

Algebra 2

Lesson Plan on Guess the Age

Goals:

- Describe graphically, algebraically and verbally real-world phenomena as functions; identify the independent and the dependent variable (3.01)
- Translate among graphic, algebraic, and verbal representations of relations (3.02)
- Graph relations and functions and find the zeros of functions (3.03)
- Write and interpret an equation of a curve (linear) which models a set of data (4.01)
- Find the equation of best fit (linear) for a set of data. Interpret the constants, coefficients, and based in the context of the data. Check the equation for goodness of fit and use equation for prediction (4.02) *This is a secondary goal, not expected, but intend to set stage for later discussion.*

Materials Needed:

- Copy of handout for each student
- Stopwatches or digital watches for students to determine heart rate (can share) –for follow-up activity
- Graphing calculator
- Graph paper for each student

Activity One: Guess the Age

This activity was developed based on “Data Driven Mathematics: A Curriculum Strand for High School Mathematics,” by Gail Burrill, which was published in the *Mathematics Teacher*, September 1996, pages 460-465.

- Each student will spend several minutes writing down their guess for the age of each of the celebrities listed on the attached handout. Some clarification should be given in the instructions about age as of December 31 of this year. Use PowerPoint file **guessage.ppt** to view celebrities.
- Once students have completed the task, give the age for each celebrity. Have students write down these ages adjacent to their guess for the age. Students should write a sentence to describe themselves as guessers.
- Discuss the question: How good are you at guessing ages? How would we uniformly determine this for the entire class?
- Form ordered pairs of (age, guess). Graph these. Be sure to talk about labeling the axes. Plots will be done first by hand, but will transfer to the calculator. **Calculator use instruction may be needed here.** Set window to include (0,0).
- What do you expect to see in this graph if you are a good guesser? Superimpose the line $guess = age$ or $y = x$ over the data. Talk about what this equation says. If the data falls above the line, what does this mean? What is the meaning of data below the line? Superimpose other lines across the data. For example, $guess = age + 1$ or $guess = 2 \cdot age$, or $guess = 0.8 \cdot age$. Talk about what each means and information given by the equation.
- Go back to read the sentence that you wrote about the kind of guesser you are. Does the graph support your sentence? How could we determine who the best guesser is? One way might be to determine how far each student’s guess is from the line $y = x$. Calculating the vertical distance from the line rather than the shortest distance will be simpler. For example, suppose you guessed Tiger Woods’ age to be 29 and his actual age is 27. If you were using the line $y = x$, this distance would be $29 - 27 = 2$, so you guessed 2 more than his actual age. If you were using the line $guess = age + 1$, this distance would be $29 - (27 + 1) = 1$, so you guessed 1 more than his actual age. This is a foreshadowing of the concept of residuals which will be addressed more fully in later lessons.

- Connect these lines with the concepts of slope and y -intercept. Do we expect the point $(0,0)$ to be part of our graph? What is a reasonable domain? Range?

Answers:

Birth year of each person is given.

		As of 2002
Nancy Reagan	1924	78
Tiger Woods	1975	27
Mister Rogers	1929	73
Chelsea Clinton	1980	22
Eddie Murphy	1961	41
Tom Brokaw	1940	62
Oprah Winfrey	1954	48
Mick Jagger	1943	59
Heather Locklear	1961	41
Elizabeth Taylor	1932	70
Garth Brooks	1962	40
Jennifer Lopez	1970	32
Ringo Starr	1940	62

Follow-Up Activity: Comparison of Heart Rates before and after exercise.

1. Each student will take his/her heart rate in number of beats per minute. To find heart rate, use fingers (not thumb) to find beat on wrist or in neck. Count number of beats for 10 seconds and multiply by 6 to get beats per minute.
2. Each student should run in place or go up and down stairs for 2 minutes. Retake heart rate in the same manner as described in step 1.
3. Form an ordered pair of (resting heart rate, heart rate after exercise) for each student. Talk about what we expect of these ordered pairs; set the stage for all points falling above the line $y = x$.
4. Form a data set from these ordered pairs from each student. Each pair of students should read their ordered pairs to the teacher who will make a composite list of all students in the class. Plot each using the graphing calculator.
5. How will $HR_{afterexercise} = HR_{resting}$ or $y = x$ look when superimposed over this data? What would that mean? Are ordered pairs all located above or below this line? What does this mean?
6. What is a reasonable line that will fit this data? (Look at all the possibilities from the class.) What is the meaning of the slope and the y -intercept? What are the units associated with the slope? What are the units associated with the y -intercept?

Student Handout
Estimate the Ages of Famous People
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The following list contains the names of famous people. Without talking to anyone, write down your estimate of the age of each person. If you do not know the person, make a guess.

	Estimated Age
Nancy Reagan	_____
Tiger Woods	_____
Mister Rogers	_____
Chelsea Clinton	_____
Eddie Murphy	_____
Tom Brokaw	_____
Oprah Winfrey	_____
Mick Jagger	_____
Heather Locklear	_____
Elizabeth Taylor	_____
Garth Brooks	_____
Jennifer Lopez	_____
Ringo Starr	_____

Once everyone has completed the task, your teacher will provide the actual ages for each celebrity.

Write a sentence below to describe yourself as an estimator of ages of this group of famous people.