To prove $\sqrt{3}$ is Irrational

Sol^n Suppose that $\sqrt{3}$ is rational

$$\sqrt{3} = \frac{p}{q}$$ where p, q are Co-prime no. $(q \neq 0)$

Squaring both sides

$$3 = \frac{p^2}{q^2}$$

So $q^2 = \frac{p^2}{3}$

So p^2 is divisible by 3

So p will also divisible by 3

Take $p = 3n$

So $q^2 = \frac{(3n)^2}{3}$

$$q^2 = \frac{\cancel{9}^{3} n^2}{\cancel{3}}$$

$$q^2 = 3n^2$$

Or $\frac{q^2}{3} = n^2$ So q^2 is divisible by 3

So q will also divisible by 3

So 3 is Common factor of both p and q

Which is opposite to our statement.

Hence $\sqrt{3}$ is irrational
So our statement is wrong

② To prove $6-\sqrt{3}$ is irrational no.

Sol^n Suppose $6-\sqrt{3}$ rational no

$$6-\sqrt{3} = \frac{p}{q}$$ Where p, q Co-prime no ($q \neq 0$)

$$6-\frac{p}{q} = \sqrt{3}$$

$$\frac{6q-p}{q} = \sqrt{3}$$

Since $\frac{6q-p}{q}$ is rational and $\sqrt{3}$ is irrational no.

Which will never be possible
So our statement is Wrong
Hence $6-\sqrt{3}$ is irrational no.

② To prove $3+2\sqrt{5}$ is irrational no.

Sol. Suppose $3+2\sqrt{5}$ rational no

$$3+2\sqrt{5} = \frac{p}{q}$$ Where p, q Co-prime no $(q \neq 0)$

$$2\sqrt{5} = \frac{p}{q} - 3$$

$$2\sqrt{5} = \frac{p-3q}{q}$$

$$\sqrt{5} = \frac{p-3q}{2q}$$

Since $\frac{p-3q}{2q}$ is rational and $\sqrt{5}$ is irrational no.

Which will never be possible So our statement is wrong Hence $3+2\sqrt{5}$ is irrational no