

1. Match the equation with the appropriate picture. Record your answers in the chart below.(24)

Card and Match		Card and Match		Card and Match	
1		9		17	
2		10		18	
3		11		19	
4		12		20	
5		13		21	
6		14		22	
7		15		23	
8		16		24	

(12: 3 points per explanation)

- a) Explain how you know 1 and ____ are a match.

- b) Explain how you know that 2 and ____ are a match.

- c) Explain how you know that 11 and ____ are a match.

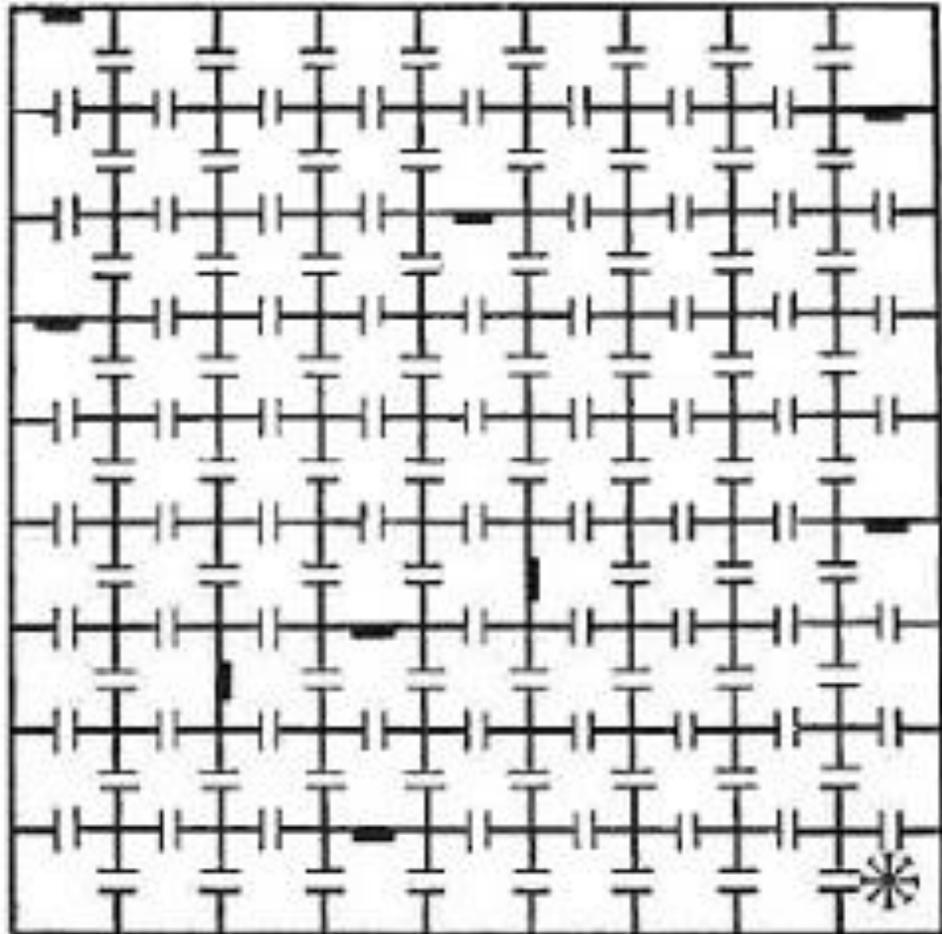
- d) Explain how you know that 9 and ____ are a match.

2. a) Combine plus signs and five 2s to get 28. (3 pts)

b) Combine plus signs and eight 8s to get 1,000. (4 pts)

3. A prisoner was thrown into a medieval dungeon with 145 doors. Nine, shown by black bars, are locked, but each one will open if before you reach it you pass through exactly 8 open doors. You don't have to go through every open door but you do have to go through every cell and all 9 locked doors. If you enter a cell or go through a door a second time, the doors clang shut, trapping you.

The prisoner (in the lower right corner cell *) had a drawing of the dungeon. He thought a long time before he set out. He went through all the locked doors and escaped through the last, upper left corner one. Show his route on the diagram. (9 pts)



Problem

(24 pts)

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

4.

In the chart, color each square according to the clues below. Also write your answer(s) next to the clue.

- Two positive odd numbers that have a sum of 40 and the largest possible product.
- The smallest square number that is the sum of two non-zero square numbers.
- The next five numbers in the arithmetic sequence 8, 19, 30, __, __, __, __, __.
- The maximum possible number of givens in a standard 9 × 9 Sudoku grid that does not render a unique solution.
- Two different odd numbers, one of whose digits are the reverse of the other, whose sum is 154.
- The two prime numbers whose product is 4 less than 5^2 .
- In a normal distribution, the percent of values within one standard deviation of the mean.
- The 43rd positive even number.
- The first four positive multiples of 4.
- The integer lengths of three sides of a right triangle whose area is 600 square units.
- The value of the sum $2^0 + 2^1 + 2^2 + 2^3$.
- The value of the sum $2^0 + 2^1 + 2^2 + 2^3 + 2^4$.

5. Students in Mrs. Walker's classroom had an estimation contest. The student whose estimate is the closest to the number of marbles in a jar wins the contest. Vicki, who estimated 135 marbles, won the contest. Timothy, who estimated 150 marbles, got second place. Lyon, who estimated 152, got third place. And Quinn, who estimated 131, got fourth place. What is the exact number of marbles in the jar? Explain your thinking. (7 pts)

6. If all grape juice concentrates are the same strength, which recipe would you expect to have the strongest grape taste? Defend your answer. (7 pts)

Jerry's Juice: 2 cups concentrate; 3 cups water

Grapeade: 5 cups concentrate; 8 cups water

Good Grape: 3 cups concentrate; 4 cups water

Jane's Juice: 4 cups concentrate; 7 cups water

7. Tom has 9 more baseball cards than Ken and Jill has 3 less than Randy. If Randy has 4 more cards than Ken could the total number of cards be 45? Explain your answer. (7 pts.)

8. Five consecutive whole numbers whose sum is odd satisfy the following condition.

$$A + C + E = B + C + D$$

Show why C cannot be even. (7 pts)

9. Would you rather be paid 7 days at \$20, or

\$2 the first day and have your salary double every day for a week? Explain your answer. (7 pts.)