

As a reminder, you are welcome to use a non-internet accessing calculator (which includes Desmos Test Mode) and one 1-sided 8.5 in by 11 in sheet of notes. Show your work as you would for a *colleague* unless otherwise indicated.

1. [3] (MultActivity #2) Let a , b , and c be whole numbers. Determine if following statement is always true, sometimes true, or never true? Briefly justify your answer.

$$a + (b \times c) = (a \times b) + (a \times c)$$

2. (Quiz1 #2) Suppose you own a square piece of land. You trade your land for a rectangular lot. The length of your new lot is 2 meters longer than the original lot and the width is 2 meters shorter than the original lot.

- (a) [2] If the original land is 50 meters by 50 meters, what are the dimensions of the new lot?

- (b) [2] Does the new lot have as much land as the old? Provide some justification.

- (c) [3] Do your conclusions above generalize for any square piece of land? Provide some justification.

3. Consider the number written in base 4 with 2 flats, 1 long, and 3 units or 213_{four} .

(a) [2] (§3.2#8) Sketch the base pieces for 213_{four} .

(b) [2] (NumberSystemActivity #4) Determine the total number of units in 213_{four} , reporting in the Hindu-Arabic number system.

4. (ExtraPractice §3.1 #11) Consider the number of units shown below.

(a) [2] Sketch the minimum number of base pieces for base six to represent the set of units shown.

☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐

(b) [1] Write the number of units in positional notation for base six.

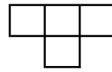
5. [3] Is Egyptian or Babylonian a positional number system? Provide justification for your answer.

6. (ProblemSolvActivity #1) Consider the sequence of numbers illustrated below.

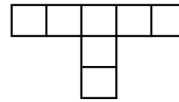
- (a) [3] Find the next two numbers in the sequence.



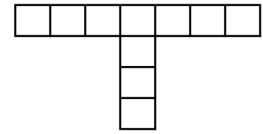
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- (b) [2] Identify if the sequence is arithmetic, geometric, or neither. Justify your answer.

- (c) [2] Find the 60th number in the sequence.

7. Show work & compute (your audience is a colleague but still highlight any regrouping!):

- (a) [2] (Quiz3 #1) $202_{\text{four}} + 22_{\text{four}}$

- (b) [2] (§3.4 #8) $62_{\text{eight}} \div 5_{\text{eight}}$

8. [3] Find a pattern for a sequence of numbers that

- form a geometric sequence, and
- begins with 3.

9. Grade the work that follows. The work may be correct or incorrect. If correct, briefly justify why. If incorrect, find the error(s) & try to detect the reason for the error.

(a) [3] (AddActivity #1)

$$\begin{array}{r} 42 \text{ five} \\ + 34 \text{ five} \\ \hline 76 \text{ five} \end{array}$$

(b) [3] (§3.2 #8)

$$\begin{array}{r} 52 \\ - 14 \\ \hline \end{array} \Rightarrow \begin{array}{r} 50 \\ - 10 \\ \hline 40 \end{array} + \begin{array}{r} 2 \\ - 4 \\ \hline -2 \end{array} \Rightarrow \begin{array}{r} 40 \\ - 2 \\ \hline 38 \end{array}$$

(c) [3] (SeveralAlgorithms)

$$\begin{array}{r} 26 \\ \times 15 \\ \hline \end{array} \Rightarrow \begin{array}{|c|c|c|} \hline 2 & 6 & \\ \hline 30 & 90 & 0 \\ \hline \end{array} \Rightarrow 390$$

10. Consider $45 - 3 \div 3 \times 4$

- (a) [1] (Quiz3 #2) Circle the operation above that should be performed first:
- (b) [1] How would you modify the above expression to make it more clear the order of the operations?

11. [5] (ExtraPractice §3.4 #33) Introduce how exponents and multiplication interact with each other as you would to an elementary school student who had forgotten. Use the example $5^4 \times 5^6$ in the explanation.

