2013 Q1

1. Danica wants to arrange her model cars in rows with exactly 6 cars in each row. She now has 23 model cars. What is the smallest number of additional cars she must buy in order to be able to arrange her cars in this way?

(A) 1   (B) 2   (C) 3   (D) 4   (E) 5

1. **Answer (A):** The smallest multiple of 6 that is at least 23 is 24, so Danica must buy 1 additional car.

2008 Q2

2. The ten-letter code BEST OF LUCK represents the ten digits 0–9, in order. What 4-digit number is represented by the code word CLUE?

(A) 8671   (B) 8672   (C) 9781   (D) 9782   (E) 9872

2. **Answer (A):** Because the key to the code starts with zero, all the letters represent numbers that are one less than their position. Using the key, C is $9 - 1 = 8$, and similarly L is 6, U is 7, and E is 1.

BEST   OF   LUCK
0 1 2 3   4 5   6 7 8 9

CLUE = 8671

2004 Q2

2. How many different four-digit numbers can be formed by rearranging the four digits in 2004?

(A) 4   (B) 6   (C) 16   (D) 24   (E) 81

2. **(B)** To form a four-digit number using 2, 0, 0 and 4, the digit in the thousands place must be 2 or 4. There are three places available for the remaining nonzero digit, whether it is 4 or 2. So the final answer is 6.

OR

Make a list: 2004, 2040, 2400, 4002, 4020 and 4200. So 6 numbers are possible.

1992 Q3

3. What is the largest difference that can be formed by subtracting two numbers chosen from the set $\{-16, -4, 0, 2, 4, 12\}$?

(A) 10   (B) 12   (C) 16   (D) 28   (E) 48

3. **(D)** To obtain the largest difference, subtract the smallest number, -16, from the largest number, 12. Thus $12 - (-16) = 28$.

OR

Graphing the numbers on the number line, the difference is represented by the distance between two points. The largest difference would be represented by the longest distance between numbers, which is the distance between -16 and 12, a distance of 28.

2
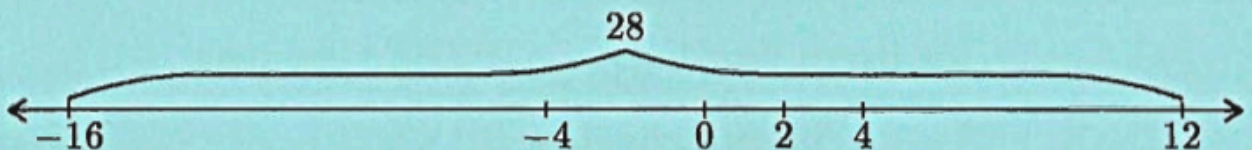
2002 Q4

4. The year 2002 is a palindrome (a number that reads the same from left to right as it does from right to left). What is the product of the digits of the next year after 2002 that is a palindrome?

(**A**) 0   (**B**) 4   (**C**) 9   (**D**) 16   (**E**) 25

4. (**B**) The next palindrome is 2112. The product of its digits is $2 \cdot 1 \cdot 1 \cdot 2 = 4$.

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2001 Q4

4. The digits 1, 2, 3, 4 and 9 are each used once to form the smallest possible **even** five-digit number. The digit in the tens place is

(A) 1   (B) 2   (C) 3   (D) 4   (E) 9

4. (E) To make the number as small as possible, the smaller digits are placed in the higher-value positions. To make the number even, the larger even digit 4 must be the units digit. The smallest possible even number is 12394 and 9 is in the tens place.

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2004 Q4

4. Lance, Sally, Joy and Fred are chosen for the team. In how many ways can the three starters be chosen?

(**A**) 2   (**B**) 4   (**C**) 6   (**D**) 8   (**E**) 10

4. (**B**) When three players start, one is the alternate. Because any of the four players might be the alternate, there are four ways to select a starting team: Lance-Sally-Joy, Lance-Sally-Fred, Lance-Joy-Fred and Sally-Joy-Fred.

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2007 Q4

4. A haunted house has six windows. In how many ways can Georgie the Ghost enter the house by one window and leave by a different window?

(A) 12   (B) 15   (C) 18   (D) 30   (E) 36

4. **(D)** Georgie has 6 choices for the window in which to enter. After entering, Georgie has 5 choices for the window from which to exit. So altogether there are $6 \times 5 = 30$ different ways for Georgie to enter one window and exit another.

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2015 Q4

4. The Centerville Middle School chess team consists of two boys and three girls. A photographer wants to take a picture of the team to appear in the local newspaper. She decides to have them sit in a row with a boy at each end and the three girls in the middle. How many such arrangements are possible?

(A) 2   (B) 4   (C) 5   (D) 6   (E) 12
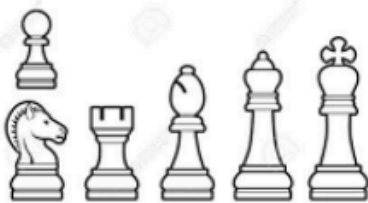
4. **Answer (E):** There are 2 ways to seat the boys, one on each end, and $3 \cdot 2 \cdot 1 = 6$ ways to seat the three girls in the middle. So there are $2 \cdot 6 = 12$ possible arrangements.

2004 Q5

5. The losing team of each game is eliminated from the tournament. If sixteen teams compete, how many games will be played to determine the winner?

(A) 4   (B) 7   (C) 8   (D) 15   (E) 16

5. **(D)** It takes 15 games to eliminate 15 teams.

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