

Show all your work!! Full credit is based on work shown!!

Seat: _____

6pts ^{1 pt each blank - (partial credit if made minor arithmetic error)}
 1. Fill in the next three numbers for each sequence:

a. 5, 12, 19, 26, 33, 40, 47, 54, 61
 $\begin{matrix} \rightarrow & \rightarrow & \rightarrow \\ +7 & +7 & +7 \end{matrix}$

b. 7, 14, 28, 56, 112, 224, 448, 896
 $\begin{matrix} \rightarrow & \rightarrow & \rightarrow \\ \times 2 & \times 2 & \times 2 \end{matrix}$

8pts

2. For this sequence from problem 1a: 5, 12, 19, 26, 33, 40, ...

a. Describe this sequence in a sentence:

^{1 pt} Begin with 5, then add 7 to get the next number.
^{2 pts} Continue by adding 7 to any number to get the next #.
[Thus each number is a multiple of 7 added to 5.]

b. What is the 251st number in the sequence? (Show your work.)

^{3 pts} $5 + 250(7) = 1755$ or $7(251) - 2 = 1755$

c. Describe this sequence with a formula using n as the variable; that is, what is the formula that would generate the sequence if $n = 1$, then $n = 2$, etc.?

^{2 pts} $5 + (n-1)7$ or $7n - 2$

10pts

3. a. Pick any number and try the following "number magic".

Pick any two consecutive numbers

Add them

Multiply by 2

Add 10

Divide by 4

Subtract 2

(Show your result)

	^{2 pts} 1st try	^{2 pts} 2nd try
Pick any two consecutive numbers	5, 6	8, 9
Add them	11	17
Multiply by 2	22	34
Add 10	32	44
Divide by 4	8	11
Subtract 2	6	9

^{4 pts} algebraic proof

Pick any two consecutive numbers	$x, (x+1)$
Add them	$2x+1$
Multiply by 2	$4x+2$
Add 10	$4x+12$
Divide by 4	$x+3$
Subtract 2	$(x+1)$

b. What generalization can you make about how the result is related to the original number picked?

^{2 pts} The resulting # is the 2nd of the two numbers picked,
or it is the larger of the 2 consecutive #s that were picked

b. Use algebra (in space above) to prove that your generalization is correct.

6pts

4. In chapter 1, we studied strategies for planning how to solve problems. List six of these strategies.

- see p. 4
- Guess + test
 - Draw a picture (diagram)
 - Make a list
 - Look for a pattern
 - Inductive Reasoning } or indirect reasoning
 - Deductive Reasoning } or direct reasoning
 - Solve a simpler problem (to find a pattern) ^{30pts}

part a $\left\{ \begin{array}{l} 3 \text{ pts their first method with work \& correct answer} \\ 2 \text{ pts for their 2nd method with work} \\ 2 \text{ pts for strategy for each method.} \end{array} \right.$

14pts 7pts each

5. Solve each of the following problems, showing your reasoning and calculations, then list the problem solving strategies that you used.

a. Show two different methods for solving this problem:

Find three consecutive counting numbers whose sum is 171

Method 1:

3pts
 $50 + 51 + 52 = 153$ too small
 $60 + 61 + 62 = 183$ too big,
 $55 + 56 + 57 = 168$ close
 $56 + 57 + 58 = 171$

Method 2:

2pts
 $x + (x+1) + (x+2) = 171$
 $3x + 3 = 171$ or $3x = 168$
 $3(x+1) = 171$
 $x+1 = 57$
 $x = 56$
 $x = 56$
 $x+1 = 57$
 $x+2 = 58$

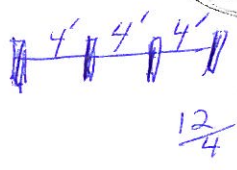
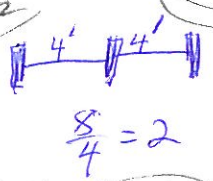
List the strategies you used for each method:

1pt Guess & Test

1pt Use a variable
 Deductive reasoning.

b. If fence posts are placed in a row 4 feet apart, how many posts are needed for 8 feet of fence? 3 12 feet of fence? 4 "n" feet of fence? $1 + \frac{n}{4}$ 2pts

1pt work



Beginning post than all
 (# of feet \div 4)

List the strategies you used:

2pts Draw a diagram (picture)

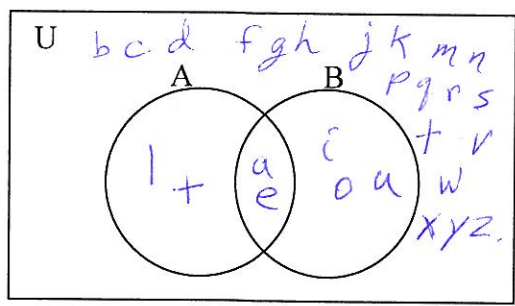
Look for a pattern & use a variable

6. If $A = \{l, a, t, e\}$ and $B = \{a, e, i, o, u\}$ and the universal set, $U = \{x \mid x \in \text{the English alphabet}\}$ then:

2pts a. $A \cap B = \{a, e\}$

2pts b. $B - A = \{i, o, u\}$

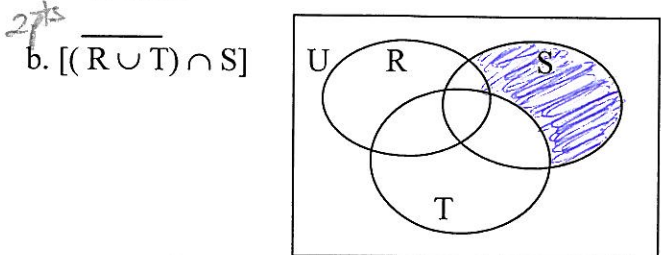
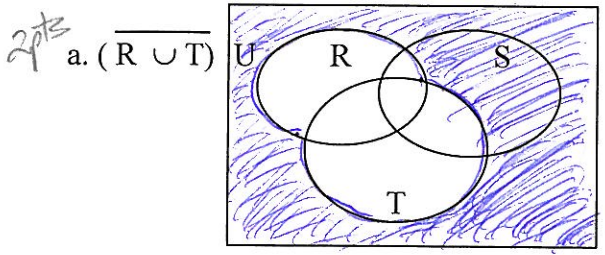
c. List the elements in the appropriate parts of this Venn Diagram for sets A, B and U:



d. The Cartesian Product $(A \times B)$ has how many elements? 20
 $n(A) = 4$ $n(B) = 5$

e. List all the subsets of the set $\{1, 2, 3\}$.
 (4pts)
 $\{1\}$ $\{2\}$ $\{3\}$ $\{1, 2\}$ $\{1, 3\}$ $\{2, 3\}$ $\{1, 2, 3\}$

7. Shade each Venn diagram to represent the set indicated:



-1pt if had $(R \cap T)$

-1pt if partially correct

8pts

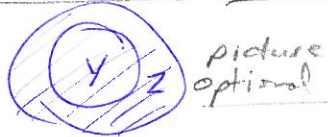
8. True or False: (If false, tell why it is false or correct the statement.)

1pt for correction

a. True The set {u, n, c, w} is equivalent to the set {w, x, y, z}
 same # of elements

b. false $7 \subset \{1, 3, 5, 7\}$
 $7 \in \{1, 3, 5, 7\}$ or $\{7\} \subset \{1, 3, 5, 7\}$

c. true If $Y \subset Z$, then $Z \cup Y = Z$



d. true $\overline{B} \cap B = \{ \}$

6pts

9. Write the usual Hindu-Arabic numeral for each of the following numerals:

a.

b. MDCCXLIV

324

1744

6pts

10. Write 387 in each of the following number systems.

a. Mayan

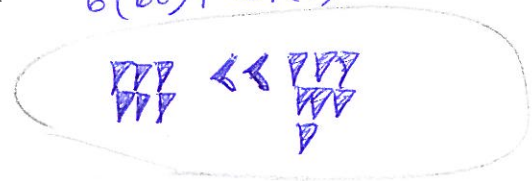
$360 \overline{) 387}$
 $\underline{360}$
 27

b. Babylonian

$6(60) + 27(1)$

\bullet 1 (8=20)
 \bullet 1 (20)
 $\bullet\bullet$ 7(1)

$60 \overline{) 387}$
 $\underline{360}$
 27



6pts

11. a. $206_{\text{eight}} = \underline{134}_{\text{ten}}$

b. $387_{\text{ten}} = \underline{1443}_{\text{six}}$

$2(8^2) + 0(8^1) + 6(8^0)$
or $2(64) + 0(8) + 6(1)$
 $128 + 0 + 6 = 134$

$6^3 = 216$ $\overline{) 387}$ $\underline{216}$ 171
 $36 \overline{) 171}$ $\underline{144}$ 27
 $6 \overline{) 27}$ $\underline{24}$ 3
 $1(6^3) + 4(6^2) + 4(6^1) + 3(1)$

4pts

12. If you are counting in base four, fill in the blanks to show what numerals would follow the ones shown.

1, 2, 3, 10, 11, 12, ..., 32 33, 100, 101, 102, 103, 110, 111, 112.

8pts

13.a. A particular function is the matching of a whole number with three more than its multiple of 4.

This could be expressed with the formula $y = 4n + 3$. If the domain of the function is $n = \{5, 10, 15\}$, what is the range of the function? 23, 43, 63 Express this function in each of the following ways:

b. As a table

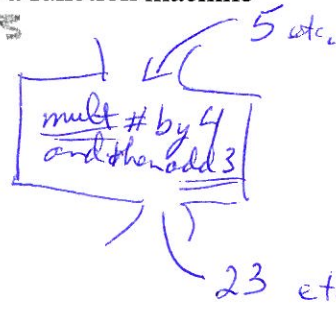
c. As a set of ordered pairs

d. As a function machine

2pts

n	y
5	23
10	43
15	63

2pts
 $\{(5, 23), (10, 43), (15, 63)\}$



38pts