TMath 171

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.

1. [9] Let a, b, and c be whole numbers. Are the following statement always true, sometimes true, or never true? Briefly justify your answer.

   (a) (Add & Sub Activity #3)
   $$a - 0 = a$$

   (b) (Add & Sub Activity #3)
   $$a - (b + c) = (a - b) + c$$

   (c) (§3.4 Suggested #21)
   $$(a + b) \div c = (a \div c) + (b \div c)$$

2. [4] (§1.1 #25) There were ships with 3 masts and ships with 4 masts at the Tall Ships Exhibition. Millie counted a total of 30 masts on the 8 ships she saw. How many of these ships had 4 masts? Provide justification but you do NOT need to explain as you would to a 3rd grader.

Show your work for the following problems. The correct answer with no supporting work will receive NO credit.

3. Consider the number represented with 2 flats, 3 longs, and 1 unit shown below in the given base.

   (a) [2] (§3.1 #11) Write the number of units in positional notation for the given base.
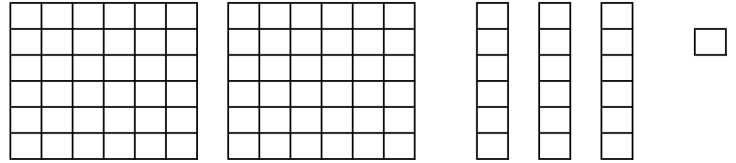
   (b) [2] (Quiz3 #2) Determine the total number of units, reporting in the Hindu-Arabic number system.

   (c) [5] (§3.3 classEx) Multiply the above number by three. Provide steps as you would for a 3rd grader. Be clear about how you communicate your answer.

4. (PatternActivity #4) Consider the sequence of numbers illustrated below.

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

1   3   6   10   15
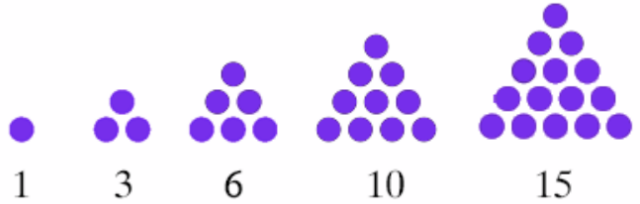
(b) [2] Identify if the sequence is recursive, arithmetic, geometric, or none of the above. Justify your answer.

(c) [2] Find the 50th number in the sequence.

5. [4] (NumSysActivity #4) For each of the pairs of numbers below, determine which is bigger, justify your answer. (You do NOT need to explain as you would to a 3rd grader, just provide evidence.)

(a)

or 508_{nine}

(b)

or 243_{twelve}

6. The work below for both problems is wrong. Find the error(s) & try to detect the reason for the error.

(a) [3] (§3.4 Suggested #19)

$$
\begin{array}{r}
37 \ R1 \\
7\overline{)2150} \\
-21 \\
\hline
50 \\
-49 \\
\hline
1
\end{array}
$$

(b) [2] (§3.2 #22)

$$
\begin{array}{r}
46 \\
+\ 78 \\
\hline
114
\end{array}
$$

(c) [2] On one division problem, a large number M was divided by 36. The student ended up with a quotient q and a remainder of 40. The student is certain they are correct since $M = 36q + 40$.

(d) [2] (§3.4 Suggested #35)

$$
\begin{aligned}
& 8 \times (6+16) \div (2^3 \times 2^1) \\
& 8 \times (22) \div (2^3) \\
& 8 \times 22 \div 8 \\
& 176 \div 8 \\
& 22
\end{aligned}
$$

4
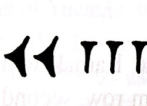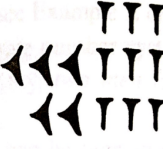
7. [3] Find a number that:

   - is not written in base 10,
   - has 4 digits, and
   - is made of less than 50 units.

8. Show work and compute:

   (a) [2] (§3.2 #8) $43_{\text{five}} - 14_{\text{five}}$

   (b) [2] (§3.2 Suggested #7) $43_{\text{five}} + 14_{\text{five}}$

9. [1] What topic or concept did you study and prepare for, but not see on the exam?

1,000,000	100,000	10,000	1000	100	10	1
Astonished man	Tadpole	Pointing finger	Lotus flower	Coiled rope	Heel bone	Stick

Egyptian Symbols

I	V	X	L	C	D	M
1	5	10	50	100	500	1000

Roman Numerals

23   6   40   59

0		5		10		15	
1		6		11		16	
2		7		12		17	
3		8		13		18	
4		9		14		19	

Mayan Symbols

5