1 / 11

1. How many positive factors of 36 are also multiples of 4?

(A) 2 (B) 3 (C) 4 (D) 5 (E) 6

1996 Q1

1. (B) The positive factors of 36 are 1, 2, 3, 4, 6, 9, 12, 18, and 36. Of these, 4, 12, and 36 are also multiples of 4.

OR

List the multiples of 4 through 36, then mark those which are factors of 36:

$\boxed{4}$, 8, $\boxed{12}$, 16, 20, 24, 28, 32, $\boxed{36}$.

OR

Since $36 = 2^2 3^2$, its positive factors are:

$2^0 3^0$, $2^1 3^0$, $\boxed{2^2 3^0}$,
$2^0 3^1$, $2^1 3^1$, $\boxed{2^2 3^1}$,
$2^0 3^2$, $2^1 3^2$, $\boxed{2^2 3^2}$.

Of these, only three are also multiples of $4 = 2^2$.

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2003 Q2

2. Which of the following numbers has the smallest prime factor?

(A) 55 (B) 57 (C) 58 (D) 59 (E) 61

2. **(C)** The smallest prime is 2, which is a factor of every even number. Because 58 is the only even number, it has the smallest prime factor.

3 / 11

2007 Q3

3. What is the sum of the two smallest prime factors of 250?

(A) 2 **(B)** 5 **(C)** 7 **(D)** 10 **(E)** 12

3. **(C)** The prime factorization of 250 is $2 \cdot 5 \cdot 5 \cdot 5$. The sum of 2 and 5 is 7.

4 / 11

1993 Q3

3. Which of the following numbers has the largest prime factor?

(A) 39 **(B)** 51 **(C)** 77 **(D)** 91 **(E)** 121

3. **(B)** Factoring each number into prime factors yields

$39 = 3 \times 13$, $51 = 3 \times 17$, $77 = 7 \times 11$, $91 = 7 \times 13$ and $121 = 11 \times 11$.

The largest of these prime factors is 17, which is a factor of 51.

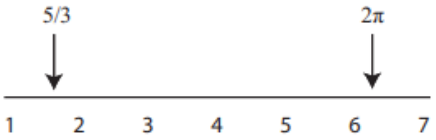
5 / 11

2000 Q3

3. How many whole numbers lie in the interval between $\frac{5}{3}$ and 2π ?

(A) 2 **(B)** 3 **(C)** 4 **(D)** 5 **(E)** infinitely many

3. **Answer (D):** The smallest whole number in the interval is 2 because $\frac{5}{3}$ is more than 1 but less than 2. The largest whole number in the interval is 6 because 2π is more than 6 but less than 7. There are five whole numbers in the interval. They are 2, 3, 4, 5, and 6.



1996 Q3

3. The 64 whole numbers from 1 through 64 are written, one per square, on a checkerboard (an 8 by 8 array of 64 squares). The first 8 numbers are written in order across the first row, the next 8 across the second row, and so on. After all 64 numbers are written, the sum of the numbers in the four corners will be

(A) 130 **(B)** 131 **(C)** 132 **(D)** 133 **(E)** 134

3. **(A)** The first row is $1, 2, 3, \ldots, 7, 8$ and the last row is $57, 58, 59, \ldots, 63, 64$. Thus the four corner numbers are 1, 8, 57, and 64, and their sum is 130.

OR

Listing the array yields:

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**

The sum of the numbers in the corners is 130.

1990 Q4

4. Which of the following could **not** be the unit's digit [one's digit] of the square of a whole number?

A) 1 B) 4 C) 5 D) 6 E) 8

4. E From the way we multiply whole numbers, the unit's digit of the square of a whole number is determined by the square of the unit's digit of that whole number. The possible squares of unit's digits are: $0^2 = \boxed{0}$, $1^2 = \boxed{1}$, $2^2 = \boxed{4}$, $3^2 = \boxed{9}$, $4^2 = 1\boxed{6}$, $5^2 = 2\boxed{5}$, $6^2 = 3\boxed{6}$, $7^2 = 4\boxed{9}$, $8^2 = 6\boxed{4}$, $9^2 = 8\boxed{1}$.
Note that 2,3,7, or 8 will never occur as the unit's digit of a square.

2014 Q4

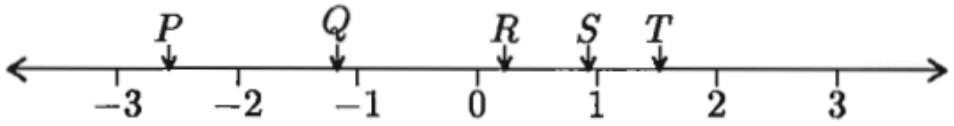
4. The sum of two prime numbers is 85. What is the product of these two prime numbers?

(A) 85 **(B)** 91 **(C)** 115 **(D)** 133 **(E)** 166

4. **Answer (E):** The sum of two odd primes is an even number. Since the sum 85 is odd, one of the primes must be 2, which is the only even prime. The two primes are 2 and 83, so the product is $2 \cdot 83 = 166$.

1996 Q5

5. The letters P, Q, R, S, and T represent numbers located on the number line as shown.



Which of the following expressions represents a negative number?

(A) $P-Q$ **(B)** $P \cdot Q$ **(C)** $\frac{S}{Q} \cdot P$ **(D)** $\frac{R}{P \cdot Q}$ **(E)** $\frac{S+T}{R}$

5. **(A)** Examine the sign of each choice. Since P is to the left of Q, $P-Q$ is negative. All the other answers are positive:
   - Since P and Q are both negative, their product **(B)** is positive.
   - Since S and Q are of opposite signs, their quotient is negative. When this quotient is multiplied by a negative number, P, the result **(C)** is positive.
   - Since R and $P \cdot Q$ are both positive, their quotient **(D)** is positive.
   - Since $S+T$ and R are both positive, their quotient **(E)** is positive.

1997 Q5

5. There are many two-digit multiples of 7, but only two of the multiples have a digit sum of 10. The sum of these two multiples of 7 is

(A) 119 **(B)** 126 **(C)** 140 **(D)** 175 **(E)** 189

5. **(A)** The two-digit multiples of 7 are:
14, 21, (28), 35, 42, 49, 56, 63, 70, 77, 84, (91), and 98.
Only 28 and 91 have digit sums of 10. The sum of 28 and 91 is 119.

11 / 11

5. The number N is a two-digit number.

- When N is divided by 9, the remainder is 1.
- When N is divided by 10, the remainder is 3.

What is the remainder when N is divided by 11?

(A) 0 **(B)** 2 **(C)** 4 **(D)** 5 **(E)** 7

2016 Q5

5. Answer (E):

The two-digit numbers that leave a remainder of 3 when divided by 10 are: 13, 23, 33, 43, 53, 63, 73, 83, 93. The two-digit numbers that leave a remainder of 1 when divided 9 are: 10, 19, 28, 37, 46, 55, 64, 73, 82, 91. Among these two sets, 73 is the only common number. When 73 is divided by 11 the remainder is 7.