

Name _____



TEST # **1**

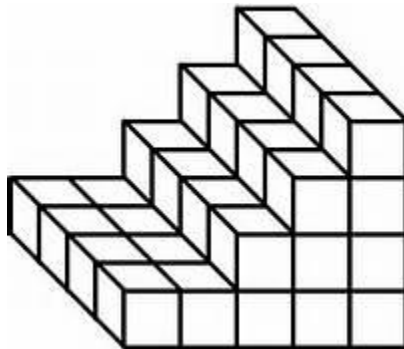
January 2017 Intermediate Level

1) How many numbers between 1-100 are equal to four times an odd number?

2) What is the digit in the 10th position in the decimal representation of $1/17$?

3) Bill and Mark have 39 marbles together. Mark and Calvin have 41 marbles together. Bill and Calvin have 44 marbles together. How many marbles does Calvin have?

4) This shape is made up of small cubes. Jim needed to make seven of these shapes for a model he was building. How many cubes did he need to build all seven of them?



5) When Mitzi counts her beads by fives she has 3 left over. When she counts them by sevens, she has 4 left over. What is the least prime number of beads she can have?

6) If 10 men can cut 30 logs in 8 hours, how many logs will 40 men cut in 4 hours if they are working at the same rate?

January 2017 Intermediate Level Answers

1) How many numbers between 1-100 are equal to four times an odd number?

11

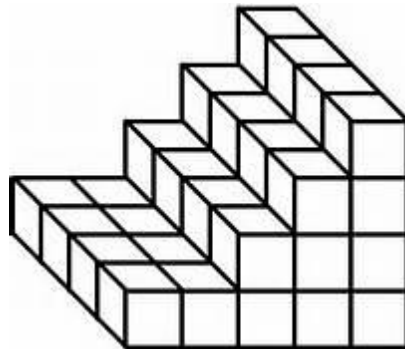
2) What is the digit in the 10th position in the decimal representation of $1/17$?

4

3) Bill and Mark have 39 marbles together. Mark and Calvin have 41 marbles together. Bill and Calvin have 44 marbles together. How many marbles does Calvin have?

23

4) This shape is made up of small cubes. Jim needed to make seven of these shapes for a model he was building. How many cubes did he need to build all seven of them?



308

5) When Mitzi counts her beads by fives she has 3 left over. When she counts them by sevens, she has 4 left over. What is the least prime number of beads she can have?

53

6) If 10 men can cut 30 logs in 8 hours, how many logs will 40 men cut in 4 hours if they are working at the same rate?

60

January 2017 Intermediate Level Solutions

1) The numbers between 1-100 are equal to four times an odd number are: $4 \times (3, 5, 7, 9, 11, 13, 15, 17, 19, 21 \text{ and } 23)$. Do not count 25 because the problem states numbers between 1 and 100 so $4 \times 25 = 100$ and it cannot be counted. There are 11 numbers.

11

2) $1 \div 17 = .0588235294117647$. The digit in the 10th position in the decimal representation of $1/17$ is 4.

4

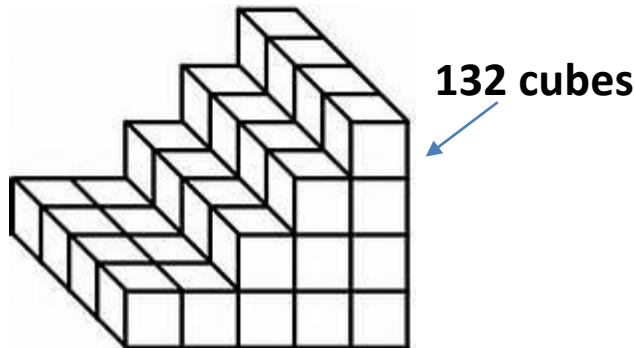
3) Use algebra: Bill (B) and Mark (M) have 39 marbles together, $B + M = 39$. Mark (M) and Calvin (C) have 41 marbles together, $M + C = 41$. Bill and Calvin have 44 marbles together, $B + C = 44$. Solve for Calvin (C).

$$\begin{array}{r}
 B + M = 39 \quad \leftarrow \\
 M + C = 41 \\
 \underline{B + C = 44} \\
 2B + 2M + 2C = 124 \quad \text{Divide both sides by 2} \\
 B + M + C = 62 \\
 \underline{-(B + M = 39)} \quad \text{Now subtract the known (B + M = 39) out to solve for C} \\
 C = 23
 \end{array}$$

23

January 2017 Intermediate Level Solutions

4) Find out how many cubes make up 1 shape. This bottom layer is $5 \times 4 = 20$ cubes. The next layer is $3 \times 4 = 12$ cubes. The next layer is $2 \times 4 = 8$ cubes. And the top layer is 4 cubes. That makes 44 cubes in the shape. Jim needed to make 7 of these so he needed 7×44 or 308 cubes.


308

5) Make a chart to find the number of beads she could have and then which number is the least prime. When Mitzi counts her beads by fives she has 3 left over. When she counts them by sevens, she has 4 left over. She could have 18, but that is not prime. The least prime number of beads she can have is 53.

Counts by 5 with 3 left over	8	13	18	23	28	33	38	43	48	53
Counts by 7 with 4 left over	11	18	25	32	39	46	53			

53

6) This is a rate of work problem. Let t = number of trees that 40 men can cut in 4 hours. We know it takes 10 men 8 hours, or $10 \times 8 = 80$ man-hours to cut 30 trees. So, 40 men working only 4 hours would be $40 \times 4 = 160$ man-hours. Use a ratio to solve: 80 man-hours is to 30 trees as 160 man-hours is to t trees, or:

$$80/30 = 160/t \quad \text{cross multiply}$$

$$80t = 30 \times 160$$

$$80t = 4800$$

$$t = 60 \text{ trees}$$

60