

Growing Up With A Mission

Elementary grades

Lesson Summary

Students measure their heights against the New Horizons growth chart and compute the class mean, mode and median. Next, each student uses the U.S. Growth Chart to predict what his or her height will be when New Horizons flies past Pluto.

Prior Knowledge & Skills

- Measurement
- Basic arithmetic (addition, division)

AAAS Science Benchmarks

The Mathematical World

Symbolic relationships

Numbers

NSES Science Standards

- **Physical Science:** Properties of objects and materials

NCTM National Mathematics Standards

- **Measurement:** Use tools to measure
- **Data analysis and probability:** Collect data using observations and surveys, Represent data using tables and graphs

Teaching Time: One 45-minute period

Materials

Each student needs:

- Pencil
- Student Activity Sheet with U.S. Growth Chart (for girl or boy)

For the whole class:

- New Horizons growth chart mission poster
- Pad of small stick notes (optional)

Advanced Planning

Preparation Time: 20 minutes

1. Hang the growth chart poster
2. Check the status of New Horizons. If it has launched, look on the New Horizons web site to see the time until the Pluto fly-by
3. On the chalk board copy a table into which students can enter their height data

NEW HORIZONS



TO PLUTO AND BEYOND

<http://pluto.jhuapl.edu>



GROWING UP WITH A MISSION

Level

Grades 2 - 5

Learning Goals

Measuring heights and using graphs (growth charts) to make predictions.
Collecting data and finding the mean, mode, and median of the data set.
Graphing points on a Cartesian coordinate system.

National Council of Teachers of Mathematics Standards

Measurement: Use tools to measure

Data Analysis and Probability: Collect data using observations and surveys;
Represent data using tables and graphs

Materials per class:

New Horizons growth chart mission poster
Pad of small sticky notes, i.e. Post-Its (optional)

Materials per student:

Pencil
Student Activity Sheet with U.S. Growth Chart (for girl or boy)

Teacher Overview

1. You will need to hang the New Horizons growth chart mission poster on an accessible wall where students can stand to measure each other. Hang the poster so that the 3 ft mark on the bottom left corner of the poster is 3 ft above the ground (or equivalently, so the 90 cm mark on the bottom right corner of the poster is 90 cm above the ground).
2. If New Horizons has launched, look on the New Horizons website (<http://pluto.jhuapl.edu>) to see the time until the Pluto fly-by. If New Horizons has not yet launched, the first possible launch is scheduled for early 2006 for arrival at Pluto in 2015.

3. On the chalk board, copy the following table with enough space for each student's data to be entered. You may use either feet and inches (scale along left edge of poster) or centimeters (scale along right edge of poster) for measuring student heights.

Student's Name	Height

4. Students will work with partners to measure each other using the growth chart, record their results, and make calculations. Depending on the math abilities of the students you are teaching, you may want to do all or portions of the calculations and analysis together as a class.
5. Next, students will work on completing the page showing a flow chart. This will lead them through making a prediction of how tall they'll be when they are adults. Here students will need a copy of a US Growth Chart. Girls should use a growth chart for girls, and boys need a growth chart developed for boys.
6. Optional: If time permits, have each student write their name on a sticky note and stick it at their predicted adult height on the poster.



NEW HORIZONS



To PLUTO AND BEYOND

<http://pluto.jhuapl.edu>



GROWING UP WITH A MISSION STUDENT ACTIVITY SHEET

Directions:

1. Stand with your back against the New Horizons growth chart poster and have your partner measure how tall you are in ____ (centimeters or inches). Round to the nearest whole number.

My Height _____

2. Record your name and height on the chart your teacher wrote on the chalkboard.
3. Copy the data on the chalkboard chart onto Table 1, *in order of increasing height, from shortest to tallest.*
4. Answer the questions next to Table 1.

Definitions

Median – the middle value when all numbers are in increasing order

Ex. 1, 3, 4, 4, 4, 5, 6, 6, 7, 10, 11

The median is 5.

Mode – the most frequently occurring number

Ex. 1, 3, 4, 4, 4, 5, 6, 6, 7, 10, 11

The mode is 4.

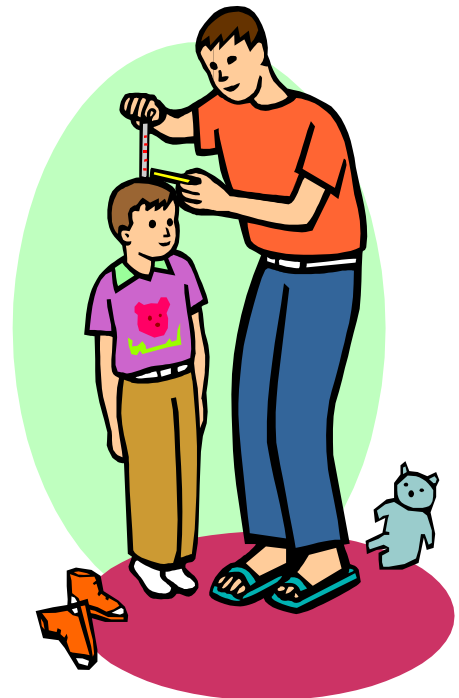
Mean – the average. Find the mean by adding all the values and dividing by the number of values.

Ex. 1, 3, 4, 4, 4, 5, 6, 6, 7, 10, 11

To find the mean:

Step 1: $1+3+4+4+4+5+6+6+7+10+11 = 61$

Step 2: $61 \div 11 = 5.5 \leftarrow$ the mean



GIRLS: Get a copy of the U.S. Growth Chart for Girls.

BOYS: Get a copy of the U.S. Growth Chart for Boys

Determine Your Age
Age in Years: _____

If you will celebrate your birthday in the next...
3 months...add $\frac{3}{4}$ to your age
3-6 months...add $\frac{1}{2}$ to your age
6-9 months...add $\frac{1}{4}$ to your age

U.S. Growth Chart Age: _____
(age + fraction)

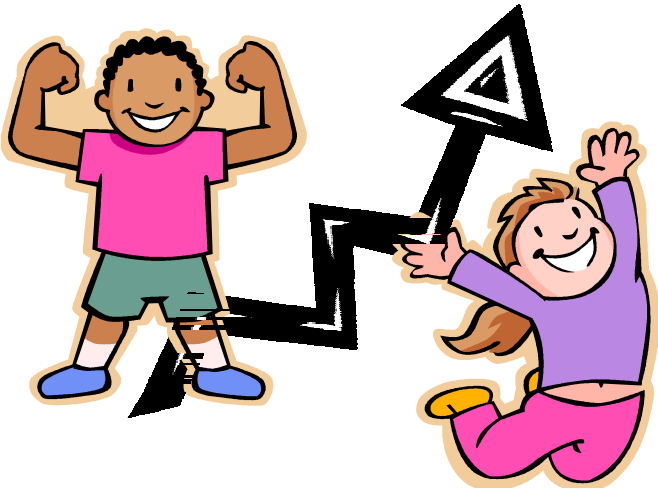
How old will you be when New Horizons flies past Pluto?

_____ + _____ = _____
U.S. Growth Chart Age Years Until Pluto Flyby Age at Pluto Flyby

Mark an "X" on the U.S. Growth Chart at the point with your U.S. Growth Chart Age and your Height.

On the U.S. Growth Chart, find the curve closest to the "X."
Trace this curve until you are at your Age at Pluto Flyby or at 20 years old. Mark an "X" here.

How tall will you be when New Horizons flies past Pluto?



Look at the New Horizons growth chart poster to see how tall you might be!