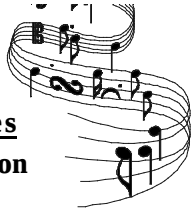
Musical Chairs



Graphs, Charts, and Tables
A study of force and motion for 6th grade students.

Graphs, charts and tables are always appropriate when any type of data collection is involved. Students must be responsible for their construction. They choose which type based on what the data is to show.

Science TEKS

6th Grade – Charts, Graphs, and Tables / Force and Motion –

(6.2) (E) The student is expected to construct simple graphs, tables, maps, and charts to organize, examine, and evaluate information.

(6.6) The student knows that there is a relationship between force and motion. The student is expected to:

(A) identify and describe the changes in position, direction of motion, and speed of an object when acted upon by force;

(B) demonstrate that changes in motion can be measured and graphically represented; and

(C) identify forces that shape features of the Earth including uplifting, movement of water, and volcanic activity.

Math TEKS

6th Grade – Probability and Statistics

(10) The student uses statistical representations to analyze data. The student is expected to:

(A) draw and compare different graphical representations of the same data;

(B) use median, mode and range to describe data;

(c) sketch circle graphs to display data; and solve problems by collecting, organizing, displaying, and interpreting data.

Materials to be used by teacher:

(1) Cassette/Compact Disc of music (This can be optional, but will be well worth the extra effort! The music will be used to tell students what to do. When the music is playing, there is movement. When the music is stopped, everyone must freeze. There will be more detail about this later.)

Materials for each group of 4 students:

(1) Rolling Chair – (works best on hard surface - it might be nice to do this somewhere outside the classroom for data collection part)
**You may need to borrow some "teacher chairs" for the day – a nice chocolate thank you upon returning the chair is always a good idea!

(1) Meter stick

(1) Clip board with data collection sheet and pencil

(1) Strip of masking tape (about as long as the chair's width)

Procedure:

1. Divide students into groups of no more than 4.
2. Have students choose jobs (or assign them)
   (If time allows, these jobs can rotate so all students have an opportunity to experience each position.)
   1. Recorder/person in charge
   2. Measurement specialist (M.S.) /holds the meter stick
   3. Object specialist (O.S.) /sits in rolling chair
   4. Force specialist (F.S.)/pushes person in rolling chair
3. Play music for students as (F.S.) pushes the (O.S.) in the chair. This should be one firm push only! Students follow instructions on data collection sheet. When music is off, all students must freeze. (M.S.) is the only one to move as distances are measured. Recorder may assist if needed, but chairs may not move at all during "no music" time. After all groups have recorded measurement, music resumes and groups go on to next trial and repeat step 3 until all 9 trials are complete.

Names Date _____ Period _____

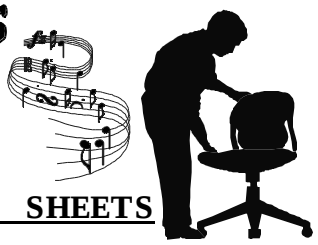
Recorder _____

Measurement Expert _____

Object Specialist _____

Force Specialist _____

Musical Chairs



DATA COLLECTION SHEETS

Finding the mean – Here you will use the **TABLE** below to help you to find the average strength of your Force specialist. The Force specialist should try to push with the same amount of force each time. ***Remember to push carefully and from the seat of the chair, not the back. Decide now which units you will use to measure the distance the chair travels from the tape line after being pushed.

Write down your **HYPOTHESIS** here. What to you predict to happen to the distance traveled as you go from Trial Number 1 to Trial Number 9? _____

_____

Data Table 1

Trial Number	Distance Traveled in meters
1	
2	
3	
4	
5	
6	
7	
8	
9	

To find the mean - add up the columns for distance traveled and divide by 9.

Show your work here:

Mean for distance traveled is: _____ (don't forget units!)

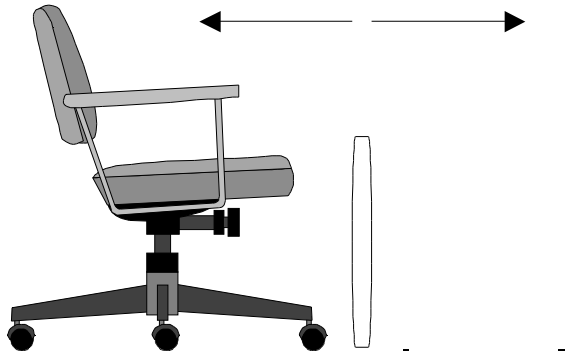
Finding the median – to find the median, make a **CHART,** a list of the 10 measurements you took in order from smallest to largest. Then find the one in the middle. That is your median.

Chart of Trials

Median for Distance traveled is: _____ ** don't forget units!

Now, pair up with another group. Each of the object specialists should face one another as they sit in the rolling chair. Make sure the chairs are lined up on one of the masking tape lines used before. With their hands, the object specialists should push away from each other. (This makes them "force specialists" as well!) The measurement specialist from each group should measure the distance traveled by the chair from their group. Record this data on a scratch piece of paper. Repeat this activity 3 times, then share your data with one other paired up group. You will also need to find the mean of each paired up group.

1. In the space below, create a **table** that shows a comparison of your data with another groups. You must include the mean of your three trials. Label the table, "Data Table 2."



masking tape

Create your table here. Don't forget to label it!

On a separate sheet of paper complete the following directions individually.

2. On the front, construct a **chart** that shows the forces involved when the chair moved. For example, one force is the force of friction between the chair and the floor. You would draw a picture of the chair and the floor and label it "Friction". Now you must illustrate at least 2 more forces.
3. On the back of the paper, copy **Data table 1**. Construct a **graph** that displays the data. On the bottom of the sheet, write at least 3 sentences explaining your hypothesis and if your data supports it.

*** This would be an appropriate time to have a class discussion on "unequal forces."

KEY

Date _____

Recorder _____

Measurement Expert _____

Object Specialist _____

Force Specialist _____

Musical Chairs

DATA COLLECTION SHEETS

Finding the mean – Here you will use the **TABLE** below to help you to find the average strength of your Force specialist. The Force specialist should try to push with the same amount of force each time. ***Remember to push carefully and from the seat of the chair, not the back. Decide now which units you will use to measure the distance the chair travels from the tape line after being pushed.

Write down your **HYPOTHESIS** here. What to you predict to happen to the distance traveled as you go from Trial Number 1 to Trial Number 9? **We think that by the time he pushes for the 9th time, the distance will be less than the first few pushes because he will be tired**

Data Table 1

Push Number	Distance Traveled in meters
1	1.2
2	1.5
3	1.5
4	1.7
5	1.8
6	1.7
7	1.5
8	1.5
9	1.4

To find the mean - add up the columns for distance traveled and divide by 9.

Show your work here:

1.2 + 15

The mean distance traveled is:

1.53 m

Numbers will vary based on what type of surface you use.

Finding the median – to find the median, make a **CHART** listing the 10 measurements you took in order from smallest to largest. Then find the one in the middle. That is your median.

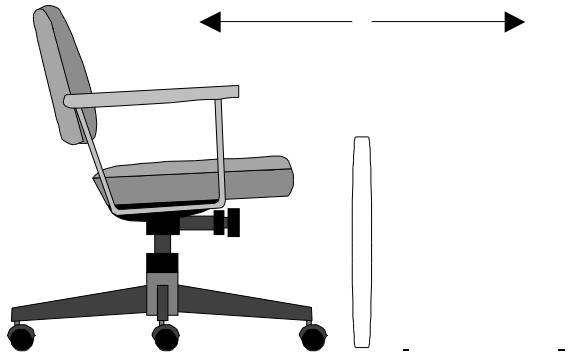
1.2, 1.3, 1.4, 1.5, 1.5, 1.5, 1.5, 1.7, 1.7

Median forDistance traveled is: 1.5 meters

KEY

Now, pair up with anc r gu h object specialists should face one another as they sit in the rolling Ma ure airs are lined up on one of the masking tape lines used before. W r h the ect specialists should push away from each other. (This makes th ce ecialis as well!) The measurement specialist from each group should measure a ravel by the chair from their group. Record this data on a scratch piece of e is vity 3 times, then share your data with one other paired up group. You will also need to find the mean of each paired up group.

4. In the space below, create a **table** that shows a comparison of your data with another groups. You must include the mean of your three trials. Label the table, "Data Table 2."



masking tape

Create your table here. Don't forget to label it!

Data Table 2 (Distance between Chairs)

Trials	Our Data	Their Data
1	1.2 m	1.3 m
2	1.3 m	1.3 m
3	1.3 m	1.4 m
Mean	1.26 m	1.33 m

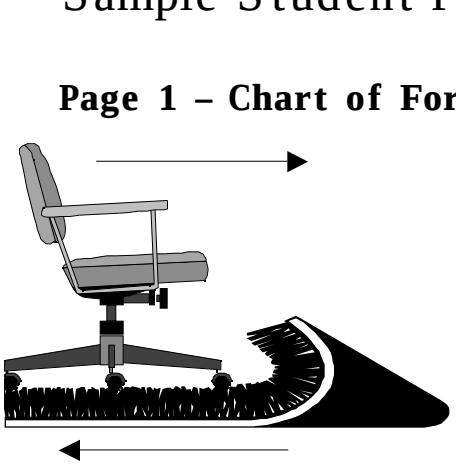
On a separate sheet of paper complete the following directions individually.

5. On the front, construct a **chart** that shows the forces involved when the chair moved. For example, one force is the force of friction between the chair and the floor. You would draw a picture of the chair and the floor and label it "Friction". Now you must illustrate at least 2 more forces.
6. On the back of the paper, copy **Data table 1**. Construct a **graph** that displays the data. On the bottom of the sheet, write at least 3 sentences explaining your hypothesis and if your data supports it.

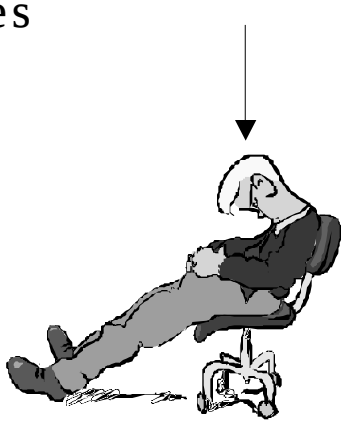
*** This would be an appropriate time to have a class discussion on "unequal forces."

Sample Student Pages

Page 1 – Chart of Forces



Friction



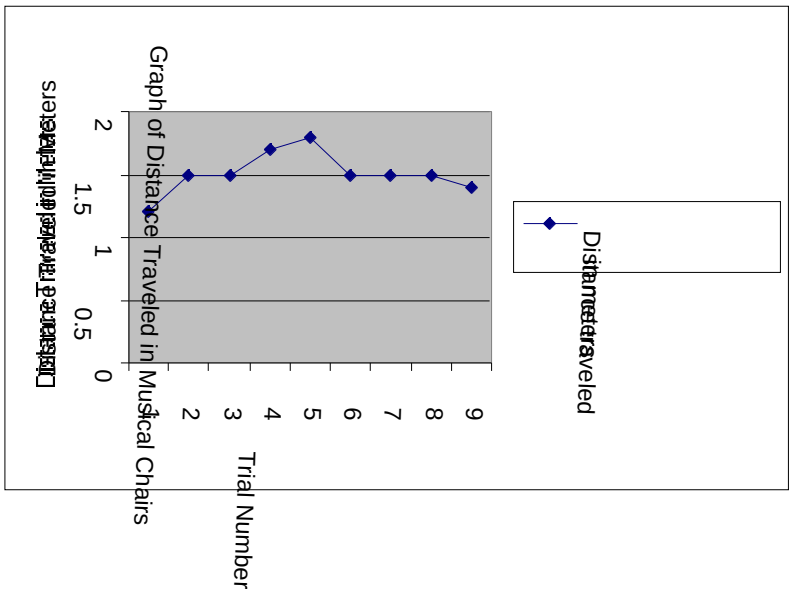
Gravity/Mass

Pushing

Page 2 – Table/Graph

Data Table 2

Trial	Distance
1	1.2 m
2	1.5 m
3	1.5 m
4	1.7 m
5	1.8 m
6	1.5 m
7	1.5 m
8	1.5 m
9	1.4 m



Our hypothesis was that after the first few pushes, our Force Specialist would get tired and the distances would decrease. This happened after the 6th push. Our pusher went from pushing 1.8 meters to 1.7. Each push after that decreased. So, our hypothesis is supported by our data.