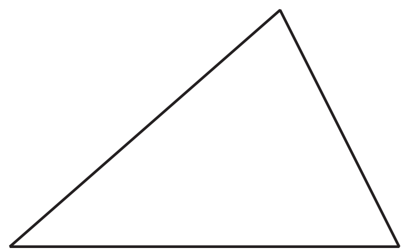
How Well Can You Measure?

Let's see how accurately we can measure.

1.1 Perimeter of a Triangle

Measure the perimeter of the triangle to the nearest tenth of a centimeter.

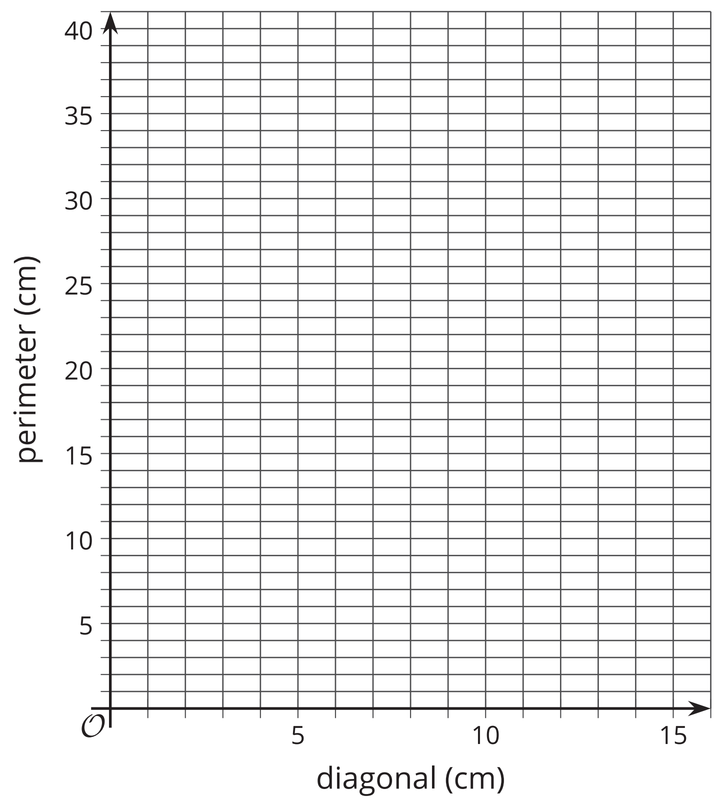


1.2 Perimeter of a Square

Your teacher will give you a picture of 9 different squares and will assign your group 3 of these squares to examine more closely.

1. For each of your assigned squares, measure the length of the diagonal and the perimeter of the square in centimeters. Check your measurements with your group. After you come to an agreement, record your measurements in the table.

	diagonal (cm)	perimeter (cm)
square A		
square B		
square C		
square D		
square E		
square F		
square G		
square H		
square I		



2. Plot the diagonal and perimeter values from the table on the coordinate plane.
3. What do you notice about the points on the graph?

Pause here so your teacher can review your work.

4. Record measurements of the other squares to complete your table.

1.3 Area of a Square

1. In the table, record the length of the diagonal for each of your assigned squares from the previous activity. Next, determine the area of each of your squares.

	diagonal (cm)	area (cm^2)
square A		
square B		
square C		
square D		
square E		
square F		
square G		
square H		
square I		

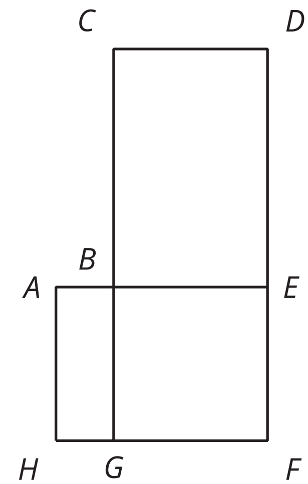
   Pause here so your teacher can review your work. Be prepared to share your values with the class.

2. Examine the class graph of these values. What do you notice?

3. How is the relationship between the diagonal and area of a square the same as the relationship between the diagonal and perimeter of a square from the previous activity? How is it different?

Are you ready for more?

Here is a rough map of a neighborhood.



There are 4 mail routes during the week.

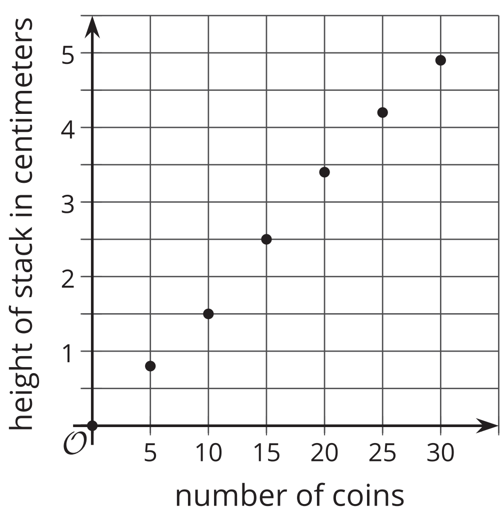
- On Monday, the mail truck follows the route A-B-E-F-G-H-A, which is 14 miles long.
- On Tuesday, the mail truck follows the route B-C-D-E-F-G-B, which is 22 miles long.
- On Wednesday, the truck follows the route A-B-C-D-E-F-G-H-A, which is 24 miles long.
- On Thursday, the mail truck follows the route B-E-F-G-B.

How long is the route on Thursdays?

Lesson 1 Summary

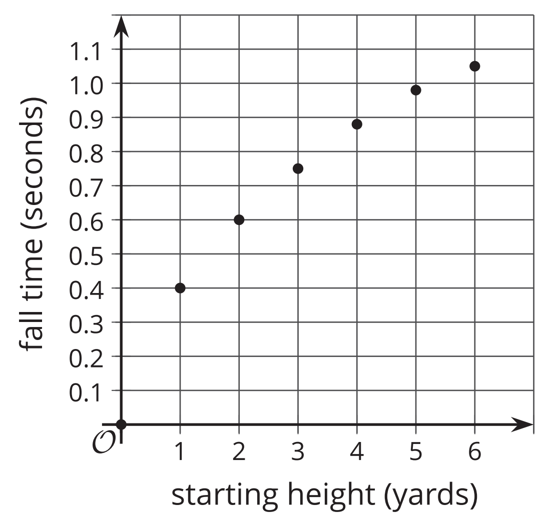
When we measure the values for two related quantities, plotting the measurements in the coordinate plane can help us decide if it makes sense to model them with a proportional relationship. If the points are close to a line through $(0, 0)$, then a proportional relationship is a good model.

This graph shows the height of the stack for different numbers of stacked coins.



These points are close to a straight line through $(0, 0)$, so the relationship may be proportional.

This graph shows the time it takes for a tennis ball to fall from different starting heights.



These points are not close to a straight line through $(0, 0)$, so the relationship is not proportional.

Another way to investigate whether or not a relationship is proportional is by making a table and dividing the values on each row. Here are tables that represent the same relationships as the previous graphs.

number of coins	height in centimeters	centimeters per coin
5	0.8	0.16
10	1.5	0.15
15	2.5	0.167
20	3.4	0.17
25	4.2	0.168
30	4.9	0.163

The centimeters of height per coin are close to the same value, so this relationship appears to be proportional.

starting height (yards)	fall time (seconds)	seconds per yard
1	0.40	0.40
2	0.60	0.30
3	0.75	0.25
4	0.88	0.22
5	0.98	0.196
6	1.05	0.175

The seconds of fall time per yard of starting height are not close to the same value, so this relationship is not proportional.