



(vi) Let  $x = (\sqrt{2} - 2)^2$  be a rational number.

$$x = (\sqrt{2} - 2)^2$$

$$\Rightarrow x = 2 + 4 - 4\sqrt{2}$$

$$\Rightarrow x = 6 - 4\sqrt{2}$$

$$\Rightarrow \frac{x-6}{-4} = \sqrt{2}$$

Since,  $x$  is rational number,

$\Rightarrow x - 6$  is a rational number

$\Rightarrow \frac{x-6}{-4}$  is a rational number

$\Rightarrow \sqrt{2}$  is a rational number

But we know that  $\sqrt{2}$  is an irrational number, which is a contradiction

So  $(\sqrt{2} - 2)^2$  is an irrational number

(vii) Let  $x = (2 - \sqrt{2})(2 + \sqrt{2})$

$$\Rightarrow x = (2)^2 - (\sqrt{2})^2 \quad \{ \text{As } (a+b)(a-b) = a^2 - b^2 \}$$

$$\Rightarrow x = 4 - 2$$

$$\Rightarrow x = 2$$

So  $(2 - \sqrt{2})(2 + \sqrt{2})$  is a rational number

(viii) Let  $x = (\sqrt{2} + \sqrt{3})^2$  be rational number

Using the formula  $(a+b)^2 = a^2 + b^2 + 2ab$

$$\Rightarrow x = (\sqrt{2})^2 + (\sqrt{3})^2 + 2(\sqrt{2})(\sqrt{3})$$

$$\Rightarrow x = 2 + 3 + 2\sqrt{6}$$

$$\Rightarrow x = 5 + 2\sqrt{6}$$

$$\Rightarrow \frac{x-5}{2} = \sqrt{6}$$

$\Rightarrow \frac{x-5}{2}$  is a rational number

$\Rightarrow \sqrt{6}$  is a rational number

But we know that  $\sqrt{6}$  is an irrational number

So, we arrive at a contradiction

So  $(\sqrt{2} + \sqrt{3})^2$  is an irrational number.

(ix) Let  $x = \sqrt{5} - 2$  be the rational number

Squaring on both sides, we get

$$x = \sqrt{5} - 2$$

$$x^2 = (\sqrt{5} - 2)^2$$

$$x^2 = 25 + 4 - 4\sqrt{5}$$

$$x^2 - 29 = -4\sqrt{5}$$

$$\frac{x^2 - 29}{-4} = \sqrt{5}$$

Now,  $x$  is rational

$x^2$  is rational.

So,  $x^2 - 29$  is rational

$$\frac{x^2 - 29}{-4} = \sqrt{5} \text{ is rational.}$$

But,  $\sqrt{5}$  is irrational. So we arrive at contradiction

Hence  $x = \sqrt{5} - 2$  is an irrational number

(x) Let

$$x = \sqrt{23}$$

$$x = 4.79583...$$

It is non-terminating or non-repeating

Hence  $\sqrt{23}$  is an irrational number

(xi) Let  $x = \sqrt{225}$

$$\Rightarrow x = 15$$

Hence  $\sqrt{225}$  is a rational number

(xii) Given 0.3796.

It is terminating

Hence it is a rational number

(xiii) Given number  $x = 7.478478...$

$$\Rightarrow x = 7.\overline{478}$$

It is repeating

Hence it is a rational number

(xiv) Given number is  $x = 1.1010010001...$

It is non-terminating or non-repeating

Hence it is an irrational number

\*\*\*\*\* END \*\*\*\*\*

