

Week in Review # 3

MATH 365

2.3 through 2.5 and Chapters 1 and 2 Review

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1. There are n people at a party. If every person shakes hands with every other person exactly once, how many handshakes are there?
2. I am thinking of a whole number. If I divide it by 13, then multiply the answer by 12, then subtract 20, and then add 89, I end up with 93. What was my original number?
3. Given the sequence 4, 12, 36, 108, ...
 - a. What are the next three terms?
 - b. What type of sequence is this?
 - c. What is a_n for all n ?
4. Solve for x in the following whole number division problem: $x \div 6 = 3R2$.
5. Model $2 + 5$ in two different ways to explain to a child this sum (clearly give the sum).
6. Explain the relationships that exist between the four operations: addition, subtraction, multiplication and division.
7. Given $f(x) = \sqrt{8 - x}$ and $g(x) = \frac{1}{x^2}$.
 - a. Find and simplify $(g \circ f)(x)$.
 - b. What is the domain of $g \circ f$?
8. By the definition of subtraction of whole numbers, for any whole numbers a and b such that $a \geq b$, $a - b$ is the unique whole number c such that what?
9. Is the following argument valid or invalid? Why or why not?

All quiggles are guarks.
Some quarks are charms.
Therefore, some quiggles are charms.
10. Model $7 - 4$.
11. Negate "No tree is an animal."
12. Suppose $p \rightarrow q$ is true and $q \rightarrow p$ is false. Can q be false? Why or why not?
13. Explain why you cannot divide a whole number by zero.
14. Use the definition of less than to show $4 < 9$.

15. Fill in the five justifications labeled a, b, c, d and e.

	STATEMENT	JUSTIFICATION
$36 + 25$	$= 3 \cdot 10 + 6 \cdot 1 + 2 \cdot 10 + 5 \cdot 1$	place value
	$= 3 \cdot 10 + 2 \cdot 10 + 6 \cdot 1 + 5 \cdot 1$	a.
	$= (3 + 2) \cdot 10 + (6 + 5) \cdot 1$	b.
	$= 5 \cdot 10 + 11 \cdot 1$	single-digit addition
	$= 5 \cdot 10 + 11$	c.
	$= 5 \cdot 10 + (1 \cdot 10 + 1 \cdot 1)$	place value
	$= (5 \cdot 10 + 1 \cdot 10) + 1 \cdot 1$	d.
	$= (5 + 1)10 + 1 \cdot 1$	e.

16. According to the *Internet Movie Database*, Sean Astin is listed as 67 inches tall, or 5 feet, 7 inches. Explain how the Division Algorithm $a = bq + r$ relates to this information. Include the values of a, b, q , and r .
17. Find the sum of the first 31 terms of an arithmetic sequence in which the 8th term is 25 and $a_{50} = 277$.
18. Is $\frac{x}{x}$ always equal to one? Explain.
19. Use two different models for division of whole numbers to explain to a child $6 \div 2$.
20. If A, B, C, and D each stand for a different single digit from 1 to 9, answer each of the following if

$$\begin{array}{r} A \\ +B \\ \hline CD \end{array}$$

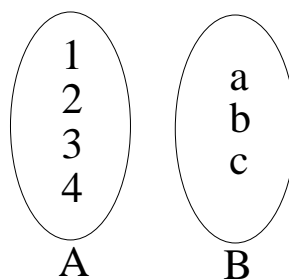
- a. What is the value of C and why?
- b. If $A > B$, what are the possible values of D?
21. Write a function $f(n)$ with domain \mathbb{N} and output 2, 5, 8, 11, 14, ...
22. If two sets G and H have 3 elements each, how many 1-1 correspondences are there between them?
23. Let p be "The sun is shining" and q be "The moon is blue." Write the following in proper English.
- a. $p \wedge q$
- b. $\sim p \vee q$
24. Circle all of the following sets where $n(S) = 0$.
- a. $S = \{0\}$
- b. $S = \{\{\}\}$
- c. $S = \emptyset$
- d. $S = \{\emptyset\}$
- e. $S = \{\}$
- f. $S = \{x | x \text{ is a wholly mammoth born in the 21}^{st} \text{ century}\}$.

25. Given the sequence $-1, 2, 1, 3, 4, \dots$
- What are the next three terms?
 - What type of sequence is this?
 - What is a_n for all n ?
26. True or False
- If $p \vee q$ is true, the p is true.
 - For every set $A, A \subseteq A$.
 - $\{5, z, m\}$ has 3 proper subsets.
 - If $A \cup B = \emptyset$, the A and B are disjoint sets.
 - $\emptyset \in A$ for all sets.
27. Circle all that are true; If for sets R and $S, R = S$ if, and only if,
- R and S have the same number of elements.
 - R and S are different names for the same set.
 - R and S have a one to one correspondence.
 - all elements of set R are also elements in set S .
28. Given non-empty sets A, B and C , such that none of the three is a subset of any of the others. Furthermore $A \cap B \neq \emptyset, A \cap C \neq \emptyset, C \cap B \neq \emptyset$, and $A \cap B \cap C \neq \emptyset$. Use a Venn Diagram to represent, by shading, $A \cup (C \cap B)$.
29. Pick a natural number, multiply it by 4, add 10 to the product, divide the sum by 2, and then subtract 5 from the quotient.
- Make a conjecture about the original number.
 - Prove, using deductive reasoning, the conjecture you made in part a.
30. Illustrate $2 + 4$ on the number line.
31. Let $R = \{a, b\}, S = \{b, 2, \$\}$, and $T = \{a, 8\}$. Find the following.
- $R \cup S =$
 - If $U = R \cup S \cup T$, then $\overline{S \cap T} =$
 - $R \cap S \cap T =$
 - $n(T) =$
 - $T \times R =$
32. Which step of Polya's 4-step Problem Solving Model is expressed in the following statement? "My answer, \$12.50, was too expensive to be the price of the candy bar, so I knew I had made a mistake somewhere."

33. The operation $*$ is defined on the set $\{a, b, c, d, e, f\}$ in the table below. For example $a * b = f$. Complete the table so that $*$ is closed, commutative, and e is the identity element for $*$.

*	a	b	c	d	e	f
a	d	f		e		
b		d	a	c		
c	b		e	f		d
d				a		b
e						
f	c	e				a

34. If $f(x) = 4x$ and $g(x) = x - 3$, find $(g \circ f)(2)$.



35. If possible, use arrows and the sets A and B above to represent a function from A to B. If not possible, write "not possible" and explain why.

36. Model $2 * 4$