Binomial Theorem

Assertion Reason Questions

Direction: In the following questions, a statement of Assertion (A) is followed by a statement of Reason (R).
Choose the correct answer out of thefollowing choices.

(a) Both (A) and (R) are true and (R) is the correct explanation of (A).
(b) Both (A) and (R) are true but (R) is not the correct explanation of (A).
(c) (A) is true but (R) is false.
(d) (A) is false but (R) is true.

1. Assertion (A): The coefficient of $a^4 b^5$ in the expansion of $(a + b)^9$ is ^9C,
Reason (R): The formula of $(a + b)^n$ is
$^nC_o a^n b^o + {}^nC_1 a^{n-1} b^1 . + ...$
$^nC_n d^n$.

Ans. (a) Both (A) and (R) are true and (R) is the correct explanation of (A).
Explanation: We know that,

$$(a + b)^n = {}^nC_0 a^n b^0 + {}^nC_1 a^{n-1} b^1 + ...\ {}^nC_n a^n.$$

Now, a^4b^5 occurs in 5^{th} term of $(a + b)^9$, therefore coefficient of a^4b^5 is $^9C_4$.

2. Assertion (A): Let x be a true integer. If the coefficient of 2^{nd}, 3^{rd} and 4^{th} term of expansion $(1 + x)^3$ are in A.P then the value of x is 7.

Reason (R): The common difference of A.P. are different.

Ans. (c) (A) is true but (R) is false.
Explanation: As $^xC_1$, $^xC_2$ and $^xC_3$ are in A.P
$= 2\,{}^xC_2 = nC_1 + nC_3$

$$x(x-1) = x + \frac{(x)(x-1)(x-2)}{6}$$

$$x - 1 = \frac{1 + (x-1)(x-2)}{6}$$

$$6x - 6 = 6 + x^2 - 3x + 2$$

$$x^2 - 9x + 14 = 0$$

$$(n-2)(n-7) = 0$$

$$n = 2 \text{ or } 7$$

The common difference of an AP is always same.

3. Assertion (A): The sum of the last eight coefficients in the expansion of a$(1 + x)^{16}$ is 2^{15}

Reason (R): If x is an odd integer, then

$({}^2C_0$ - ${}^2C_1$-1${}^2C_2$- ${}^2C_3$ + ...+

$(-1))^{x.2}C_x$ 0.

Ans. (c) (A) is true but (R) is false.

Explanation: We have,

$${}^{16}C_0 + {}^{16}C_1 + \ldots + {}^{16}C_{16} = 2^{16}$$

[putting $x = 1$]

$$\Rightarrow 2({}^{16}C_8 + {}^{16}C_9 + \ldots + {}^{16}C_{16}) = 2^{16}$$

$$\Rightarrow {}^{16}C_8 + {}^{16}C_9 + \ldots + {}^{16}C_{16} = 2^{15}$$

$${}^2C_0 - {}^2C_1 + {}^2C_2 - {}^2C_3 + \ldots (-1)^x \, {}^2C_x = 0$$