**Q1) Find the HCF of 2n + 13 and n + 7, where n is a natural number.**

**1) 1** **2) n + 6** **3) n + 7** **4) Depends on n**

As 'n' is a natural number so, substitute any natural number in place of n.
Put n = 1. HCF of 2n + 13 and n + 7 = HCF of 15 and 8 = 1
When n = 1, then option 2 and 3 are eliminated. So, answer is either option 1 or option 4.
Now, put another value of n. Say n = 2. HCF of 2n + 13 and n + 7 = HCF of 17 and 9 = 1
As the answer does not depend on the value of 'n' so, option 1 is the answer.

**Q2) If $\frac{a}{b} = \frac{1}{3}, \frac{b}{c} = 2, \frac{c}{d} = \frac{1}{2}, \frac{d}{e} = 3, \frac{e}{f} = \frac{1}{4}$, then what is the value of $\frac{abc}{def}$.**

**1) 3/8** **2) 27/8** **3) 1/4** **4) 27/4**

$\frac{a}{b} = \frac{1}{3} = \frac{2}{6}, \frac{b}{c} = 2 = \frac{6}{3}, \frac{c}{d} = \frac{1}{2} = \frac{3}{6}, \frac{d}{e} = 3 = \frac{6}{2}, \frac{e}{f} = \frac{1}{4} = \frac{2}{8}$
So, a = 2, b = 6, c = 3, d = 6, e = 2, f = 8 i.e. $\frac{abc}{def} = \frac{3}{8}$

**Q3) If $a + b + c = 0$ the value of $\frac{a^4+b^4+c^4}{a^2b^2+b^2c^2+c^2a^2}$ is**

**1) 2** **2) 3** **3) 4** **4) 5**

In this question, $a + b + c = 0$.
Put $a = 1, b = 0$ so $c = -1$

$$\frac{a^4 + b^4 + c^4}{a^2b^2 + b^2c^2 + c^2a^2} = \frac{1 + 0 + 1}{1} = 2$$

**Q4) If $x = a^2 - bc, y = b^2 - ca$ and $z = c^2 - ab$, then the value of $\frac{(a+b+c)(x+y+z)}{ax+by+cz}$ is**

**1) 3** **2) 2** **3) 1** **4) 0**

Say a = 1, b = 2, c = 0
Then x = 1, y = 4 and z = -2

$$\frac{(a + b + c)(x + y + z)}{ax + by + cz} = \frac{(1 + 2 + 0)(1 + 4 - 2)}{1 + 8} = \frac{3 \times 3}{9} = 1$$

**Q5) If $a+b+c=3, a^2+b^2+c^2=5$ and $\frac{1}{a}+\frac{1}{b}+\frac{1}{c}=1$ where a, b, c are non-zero, then the value of abc is**

**1) 1** **2) 3/4** **3) 3/2** **4) 2**

In this question, we have 3 conditions. So, whenever we have multiple conditions then we need to follow full method

$$(a+b+c)^2 = a^2+b^2+c^2+\ 2(ab+bc+ca)$$

9 = 5 + 2(ab+bc+ca) i.e. ab+bc+ca = 2

Dividing both sides by abc we get, $\frac{1}{a}+\frac{1}{b}+\frac{1}{c}=\frac{2}{abc}=1$

So, abc = 2

**Q6) If $a+b+c=0$ then one of the roots of the equation $ax^2-bx+c=0$ is**

**1) $-\frac{c}{a}$** **2) $\frac{c}{a}$** **3) $\frac{b-a}{a}$** **4) $\frac{b}{a}$**

In this question, $a+b+c=0$

Put $a=1, b=2$ so, $c=-3$. The equation becomes $x^2-2x-3=0$

On solving, $x=-1,3$

Option 1: $-\frac{c}{a}=3$ (Possible)

As we are using substitution method so we need to check other options also.

Option 2: $\frac{c}{a}=-3$ (Not Possible)

Option 3: $\frac{b-a}{a}=1$ (Not Possible)

Option 4: $\frac{b}{a}=2$ (Not Possible)

**Q7) If $ab+bc+ca=0$ then the value of $\frac{1}{a^2-bc}+\frac{1}{b^2-ca}+\frac{1}{c^2-ab}$ is**

**1) 3** **2) 3abc** **3) abc** **4) 0**

In this question, $ab+bc+ca=0$

Put a = 1 = b then c = $-\frac{1}{2}$

$$\frac{1}{a^2-bc}+\frac{1}{b^2-ca}+\frac{1}{c^2-ab}=0$$

**Q8) If $x = a + \sqrt{a^2 - 1}$ then $x^3 + \frac{1}{x^3}$ is equal to**

**1) $3a^3 - 3a$ 2) $8a^3 - 6a$ 3) $8a^3 + 6a$ 4) $3a^3 + 3a$**

Put a = 1 then x = 1

$$x^3 + \frac{1}{x^3} = 2$$

Put a = 1 in options. Option 2 gives the answer as ‘2’.

**Q9) Find the sum of ‘n’ terms in the series 7+77+777+7777+…… n terms**

**1) $\frac{7}{81}(10^{n+1} - 9n + 10)$ 2) $\frac{7}{81}(10^{n+1} - 9n - 10)$**

**3) $\frac{7}{9}(10^{n+1} - 9n - 10)$ 4) $\frac{7}{9}(10^{n+1} - 9n + 10)$**

Put n = 1 i.e. sum of 1 term of the series. So, required answer is 7.
Put n =1 in options.
Option 1: $\frac{7}{81}(10^{n+1} - 9n + 10) = \frac{707}{81}$
Option 2: $\frac{7}{81}(10^{n+1} - 9n - 10) = 7$
Option 3: $\frac{7}{9}(10^{n+1} - 9n - 10) = 63$
Option 4: $\frac{7}{9}(10^{n+1} - 9n + 10) = \frac{707}{9}$
Hence, option 2 is the answer.

**Q10) Find the value of $4\log x + 4\log x^{2\times2} + 4\log x^{3\times3} \dots\dots + 4\log x^{k\times k}$**

**1) $\frac{(k^2+k)(2k+1)}{6}$ 2) $\frac{k(k+1)}{6}$ 3) $(k-1)\log x$**

**4) $\frac{2}{3}(k^2 + k)(2k + 1)\log x$**

Put k = 1
$4\log x + 4\log x^{2\times2} + 4\log x^{3\times3} \dots\dots + 4\log x^{k\times k} = 4\log x$ {when k =1}
Put k = 1 in options. Option 4, gives the answer as ‘$4\log x$’

**Q11) What is the sum of 'n' terms in the series**

$$\mathbf{Log}\, m + \log\left(\frac{m^2}{n}\right) + \log\left(\frac{m^3}{n^2}\right) + \log\left(\frac{m^4}{n^3}\right) + \cdots \ldots \ldots ?$$

1) $\log\left[\frac{n^{n-1}}{m^{n+1}}\right]^{\frac{n}{2}}$ 2) $\log\left[\frac{m^m}{n^n}\right]^{\frac{n}{2}}$ 3) $\log\left[\frac{m^{1-n}}{n^{1-m}}\right]^{\frac{n}{2}}$ 4) $\log\left[\frac{m^{n+1}}{n^{n-1}}\right]^{\frac{n}{2}}$

Put n = 1 i.e. sum of 1 term of the series. So, required answer is $\log m$. Put n =1 in options. Option 4 gives the result as $\log m$.