



Mental Math and Estimation

"Students proficient with mental mathematics 'become liberated from calculator dependence, build confidence in doing mathematics, become more flexible thinkers and are more able to use multiple approaches to problem solving' (Rubenstein, 2001, p.442)." (pg. 7)

"Estimation is used for determining approximate values or quantities, usually by referring to benchmarks or referents, or for determining the reasonableness of calculated values." (pg. 7)

The Alberta 10-12 Mathematics Programs of Study with Achievement Indicators 2008, Alberta Education)

Seven Mathematical Processes

- Communication
- Connections
- **Mental Mathematics and Estimation**
- Problem Solving
- Reasoning
- Technology
- Visualization



Thoughts on Mental Math and Estimation

No Calculators

One strategy to improve mental mathematics is to not allow students the use of calculators for the Algebra & Number unit in Math 10C. The General Outcome for Algebra & Number is "develop algebraic reasoning and number sense" and eliminating the use of calculators prevents students from using the calculators unnecessarily and forces them to improve their number sense.

Number Line Estimation

A great example of estimation is asking students to place a variety of powers, radicals, fractions, etc. onto a number line. This really shows a student's number sense and understanding of the numerical value of powers and radicals.

Practice: Arrange the following sets of numbers on a number line.

a) $\sqrt[3]{13}$, -0.5 , $\sqrt{18}$, $9^{\frac{1}{2}}$, $\sqrt[4]{27}$, $(-5)^{\frac{1}{3}}$

b) $\sqrt{2}$, $2^{\frac{1}{3}}$, $\sqrt[3]{6}$, $\sqrt{11}$, $30^{\frac{1}{4}}$

c) $\sqrt[3]{9}$ 4.9 $\sqrt{2}$ $\sqrt{26}$ $\sqrt[3]{27}$ 1.9 $\sqrt{8}$

One benefit from estimating first is that it helps with student "buy-in". Students often want to know who made the best estimate and how close they were to the correct answer.

Estimate First

[Dan Meyer](#) emphasizes the importance of getting students to make an estimate before attempting to solve a problem. You can ask students to make three estimates, one they know is too low, one they know is too high, and one they think is correct. Make the estimate come first rather than at the end.

For more information and additional supports for implementation, visit <http://erlc.ca/resources/filter.php?theme=11&title=Mathematics>