested in.

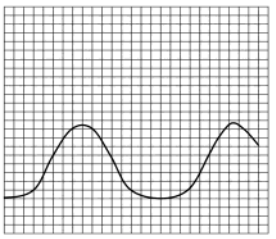
Can you visualize a graph for the following relationships?

- The height above the ground of a passenger on a Ferris Wheel as a function of time.
- The number of cars in a parking lot as a function of the time of day.
- Temperature of a cup of coffee as a function of time since it was poured.
- The cost of mailing a package as a function of its mass.
- The height of a football as a function of time since it was kicked.

Match each of the following with an example from above. Then describe below why you made that choice.







_____ _____ _____

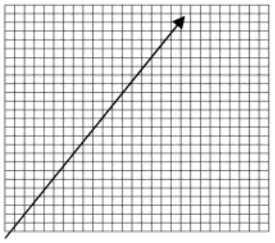
_____ _____ _____

_____ _____ _____

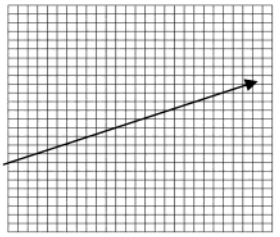
Some notes here possibly…

Answer the questions associated with each graph.

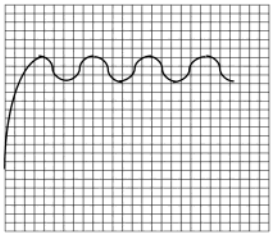
171. Describe a relationship that could be represented by the graph below.



172. Describe a relationship that could be represented by the graph below.

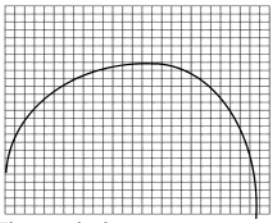


173.



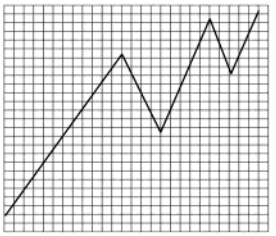
Above is a graph of the temperature inside an oven set to 425°C. Why does the graph fluctuate?

174.

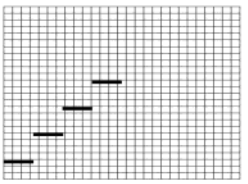


The graph above represents the height of a kicked ball as a function of time. Why is the graph not symmetrical?

175. Describe a relationship that could be represented by the graph below.



176.



Explain why this graph of postage rates appears stepped.