MTH 231  Test 1 (1.2, 1.3, 2.2-2.4, 3.1, 3.2)  Name

Be sure to read instructions carefully and provide all information asked for in each problem. When asked for explanations, be very thorough and detailed. Write answers in blanks provided.

Problems 1 – 15, 2 points each; problems 16-34, 3 points each; 35 & 36, 4 pts each  (104 possible)

Use inductive reasoning to predict the next number in the sequence.

1) 22, 19, 16, 13, 10

Short Answer.

2a) What is the multiplicative identity element?  

2b) What is the additive identity element?  0

Decide whether the argument is an example of inductive or deductive reasoning.

3) Fresh fruit costs more in winter. This is February. These fresh strawberries cost more.  

Determine whether the sets are equal only, equivalent only, both equal and equivalent, neither equal nor equivalent. Describe the relationship(s) that exists between the two sets in terms of “subsets”, “proper subsets”, “improper subsets”, etc.

4) \{real numbers\} and \{integers\}  

Type of Sets: \textit{neither}

Relationship: \{integers\} is a proper subset of \{Real\}

5) Find the number of subsets of the set: \{math, English, history, science, art, economics\}  2^6 = 64

Solve the problems.

6) Find A ∩ B ∩ C, given A={1, 2, 3, 4, 5, 6}, B={3, 5, 6}, and C={1, 2, 4, 5}.  \{5\}

7) Find A ∪ B, given A={1, 6, 12, 4}, and B={12, 4, 100}.  \{1, 4, 6, 12, 100\}

State whether the IDENTITY, CLOSURE, COMMUTATIVE, or ASSOCIATIVE property for whole numbers is used. (Not all will be used.)

8) 27 + (36 + 54) = (27 + 36) + 54  \textit{Associative}

9) 4 + 1 = 1 + 4  \textit{Commutative}

10) 0 + 3 = 3  \textit{Identity}
Identify the property of whole number multiplication that is illustrated in the following:

11) \(2(x + 6) = 2x + 2 \cdot 6\) \(\text{Distributive}\)

12) \(5 \cdot 1 = 5\) \(\text{Identity}\)

Write the number in the indicated form.

13) 587 using expanded notation with exponents \((5 \times 10^2) + (8 \times 10^1) + (7 \times 10^0)\)

14) Write the Hindu-Arabic numeral for the number represented by the following: \(\text{MCMLXIV = 1964}\)

15) Write 842 using Roman numerals. \(\text{DCCC XLII}\)

Decide whether or not the set is closed under addition. Give an explanation and an illustration (example) that validates your answer.

16) \(\{1, 3, 5, 7, \ldots\}\) \(\text{not closed} \quad \text{b/c} \quad 1 + 3 = 4 \quad \text{is not in set}\)

Decide whether or not the set is closed under multiplication. Give an explanation and an illustration (example) that validates your answer.

17) \(\{1, 3, 5, 7, \ldots\}\) \(\text{closed} \quad \text{b/c} \quad \text{when two odds are mut. = odd}\)

Provide the proper response.

18) Explain why the sets \(\{w, x, y, z\}\) and \(\{1, 2, 3, 4\}\) are equivalent sets but not equal sets.

They have the same \# of elements but not exactly the same elements

Write the number in base ten. Show your work.

19) \(27_{\text{eight}}\) \(23\)

\(2 \times 8^1 + 7 \times 8^0 = 2 \cdot 8 + 7 \cdot 1 = 16 + 7\)
Convert the base-ten number to a number in the indicated base. Show your work in the space provided.

20) 328 to base six

\[
\begin{array}{c|c}
328 & \text{r}\overline{6} \\
152 & 0 \\
76 & 0 \\
38 & 0 \\
12 & 3 \\
4 & 2 \\
1 & 1 \\
0 & \\
\end{array}
\]

\[
3 \text{eight} = 4_\text{six}
\]

21) Change 24 to base four.

\[
\begin{array}{c|c}
24 & 100 \\
8 & 1 \\
4 & 1 \\
1 & 1 \\
\end{array}
\]

Identify the role/part played by each number in the following computational statements.

22) \(8 + 6 = 14\)

8 is called the \textbf{addend}, 6 is called the \textbf{addend}, 14 is called the \textbf{sum}.

23) \(32 - 13 = 19\)

32 is called the \textbf{minuend}, 13 is called the \textbf{subtrahend}, 19 is called the \textbf{difference}.

24) \(112 \div 7 = 16\)

112 is called the \textbf{dividend}, 7 is called the \textbf{divisor}, 16 is called the \textbf{quotient}.

Explain the difference between the following. Which of the two should you encourage/expect from your students? Why? Be thorough in your explanation.

25) An answer and a solution

| An answer is the final result. The solution is the process used to find the answer. Solutions help diagnose errors. |
Classify each problem below as MULTIPLICATION, PARTITIVE DIVISION, or MEASUREMENT DIVISION. State the unknown for each. (3 points each part)

26a) For a planned school outing to the zoo for all the third grade classes, a number of school buses will need to be requested. Each school bus can carry up to 48 students. If there are 140 students in the combined classes, what is the minimum number of school buses that need to be requested?

Classification  **Meas. Div.**  Unknown  **# of groups**

26b) In Mrs. Clooney’s second graded classroom, students are equally grouped among 8 tables placed around the room. If her class roll contains 24 students, how many students can she place at each table?

Classification  **Part. Div.**  Unknown  **size of groups**

Classify each problem as JOIN, SEPARATE, PART-PART-WHOLE, or COMPARE. State the unknown for each. (3 points each part a-c)

27a) Lindsay has several cats. Four are girls and two are boys. How many cats does she have?

Classification  **part-part-whole**  Unknown  **total (whole)**

27b) Brenda has 15 CDs in her car. Fritz has 10 more CDs in his car than Brenda. How many CDs does Fritz have in his car?

Classification  **Compare**  Unknown  **compare (or referent)**

27c) Noah has $50 in his piggy bank. For his birthday, his grandparents gave him some money, and he now has 475 dollars in his piggy bank. How much did he receive from his grandparents?

Classification  **Join**  Unknown  **change**

**Answer the following.**

28) Use repeated addition to model 4 x 3. Demonstrate only.

\[
\begin{array}{c}
4 \times 3 \\
\text{# of groups} \quad \text{size} \\
\hline
3 \quad 6 \\
\hline
+3 \quad 9 \\
\hline
12 \\
\end{array}
\]

29) Use counters to model 8 – 3. Provide necessary instructions and explanations for each diagram.

\[
\begin{array}{c}
\text{Begin w/ 8 counters.} \\
\text{Remove 3 counters.} \\
\text{Count remaining counters.} \\
\hline
00000000 \quad 8 \\
00000000 \quad -3 \\
0000 \quad 5 \\
\end{array}
\]
Perform calculations mentally using the method specified. Demonstrate and briefly describe your procedure.

30) 650 + 574: Break Apart Numbers

\[
\begin{align*}
600 + 500 &= 1100 \\
50 + 70 &= 120 \\
0 + 4 + 4 &= 1224 \\
\end{align*}
\]

Add place values.

31) 139 – 93; Equal Additions Technique

\[
\begin{align*}
146 - 100 &= 46 \\
\text{Add 7 to 93 to make} &= 100 \\
\end{align*}
\]

32) $9.97 x 5; Compensation

\[
\begin{align*}
+ .03 \\
10 \times 5 &= \$50 - (.03 \times 3) = .15 = \$49.85 \\
\end{align*}
\]

Add 3¢ to make $10 + then subtract 3¢ x 5

33) Explain the difference between computational estimation and mental computation. Be thorough in your explanation.

Comp. Estimation gives an APPROXIMATE answer.
Comp. Mental Computation gives an exact answer w/o the use of paper, pencil, calculator, ...

34) What is meant by “discourse” in a classroom? Give at least 3 ways that teachers can promote/orchestrate discourse in their classroom.

Discourse = way of representing ideas, talking, agreeing/disagreeing.
- Pose questions that challenge
- Decide when to go in depth discourse
- Listen to students
- Ask students to clarify/justify
- Decide when to provide information model, lead, or let struggle
Read the following carefully and provide answers to the questions below that pertain to Jack and Jill’s methods.

35) The refrigerator cars on trains keep food at the right temperature. In one car are 183 boxes of lettuce. In another car are 315 boxes of lettuce. About how many boxes of lettuce are in the two cars? (2 pts each)

a) Jack said there are about 500 boxes in the two cars.

Jack’s method: \[ 183 \rightarrow 200 \]
\[ + 315 \rightarrow 300 \]
\[ \rightarrow 500 \]
How did Jack estimate the sum? \underline{Rounding to 100s}

b) Jill said there are about 400 boxes in the two cars.

Jill’s method: \[ 183 \rightarrow 100 \]
\[ + 315 \rightarrow 300 \]
\[ \rightarrow 400 \]
How did Jill estimate the sum? \underline{Front End Est.}

36) Draw the Venn Diagram illustrating the Real Number System in the box provided. (4 points)

BONUS (2 points) – From the “People Hunt” we did on the first day of class, name one thing you found in common with a classmate. (It must be recorded on the sheet you used for the activity to get the bonus points.)

Classmate’s Name ____________________________________________

Common Trait/Like ____________________________________________