Q.No6 We know that

$$G.M = \sqrt{ab} \quad \text{——— (i)}$$

but we have given

$$G.M = \frac{a^n + b^n}{a^{n-1} + b^{n-1}} \quad \text{——— (ii)}$$

Comparing (i) and (ii)

$$\frac{a^n + b^n}{a^{n-1} + b^{n-1}} = \sqrt{ab}$$

$$\Rightarrow a^n + b^n = a^{1/2} b^{1/2} (a^{n-1} + b^{n-1})$$

$$\Rightarrow a^n + b^n = a^{n-1/2} b^{1/2} + a^{1/2} b^{n-1/2}$$

$$\Rightarrow a^n - a^{n-\frac{1}{2}} b^{1/2} = a^{1/2} b^{n-1/2} - b^n$$

$$\Rightarrow a^{n-\frac{1}{2}} (a^{1/2} - b^{1/2}) = b^{n-1/2} (a^{1/2} - b^{1/2})$$

$$\Rightarrow a^{n-1/2} = b^{n-1/2}$$

$$\Rightarrow \frac{a^{n-1/2}}{b^{n-1/2}} = 1$$

$$\Rightarrow \left(\frac{a}{b}\right)^{n-1/2} = \left(\frac{a}{b}\right)^0 \quad \because \left(\frac{a}{b}\right)^0 = 1$$

$$\Rightarrow n - \frac{1}{2} = 0 \Rightarrow \boxed{n = 1/2}$$

Q.No7 Let a and b be two +ive integers then by given condition.

$$A.M = G.M + 2$$

$$\Rightarrow \frac{a+b}{2} = \sqrt{ab} + 2$$

$$\Rightarrow a + b = 2(\sqrt{ab} + 2) \quad \text{——— (i)}$$

Also we have given

$$a + b = 20 \quad \text{——— (ii)}$$

Comparing (i) & (ii)

$$2(\sqrt{ab} + 2) = 20 \Rightarrow 2\sqrt{ab} + 4 = 20$$

$$\Rightarrow 2\sqrt{ab} = 20 - 4$$

$$= 16$$

$$\Rightarrow \sqrt{ab} = \frac{16}{2} = 8$$

$$\Rightarrow ab = 64 \quad \text{by squaring}$$

$$\Rightarrow b = \frac{64}{a} \quad \text{——— (iii)}$$

putting in (ii)

$$a + \frac{64}{a} = 20$$

$$\Rightarrow a^2 + 64 = 20a$$

$$\Rightarrow a^2 - 20a + 64 = 0$$

$$\Rightarrow a^2 - 16a - 4a + 64 = 0$$

$$\Rightarrow a(a-16) - 4(a-16) = 0$$

$$\Rightarrow (a-16)(a-4) = 0$$

$$a - 16 = 0 \quad , \quad a - 4 = 0$$

$$a = 16 \quad , \quad a = 4$$

putting in (iii)

$$b = \frac{64}{16} = 4 \quad , \quad b = \frac{64}{4} = 16$$

hence 16, 4 OR 4, 16 are required numbers.

Q.No.8 Let a, and b be two ~~five~~ required numbers then

$$A.M = 5$$

$$\Rightarrow \frac{a+b}{2} = 5$$

$$\Rightarrow a + b = 10 \quad \text{——— (i)}$$

Also

$$G.M = 4$$

$$\Rightarrow \sqrt{ab} = 4$$

$$\Rightarrow ab = 16 \quad \text{on squaring}$$

$$\Rightarrow b = \frac{16}{a} \quad \text{——— (ii)}$$

putting in (i)

$$a + \frac{16}{a} = 10$$

$$\Rightarrow a^2 + 16 = 10a$$

$$\Rightarrow a^2 - 10a + 16 = 0$$

$$\Rightarrow a^2 - 8a - 2a + 16 = 0$$

$$\Rightarrow a(a-8) - 2(a-8) = 0$$

$$\Rightarrow (a-8)(a-2) = 0$$

$$a - 8 = 0 \quad , \quad a - 2 = 0$$

$$a = 8 \quad , \quad a = 2$$

putting in (ii)

$$b = \frac{16}{8} = 2 \quad , \quad b = \frac{16}{2} = 8$$

hence 8, 2 OR 2, 8 are required numbers.

END