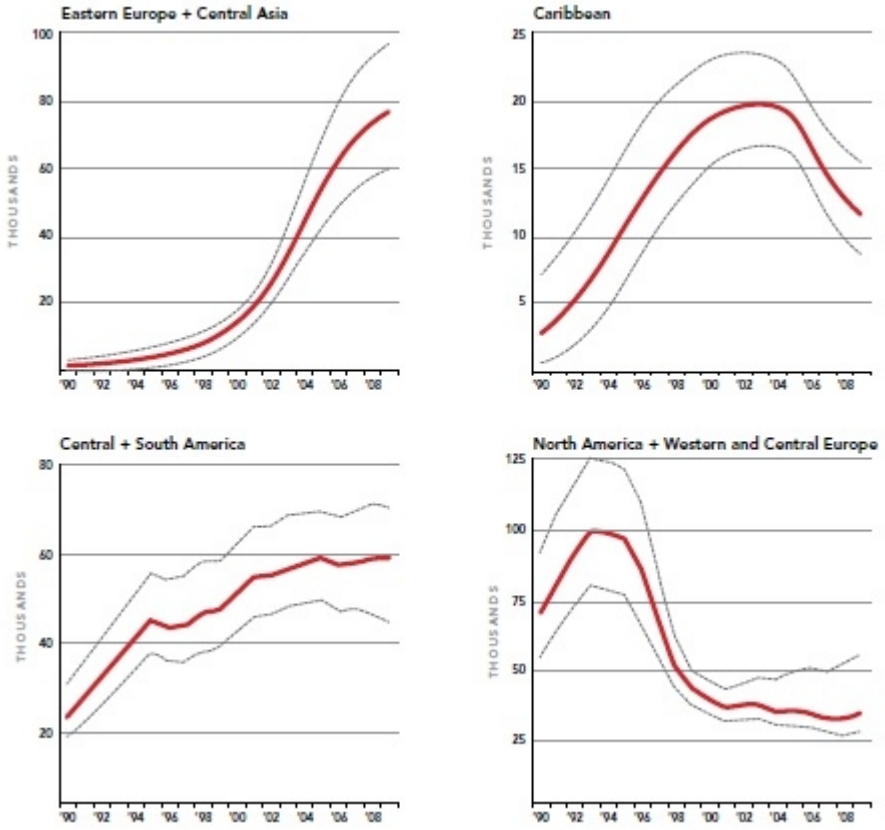
LET'S MAKE SOME SENSE OF ALGEBRA 1. The picture shows kids who were orphaned because their parents died of AIDS.

1) Jenny wants to be a nurse, because she wants to help AIDS orphans. She is reading a United Nations report on AIDS, which contains the following charts. If you were Jenny, what area in the world would you be most concerned, and why?



2) On the second page of the report, a map shows the only area in the world where the number of AIDS cases is increasing seriously (in red). Does this map confirm your previous concern?

Changes in the incidence rate of HIV infection, 2001 to 2009, selected countries

Source: UNAIDS.

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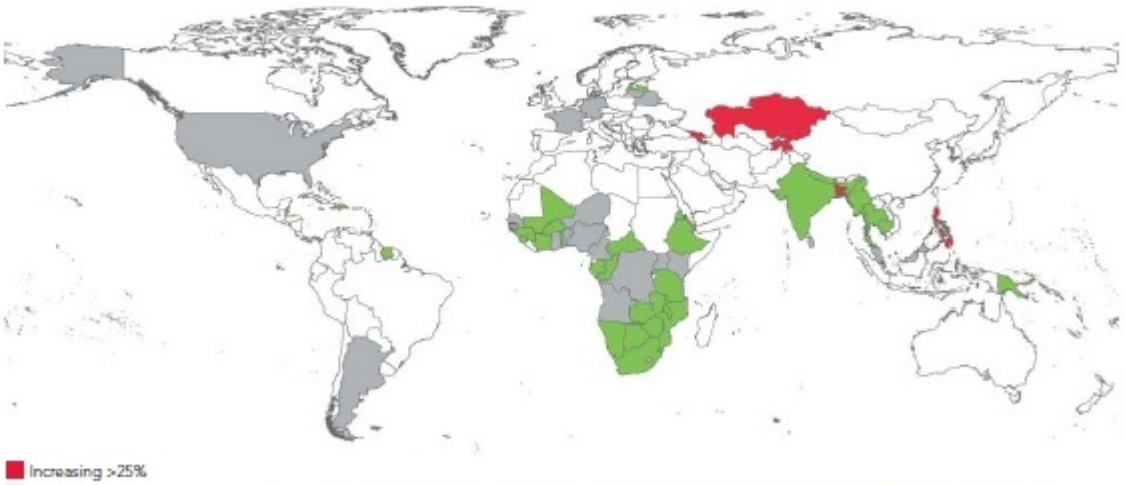


In the absence of a reliable diagnostic test that can directly measure the level of new HIV infections in a population, estimates of HIV incidence have been produced through modeling. The map includes 60 countries for which reliable estimates of new HIV infections over time were available from the 2010 round of country-specific estimation using the EPP/Spectrum tools, and 3 countries for which peer-reviewed publications with incidence trends were available. The EPP/Spectrum methods estimate HIV incidence trends from HIV

In another part of the report, it showcases an effort dedicated to by a group of Dominican sisters, who worked in a Pacific island community. There were 50 AIDS patients at that time . They were given three options in 1999 to start implementing a program in 2000. They were:
Plan A: cost $10,000 a year will eliminate number of patients by 1 per year
Plan B: cost $20,000 a year will eliminate number of patients by 5 per year
Plan C: cost $50,000 a year will eliminate number of patients by 6 per year

After considerations, the group adopted Plan B and worked really hard to achieve their goal.

3) The sisters presented their report in 2009, which shows in below. What do you think would happen in 2010?

year	# of patients
0 (2000)	50
1 (2001)	45
2 (2002)	40
3 (2003)	35
4 (2004)	30
5 (2005)	25
6 (2006)	20
7 (2007)	15
8 (2008)	10
9 (2009)	5

4) In Algebra 1, we study the relationships between two groups of numbers. One group contains the input numbers, and we call this group the "domain"; in the other group are the output numbers, and we call this group the "range". In the Dominican sisters case, the input numbers are the years denoted as 0, 1, etc.. The output numbers are the number of patients, which are 50, 45, etc..

In the standard form we will state (for this case): domain = {0, 1, 2, 3, 4, 5, 6, 7, 8, 9}
range = {50, 45, 40, 35, 30, 25, 20, 15, 10, 5}

And the relation is: the number of patients started at 50 at the beginning of the program, and after each year, the number was reduced by 5.

How will you represent the relation: y interms of some relation with x?

5) Which expression do you think is appropriate to represent the relation:?

a) $y = 5x + 50$
b) $y = -5x + 50$
c) $y = -50x + 5$
d) $y = 50x + 5$

6) Do you think the same analytical abilities that we learned in Algebra 1 from the Dominican sisters' case can also be used in other island communities? other communities? or applied to solving other problems of the world? Briefly state your answer and justification.

7) When we analyze the relationships between two sets of data, there is a concept we must be aware of; which is the 'continuity' or 'discreteness'. To make it easy to understand, for example, if you are driving a car, at this moment you are driving at 50 mph. You acclerate by 1 mph per second. The chart in below will be able to represent the relationship between the time and the speed:

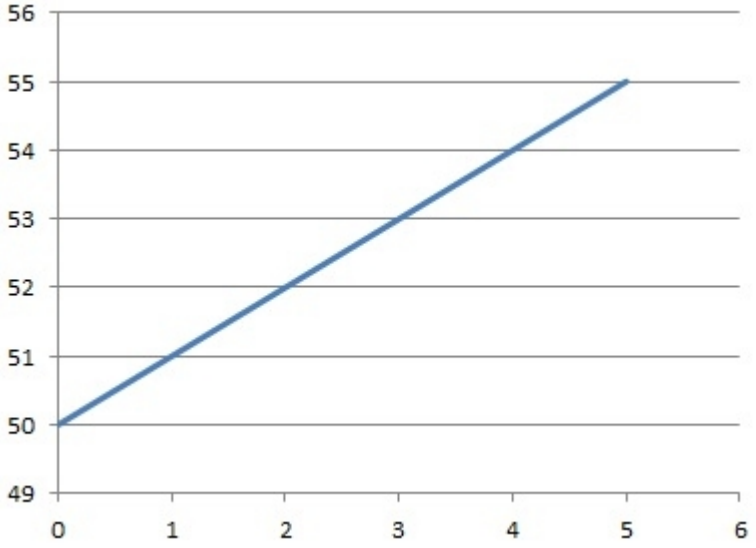
The time never skipped and the speed never skipped either. If you put them in a graph, it will be a continuous line. Which we will do immediately.

In this case, we will call the relation (or the function that represents the relation) continuous. On the contrary, the case of the Dominican sisters reducing the number of AIDS patients is a discrete relation or function. (The number of patients decreased will be either 0, or 1, or 2, etc.; it could not be, for example 1.375)

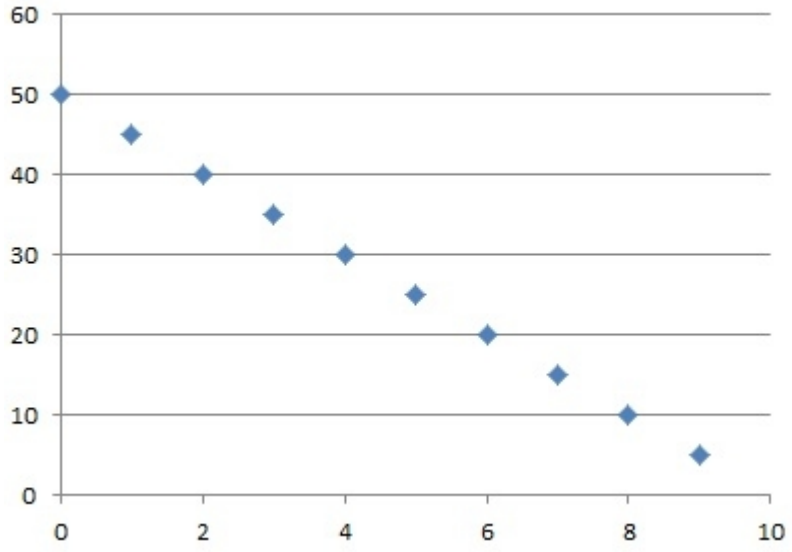
Give an exmaple of a discrete relation and an example of a continuous relation.

time (second)	speed (mph)
0	50
1	51
2	52
3	53
4	54
5	55

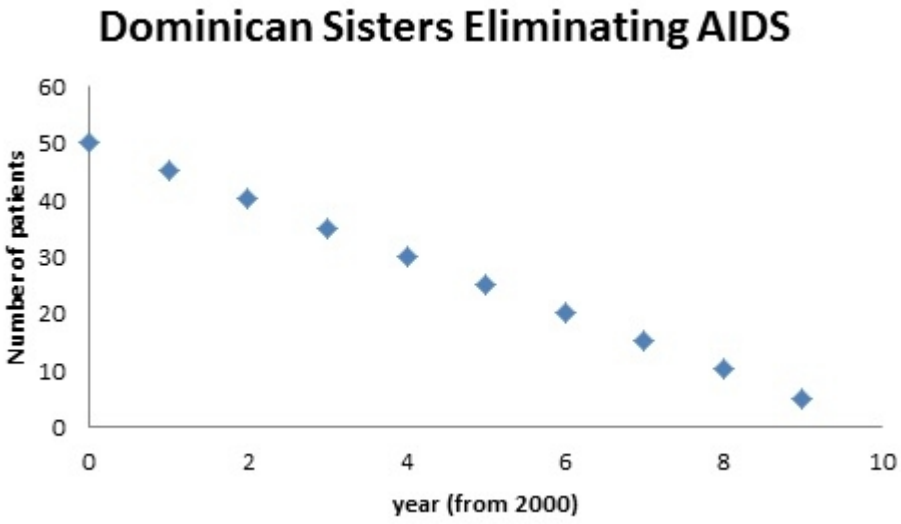
8) Does this graph represent the Dominican sisters' case or the driving speed case?



9) Does this graph represent the Dominican sisters' case or the driving speed case?



When we do a graph, we must remember to clarify what data are being represented so that the readers can understand without guessing. Here is a graph that appeared in the local newspaper in honor of the Dominican sisters' dedication.



10) Jenny's Dad likes to fish. On Christmas day, her Dad took the family to fish at Rockport. When they came back, Jenny helped her Dad weigh the fish and discovered the following:
#1 fish 24 inches 9.6 lbs
#2 fish 22 inches 7.4 lbs
#3 fish 20 inches 5.6 lbs
#4 fish 18 inches 4.1 lbs
#5 fish 16 inches 2.8 lbs
Do you think the relationship between the fish's lengths and weights is linear or non-linear? Justify your answer.