Math 190
Spring 2013
Dr. Lily Yen

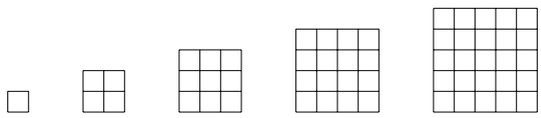
Test 1

Show all your work

Name: _____

Score: ___/50

Problem 1: Consider the pattern of square numbers below:



Count the number of squares in each grid, and write the number of squares below each grid. You have then the first five square numbers.

a. What is the tenth square number?

b. What is the n-th square number?

c. What type of integer is added to go from one square number to the next one?

Score: /3

Problem 2: Explain the connection between the following two problems.

a. Find the number of intersections among 6 lines in general position.

b. Find the number of handshakes among 6 people who all shake hands with one another.

Do you get the same answer for both problems? ☐ How many handshakes will there be among 20 people?

Score: /4

Problem 3: Jean-Paul has some coins in his pocket totalling 55 cents. He knows that he only has nickels and dimes, at least one of each. List all possible scenarios in Jean-Paul's pocket.

Score: /4

Problem 4: Sarah had five times as many stickers as Maddie did, and twice as many as April. April had 25 stickers. How many stickers did they have altogether?

Score: /3

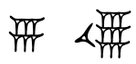
Problem 5: Justine read three novels, with the first having 120 more pages than the second, and the second having 75 fewer pages than the third. Order the novels from the least number of pages to the most.

Score: /4

Problem 6: Convert the following numbers to Hindu Arabic numerals. Show all steps.

a. MCMLXXIV

b. 

c. 

Score: /6

Problem 7: When you count in base 4, what are the next six numbers following 1, 2, 3, 10, 11, 12, 13, 20, 21, 22, 23?

Score: /3

Problem 8: Which is larger? 143_6 or 81_9?

Score: /2

Problem 9: Subtract 223_5 from 2431_5. Indicate clearly the base of your answer.

Score: /3

Problem 10: Let $S = \{1, 3, 5, x, y, z\}$, $A = \{1, 2, 3, 4, 5\}$, and $B = \{2, 3, 4, 5, y\}$.

a. Find $A \cup B =$ [ ].

b. Is $(A \cap B) \subset S$?

Score: /3

Problem 11: Out of 28 students in Math 190, 27 students own laptop computers and 26 own cellphones. No student owns neither. How many own both? Draw a Venn diagram to represent the problem.

Score: /3

Problem 12: For each example from children's ways of reasoning, if it is wrong, explain the mistake and correct it. If it is correct, explain the child's logic.

a.
$$\begin{array}{r} 55 \\ +\ 48 \\ \hline 913 \end{array}$$

b.
$$\begin{array}{r} 36 \\ \times\ \ 8 \\ \hline 2448 \end{array}$$

c. $364 - 79$

$$\begin{array}{r} 364 \\ -\ 79 \\ \hline 300 \\ -\ 10 \\ \hline 290 \\ -\ \ 5 \\ \hline 285 \end{array}$$

d. $280 \div 35$

$$\begin{array}{r} 280 \\ -\ 70 \\ \hline 210 \\ -\ 70 \\ \hline 140 \\ -\ 70 \\ \hline 70 \\ -\ 70 \\ \hline 0 \end{array}$$

So, four 70's is equal to eight 35's. The answer is 8.

Score: /8

Problem 13: Illustrate the distributive property of multiplication over addition using rectangular arrays (areas). First quote the property.

Score: /4