ODD EVEN NUMBERS

1)
Which of the following is an even number?

A) 2^0+4^3 B) $13^2+15^2-23^2$ C) $2^5-7^2-4^3$

D) $7^3-4^6+5^5$ E) 6^5+7^5

Solution:
Let's examine the options one by one.

A) 2^0+4^3

$2^0 \rightarrow$ The zeroth power of any number is 1. Therefore, it is odd.

$4^3 \rightarrow$ All positive powers of even numbers are even.

$\Rightarrow 2^0+4^3 \Rightarrow O + E = O$

$\Rightarrow$ The number in option A is odd.

B) $13^2+15^2-23^2 \Rightarrow$ All natural number powers of odd numbers are odd.

$\Rightarrow O+O-O=O$

$\Rightarrow$ The number in option B is odd.

C) $2^5-7^2-4^3 \Rightarrow E-O-E=O$

$\Rightarrow$ The number in option C is odd.

D) $7^3-4^6+5^5 \Rightarrow O-E+O=E$

$\Rightarrow$ The number in option D is even.

E) $6^5+7^5 \Rightarrow E+O=O$

$\Rightarrow$ The number in option E is odd.

Correct Answer: D

2)
Assuming a is an integer and that $7a+4$ is an even number, which of the following is an odd number?

A) $a+4$ B) $5a-2$ C) a^2+a

D) a^5+2 E) a^5+4a-3

Solution:
Since the expression $7a+4$ is even, we can deduce information about the value of a.

$7a+4=E \Rightarrow 7a+E=E \Rightarrow 7a=E \Rightarrow$ a is even.

Let's examine the options one by one.

A) $a+4 \Rightarrow E+E=E$

B) $5a-2 \Rightarrow O.E-E \Rightarrow E-E=E$

C) $a^2+a \Rightarrow E^2+E \Rightarrow E+E=E$

D) $a^5+2 \Rightarrow E^5+E \Rightarrow E+E=E$

E) $a^5+4a-3 \Rightarrow E^5+E.E-O \Rightarrow E+E-O=O$

Correct Answer: E

3)
Considering that a, b, c, m, and n are all positive integers and that

$(a+b)^c=2m+3$ ve $(b.c)^a=2n$

which of the following is definitely true?

A) If a is an even number, then c is an even number.
B) If b is an even number, then c is an odd number.
C) b is an even number.
D) a is an odd number.
E) If a is an odd number, then c is an odd number.

Solution:
The number "$2m+3$" is a single number, and "$2n$" is an even number. Therefore,

$(a+b)^c=O$ and $(b.c)^a=E$

$(a+b)^c=O \Rightarrow a+b=O$ $(O^n=O)$

$\Rightarrow$ One of the numbers a and b must be even, and the other must be odd.

$(b.c)^a=E \Rightarrow b.c=E$ $(E^n=E)$

$\Rightarrow$ At least one of the numbers b and c must be even.

In this case,
If a is even, then b is odd, and c is even.
If a is odd, then b is even, and c can be either odd or even

Only option A specifies a condition that meets these criteria; the other options do not provide definitive condition.

Correct Answer: A

4)

a, b, and c are all integers, and

$$\frac{a}{12} = 11.b.c$$

Which of the following is definitely an even number?

A) $ac + b$ B) $a + 2b$ C) $a^2 + b$ D) $2c - b$ E) $a + b + c$

Solution:

In the equation $\frac{a}{12} = 11.b.c$,
when we move 12 to the other side $\Rightarrow$ $a = 12.11.b.c$
Since 12 is even, a must be an even number.
We don't have a definite piece of information about b and c. Let's examine the options:

A) $ac + b \Rightarrow E.b + b = E + b \Rightarrow$ There is no certainty
B) $a + 2b \Rightarrow E + E.b \Rightarrow E + E = E \Rightarrow$ It is definitely even.
C) $a^2 + b \Rightarrow E^2 + b \Rightarrow E + b \Rightarrow$ There is no certainty
D) $2c - b \Rightarrow E.c - b \Rightarrow E - b \Rightarrow$ There is no certainty
E) $a + b + c \Rightarrow E + b + c \Rightarrow$ There is no certainty

Correct Answer: B

5)

Given that a, b, and c are even numbers, which of the following is always an even number?

A) $\frac{a+b-c}{2}$ B) $\frac{a+b+c}{2}$ C) $\frac{a+b}{2} + c$ D) $\frac{a.b.c}{2}$ E) $a + \frac{b-c}{2}$

Solution:

Since a, b, and c are even numbers, we can express them as follows: $a = 2x$, $b = 2y$, $c = 2z$
Now, let's examine the options:

A) $\frac{a+b-c}{2} \Rightarrow \frac{2x+2y-2z}{2} = \frac{2(x+y-z)}{2} = x + y - z$
$\Rightarrow$ There is no certainty

B) $\frac{a+b+c}{2} \Rightarrow \frac{2x+2y+2z}{2} = \frac{2(x+y+z)}{2} = x + y + z$
$\Rightarrow$ There is no certainty

C) $\frac{a+b}{2} + c \Rightarrow \frac{2x+2y}{2} + 2z = \frac{2(x+y)}{2} + 2z = x + y + E$
$\Rightarrow$ There is no certainty

D) $\frac{a.b.c}{2} \Rightarrow \frac{2x.2y.2z}{2} \Rightarrow 4x.y.z \Rightarrow E$
$\Rightarrow$ It is definitely even.

E) $a + \frac{b-c}{2} \Rightarrow 2x + \frac{2y-2z}{2} \Rightarrow E + \frac{2(y-z)}{2} \Rightarrow E + y - z$
$\Rightarrow$ There is no certainty

Correct Answer: D