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(A) **Lesson Objectives:**

- a. Investigate the effect of accumulating rounding errors
- b. Calculate absolute error, relative and percent error when rounding numbers
- c. Apply error to contextual problems

(B) **Contextual Introduction**

Mr Santowski gets paid \$13.6986301368/hour to teach at ISM (based upon an 8 hour day). You will investigate the effects of rounding as you work out Mr S's annual salary

(a) Round all the calculated numbers to the ***nearest dollar*** as you complete the following estimations:

- a. Work out my daily pay and then with that number, work out my annual pay.
- b. Work out my weekly pay and then with that number, work out my annual pay.
- c. Work out my monthly pay and then with that number, work out my annual pay.

(b) Round all the calculated numbers to the ***nearest tenth of a dollar*** and complete the following estimations:

- d. Work out my daily pay and then with that number, work out my annual pay.
- e. Work out my weekly pay and then with that number, work out my annual pay.
- f. Work out my monthly pay and then with that number, work out my annual pay.

(c) Round all the calculated numbers to the ***nearest hundredth of a dollar*** and complete the estimations:

- g. Work out my daily pay and then with that number, work out my annual pay.
- h. Work out my weekly pay and then with that number, work out my annual pay.
- i. Work out my monthly pay and then with that number, work out my annual pay.

(C) **Error**

We can introduce 3 (THREE) ways to describe the error produced when we round numbers:

1. Absolute error – the absolute value of the difference between the EXACT and ROUNDED value
2. Relative error – the absolute error divided by the EXACT value
3. Percent error – the relative error expressed as a percentage

(D) **Practice of Calculating Error** → Cirrito Textbook, S4.4, p103, Q1-7

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(E) **Computational Errors:** when we calculate with quantities that are in error, the result of our calculation will also be in error

a. **Ex 1:** Let  $a = 3.2 \pm 0.1$  and let  $b = 6.9 \pm 0.1$  and let  $c = 4.7 \pm 0.1$ . Evaluate each and determine the "error bound" for each calculated result:

i.  $2a + b$

(ii)  $a(b + c)$

(iii)  $b - c$

b. **Ex 2:** A rectangular field measures 120 m by 55 m. Both measures are correct to 2 sig figs. What are the errors if these quantities are used to calculate the perimeter of the field?

(F) **Rounding Error Practice:** Cirrito Textbook, S4.5, p 107, Q1,2

(G) **HOMEWORK:** HH Textbook, S2I, p62, Q1-4 as well as S2H, p59, Q4,6