Mental Math Part 4: Measurement Estimation

The following Key Understandings underpin students' abilities to directly measure objects, giving them the skills to decide what needs to be measured by selecting what attributes to measure and what units to use.

The Key Understandings for Measurement

KU1 We can compare things by how much of a particular attribute each has. Different attributes may result in different orders.

KU2 There are special words and phrases that help us to describe and compare quantity.

KU3 To measure something means to say how much of a particular attribute it has. We measure by choosing a unit and working out how many of the unit it takes to match the thing.

KU4 The instrument we choose to represent our unit should relate well to the attribute to be measured and be easy to repeat to match the thing to be measured.

KU5 Measurements of continuous quantities are always approximate. Measurements can be made more accurate by choosing smaller units, subdividing units and other strategies.

KU6 Our choice of attribute and unit depends upon what we are trying to measure and why.

KU7 Standard units help us to interpret, communicate and calculate measurements.

KU8 The relationships between standard units in the metric system help us to judge size, move between units and do calculations.

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baseball bat
approximately
1 m

The Key Understandings related to Measurement Estimation

These additional Key Understandings are the basis for making sensible direct and indirect estimates of quantities and for being alert to the reasonableness of measurements and results.

KU1 We can make judgments about order and size without actually measuring. We should think about how confident we can be of our estimate.

KU2 We can improve our estimates by getting to know the size of common units and by practising judging the size of things.

KU3 We can use information we know to make and improve estimates. This also helps us to judge whether measurements and results are reasonable.

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hand span
approximately
20 cm

Measurement Estimation is the process of using internal and external visual (or tactile) information to get approximate measures, or to make comparisons of measures, without the use of measurement instruments.

Manitoba
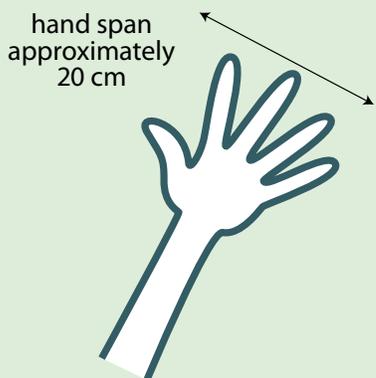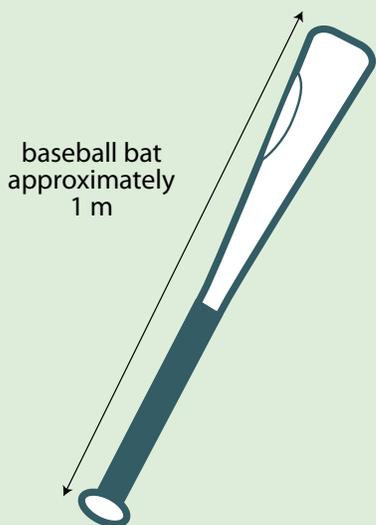
Measurement Estimation Strategies

Successful students are able to use a number of different strategies when estimating measurement, including the following:

using benchmarks. A benchmark refers to an internalized measurement that is used to estimate other measurements. For example, knowing that the length of a baseball bat is approximately 1m allows a person to estimate the length of a board.

using personal referents. A knowledge of a person's own height, mass, length of hand span, length of arm, and so on, can be used to estimate. For example, knowing that the length of one's hand span is approximately 20 cm allows a person to estimate the length of a table.

chunking. Chunking involves visually breaking an object into parts and then estimating each part. For example, a person could estimate the length of a room by breaking the length into parts, estimating the length of each part, and then adding the estimates of the parts together. (Ontario Ministry of Education, 2007, p. 20)

Why Measurement Estimation?

- Estimation activities help students pay attention to what is being measured, the unit being used and the measurement process itself.

- Estimation activities can be motivating for students as they try to see how close their estimate comes to the actual measurement. In order for this to happen, students need a variety of experiences so that they can become confident enough to trust their estimates.

Note: It is not necessary to find the actual measurement every time students make an estimate. However, it is important that students are able to determine when an actual measurement is needed and when an estimate is all that is required.

Reflection and Discussion

- What learning opportunities and experiences are provided for measurement estimation?

- How might measurement estimation (estimation in general) be integrated into math routines?

- How is student performance related to measurement estimation (estimation in general) reflected on the Provincial Report Card in the Mental Math and Estimation category?

Resources

Government of Western Australia. *First Steps in Mathematics: Measurement – Book 1*. Perth, AU: Australia Department of Education, 2013a. Available online at http://det.wa.edu.au/stepsresources/detcms/navigation/first-steps-mathematics/

———. *First Steps in Mathematics: Measurement – Book 2*. Perth, AU: Australia Department of Education, 2013b. Available online at http://det.wa.edu.au/stepsresources/detcms/navigation/first-steps-mathematics/

Ontario Ministry of Education. *A Guide to Effective Instruction in Mathematics,* *Kindergarten to Grade 3 – Measurement*. Toronto, ON: Queen's Printer for Ontario, 2007. Available online at http://eworkshop.on.ca/edu/resources/guides/Measurement_K-3.pdf

Stadel, Andrew, and Michael Fenton. *Estimation 180: Building Number Sense One Day at a Time*. Andrew Stadel, n.d. www.estimation180.com/ (Accessed –11 08 2016)

Van de Walle, John, Karen S. Karp, Jennifer M. Bay-Williams, Lynn M. McGarvey, and Sandra Folk. *Elementary and Middle School Mathematics: Teaching Developmentally*. Toronto, ON: Pearson, 2015.