EXPLORATIONS™

Unit 14

How do you Measure Up?

Concepts

- Measurement
- Proportion

Materials

- TI-10
- Book: *Biggest, Strongest, Fastest*
- Scale
- Balance
- Weights to at least 1 pound
- Classroom books
- Roll of adding machine tape
- Dime
- Rulers
- Yardsticks and/or tape measures
- Chart paper
- Markers

Calculator Connections

- Rounding Fix
- Number sentences with two-line display

Suggested Age/Grade Level

- Ages 7-8
- Second grade

Overview

After reading *Biggest, Strongest, Fastest* written by Steve Jenkins (Scholastic, 1995), relationships are investigated by determining what students would be like or what they could do if they possessed some of the same characteristics as the animals in the book. Students measure weight, height, and length through the use of a balance, scales, rulers, yardsticks, and/or tape measures. Students use the TI-10 to find proportions and to round answers to whole numbers.

Assessment

Teacher observation of the use of measurement tools and of the process of measuring could be incorporated into a checklist where the teacher moves around the room assessing student ability. Items that should be considered throughout the unit could include the following.

Does the student:

- Identify the appropriate tool for the measurement needed?
- Read a scale correctly?
- Use a balance correctly?
- Measure by iterating the unit?
- Measure accurately with a ruler?
- Measure from zero on the ruler?
- Measure accurately with a yardstick?
- Measure accurately with a tape measure?
- Measure from zero on the tape measure?
- Engage in mathematical conversation about the problem with his or her group?
- Record information appropriately?
- Recognize the TI-10 key used for rounding?
- Recognize and use the correct TI-10 symbols for addition, subtraction, multiplication, and division?

In addition, a running chart of the activities can be kept. A sample chart could look like the following.

Biggest, Strongest, Fastest

Weight of one elephant = about 366 second graders

Height of a giraffe = about 4 second graders

Weight of a Blue Whale = about 5,600+ second graders

Activity A: Connecting Literature and Mathematics

Questions to ask:

- Many of you have pets. What are some words that describe how your pets move?
- Are there other ways animals move?
- Besides the ways they move, what other ways are animals different from each other?
- What do you think the biggest animal is?
- What do you think the strongest animal is?
- What is the slowest animal?
- What animal lives the longest?
- If you've ever wondered about which animal is the biggest or the strongest or the fastest or the slowest or the oldest, you will want to listen carefully as I read this book.

Read *Biggest, Strongest, Fastest*.

Activity B: Big Elephants

Reread the insert in the book about the elephant, and display and explain the drawing that shows the comparison of an average adult male to an elephant.

Questions to ask:

- Can you name the largest animal that lives on land? (elephant)
- How much did the largest elephant ever measured weigh? (22,000 pounds)
- How much do you weigh?

1. Weigh yourself and record your weight on a piece of paper.
2. Press On/Off on the TI-10.

New Vocabulary:
Average
Balance
Comparison
Foot/feet
Height
Inch
Length
Measure
Ounce
Perimeter
Pound
Round
Scale
Tentacles
Ton
Weigh

Prerequisite Skills:

Uses a ruler, yardstick, and tape measure

Reads a scale

Uses a balance

Teaching Tip:
Students would have a better visual comparison if the means exist to enlarge the drawing and project it using an overhead projector.

3. Press AC to clear anything previously stored in the memory.
4. Press Clear. The screen is blank (except for the cursor), the memory is clear, and you are ready to begin.
5. Press the number that represents your weight. For these purposes, use 6 2.
6. Press Fix 10. to round to the nearest 10.
7. Press =.

Example:
For this example, we've used 62 pounds as the student's weight. Children should enter their actual weight.

The TI-10 displays:

This shows that the student weighs about 60 pounds.

Question to ask:

- How many students your size would be needed to equal the weight of the elephant?

8. Reset the TI-10.
9. Press 2 2 0 0 0 for the weight of the elephant.
10. Press ÷ to find the number of equal groups in 22,000.
11. Press 6 0 (the number representing your rounded weight).
12. Press =.

Resetting the TI-10:
Press On/Off to wake it up if it has turned off.

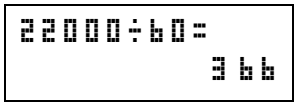
Press AC if you need to clear the memory.

Press Clear to clear the display.

The TI-10 displays:

13. To round to a whole number, press Fix 1.

The TI-10 displays:



Approximately 366 students your size would equal the weight of 1 elephant.

On the class chart (a sample can be found on page 138), record that the weight of 366 students equals the weight of just 1 elephant.

Extension

Question to ask:

- How many elephants would equal the mass of all the people in our school?

Activity C: Strong Ants

1. Reread the section of *Biggest, Strongest, Fastest* that describes the ant.

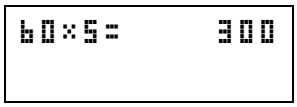
Questions to ask:

- What very small insect is very strong?
- How many times its own weight can an ant carry?
- What is about five times your weight?

Use your rounded weight from the previous activity to do the following problem.

2. Reset the TI-10.
3. Press [6] [0] (the number representing your rounded weight).
4. Press [×] [5] [=] to find five times your rounded weight.

The TI-10 displays:



An individual weighing about 60 pounds could lift 300 pounds if he were as strong as an ant.

5. Record your findings on the class chart.

Resetting the TI-10:
Press (On/Off) to wake it up if it has turned off.

Press (AC) if you need to clear the memory.

Press (Clear) to clear the display.

To help students understand just how much 300 pounds is, find one of the students' textbooks that weighs close to 1 pound. To create interest, have the students pile one book on top of another. When they have a stack of 20 to 25 books, explain that they would have to be able to carry 300 books to be as strong as an ant. A stack of books that high would go from the floor to the ceiling and still have some books left over.

Activity D: Tall Giraffes

1. Read the section about giraffes in *Biggest, Strongest, Fastest*.

Questions to ask:

- What is the tallest animal on land?
- How tall do the male giraffes grow?
- About how tall are you?

Using a roll of adding machine tape, measure a strip for each student from the top of the student's head to the student's feet. Tear the strip off the roll and hand it to the student.

2. Starting at one end, measure your strip using a ruler. Mark off each 12-inch section with a line.
3. Number each section on the paper strip, starting with one.

The highest number on the strip should be about how many feet tall the student is.

Question to ask:

- How many children your height would be needed to stand with their feet on another's head to reach the height of a giraffe?

4. Reset the TI-10.
5. Press 1 9 for the height of the giraffe.
6. Press ÷ to find the number of equal groups in 19.
7. Press 4 for the approximate student's height.

Teaching Tip:
Monitor students as they complete this task. When students reach the last section on their paper strip, have them number the section if it is longer than six inches. If the last section is shorter than six inches, they should not number the section.

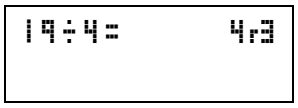
Resetting the TI-10:
Press On to wake it up if it has turned off.

Press AC if you need to clear the memory.

Press Clear to clear the display.

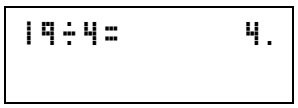
8. Press [=] to see the answer.

The TI-10 displays:



9. To round to a whole number, press [Fix] [I.].

The TI-10 displays:



About four students who are each 4 feet tall would reach the height of a giraffe.

10. Record your findings on the class chart.

Activity E: Long Tentacles

1. Read the section about the sun jellyfish in *Biggest, Strongest, Fastest*.

Questions to ask:

- If the classroom were a big aquarium, do you think the tentacles of a sun jellyfish could wrap around the room?
- How long are its tentacles?
- How can you find out how far the tentacles will go around the edges of the classroom?
- Will you measure weight, length, height, or speed?
- What unit of measure should be used?
- Where will you measure?

2. Divide the class into four groups and have each group measure one side of the room.
3. Write each group's results on the chalkboard.
4. Reset the TI-10.

Teaching Tip:
Be sure students are using feet as the unit of measure.

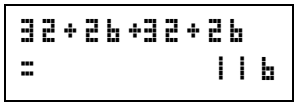
Resetting the TI-10:
Press (On/Off) to wake it up if it has turned off.

Press (AC) if you need to clear the memory.

Press (Clear) to clear the display.

5. Using the TI-10, add wall lengths to get the classroom perimeter. For this example, you have added a 32 by 26 foot room. Substitute your own classroom dimensions. Press 3 2 + 2 6 + 3 2 + 2 6 =.

The TI-10 displays:



Questions to ask:

- About how many feet is it around the classroom?
- How long are the tentacles of the sun jellyfish?
- Will the tentacles wrap around the classroom?
- How do you know?

6. Record the results on the classroom chart.

Activity F: Slow Snails

1. Read the section about land snails in *Biggest, Strongest, Fastest*.

Questions to ask:

- About how fast does a land snail move?
- If a land snail moved in a straight line across the classroom, how long would it take?

To determine how long it would take the land snail to go across the room, the distance across the room must be changed from feet to inches.

2. Reset the TI-10.
3. Press 3 2 for the number of feet across the room.
4. Press × 1 2 as there are 12 inches in 1 foot.

Resetting the TI-10:
Press (On/Off) to wake it up if it has turned off.

Press (AC) if you need to clear the memory.

Press (Clear) to clear the display.

Teaching Tip:
In this activity, use one of the wall lengths determined in the last activity. For this example, we used 32 feet. Substitute your own wall length.

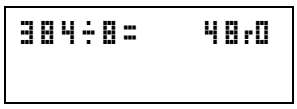
5. Press [=] to find the answer.

The TI-10 displays:

There are 384 inches across the front of a room that is 32 feet wide. The snail travels at a speed of 8 inches per minute.

6. Press [÷] [8] [=] to find how many groups of 8 inches are in 384 inches.

The TI-10 displays:



It would take a land snail 48 minutes, without stopping, to move across a room about 32 feet wide.

7. Record the results on the classroom chart.

Activity G: Jumping Fleas

1. Read the section about fleas in *Biggest, Strongest, Fastest*.

Questions to ask:

- What very small animal is a better high jumper than any Olympic athlete?
- About how tall is a flea?
- How many fleas standing on each other's back would be about 1 inch high?
- Can you show me about 1 inch using your fingers?
- About how high can one tiny flea jump?
- If you could jump like a flea, how high could you jump?

2. Reset the TI-10.
3. Press [4] for your height.

Resetting the TI-10:
Press (On/Off) to wake it up if it has turned off.

Press (AC) if you need to clear the memory.

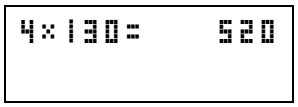
Press (Clear) to clear the display.

Teaching Tip:
Instruct students to use the height they found earlier when investigating their relationship to a giraffe.

4. Press [×] [1] [3] [0] to multiply by the number of times the flea can jump its own height.

5. Press [=] to find the answer.

The TI-10 displays:



A child about 4 feet tall could jump 520 feet high if he could jump like a flea.

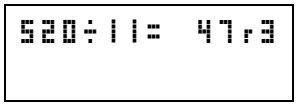
According to the book, an average woman could jump as high as a 65-story building.

Question to ask:

- If there are 11 feet in each story of a building, how many stories are in 520 feet?

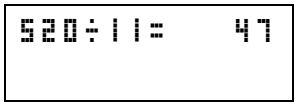
6. Press [÷] [1] [1] [=] to find the number of stories in 520 feet.

The TI-10 displays:



7. To round to a whole number, press [Fix] [1.].

The TI-10 displays:



A person about 4 feet tall could jump from the ground up to the top of a 47-story building. That is close to the height of the Washington Monument.

8. Record this information on the class chart.

Teaching Tip:
If there is an equally tall structure in your locale, use it as an example instead of the Washington Monument. Students are more likely to identify with a structure they are familiar with.

Conclusion

Gather students together to review the information recorded on the class chart. Discuss students' findings. Allow student interest and questions to drive the conversation. Use the following suggestions as needed.

- What one finding on the class chart is most amazing to you?

- If you were as strong as an ant and could lift 300 pounds, what are some things that you might be able to lift?
- What else surprised you?

Extension

Rather than comparing students to the animals in the book, compare one animal to another. Use the following examples to begin the comparisons.

- How high would a giraffe be able to jump if it could jump like a flea?
- If a cheetah moved like a land snail, how long would it take to travel the length of a football field?
- If elephants were as strong as ants, how much weight could an elephant lift? Could an elephant lift a car? Could it lift a blue whale?

Students may search for other amazing facts about animals and see what a human could do if they were able to perform the same feat.

Students could also write stories like the following:

- If I were as tall as a Giraffe...
- If I were as strong as an Ant...
- If I were as fast as a Cheetah...
- If I were as big as a Blue Whale...
- If I were as tiny as a Bee Hummingbird...