 FSHu2CEC Body measurements

MG1H-1 uses mathematics and statistics to evaluate and construct arguments in a range of familiar contexts

MG1H-2 analyses representations of data in order to make predictions

MG1H-3 makes predictions about everyday situations based on simple mathematical models

MG1H-4 analyses simple two-dimensional and three-dimensional models to solve practical problems

MG1H-5 interprets the results of measurements and calculations and makes judgements about reasonableness, including the conversion to appropriate units

MG1H-9 chooses and uses appropriate technology to organise information from a range of practical and everyday contexts

MG1H-10 uses mathematical argument and reasoning to evaluate conclusions drawn from other sources, communicating a position clearly to others.

Content

* investigate biometric data obtained by measuring the body and by accessing published data
* plot ordered pairs of body measurement data onto a scatterplot by hand and by using appropriate technology
* recognise patterns in a scatterplot of body measurements, eg
  + whether the points appear to form a mathematical pattern
  + whether the pattern appears to be linear
* construct a line of fit and determine the equation, by hand and by using appropriate technology
* use the equation of a line of fit to make predictions about body measurements
* recognise the practical limitations of the equation of a line of fit
* calculate correlation coefficients for different body measurements using appropriate technology (students are not required to calculate correlation coefficients by hand)
* interpret the strength of association for different body measurements using a given correlation coefficient
* interpret the sign of a given correlation coefficient.

Teaching Strategies

Introduce the idea of ‘beauty’ in mathematics, the Golden Ratio phi (ϕ)

<http://www.goldennumber.net/beauty/>

<https://www.youtube.com/watch?v=kKWV-uU_SoI> (video accompanying above link)

<http://www.intmath.com/numbers/math-of-beauty.php>

Is it really valid? Introduce the idea of symmetry vs asymmetry.

<http://time.com/2848303/heres-what-faces-would-look-like-if-they-were-perfectly-symmetrical/>

<http://www.businessinsider.com.au/symmetrical-faces-2011-7#real-portrait-left-side-symmetrical-right-side-symmetrical-1>

So ratios tend to be ‘ideal’, but there are always variations.

Introduce Leonardo Da Vinci’s Vitruvian man:

<http://www.world-mysteries.com/sci_17_vm.htm>

Ask if anyone can figure out how long their foot is. Ask them to measure their forearms. Other corresponding measurements e.g:

* Total height is equivalent to 7 to 7.5 heads tall
* Nose length is equivalent to first two digits of index/pointer finger
* Head is approximately four to five eyes wide
* Length of face is equal to length of hand
* Eyes are separated by one eye’s width
* Bottom of nose to outside corner of eye is equal to length of ear
* Length of foot is equal to length of forearm
* Waist to neck ratio is 1 to 2 (waist is twice the circumference of the neck)
* Neck to wrist ratio is 1 to 2 (neck is twice the circumference of the wrist)

Start measuring activities

Use group data to start scatter plots.

Analyse, find the line of best fit, determine correlation coefficients etc.

Understand the difference between causality and correlation.

Compare to ‘ideal’ ratios -

Discuss disproportionality. Is it aesthetically pleasing?

Resources

<http://www.goldennumber.net/beauty/>

<https://www.youtube.com/watch?v=kKWV-uU_SoI>

<http://www.intmath.com/numbers/math-of-beauty.php>

How body part ratios occur:

<http://www.goldennumber.net/human-body/>

<http://www.bioedonline.org/lessons-and-more/lessons-by-topic/human-organism/fitness-and-physical-activity/human-body-ratios/>

<http://www.fastcodesign.com/3030529/infographic-of-the-day/hilarious-graphs-prove-that-correlation-isnt-causation#1>

<http://www.buzzfeed.com/kjh2110/the-10-most-bizarre-correlations#.hilz3NQA1>

<http://www.bodybuilding.com/fun/calbs.htm>

Activity: Dan Meyer, Three Act Task: <https://s3.amazonaws.com/threeacts/bonecollector.zip> Bone Collector

Additional Links: [MathsLinks SHu2CEC: Body measurements](https://mathslinks.net/browse/fshu2cec)