NCERT solutions for class 9 Maths Number System Ex-1.5

Q1. Classify the following numbers as rational or irrational:

(i) $2-\sqrt{5}$

(ii) $\left(3+\sqrt{23}\right)-\sqrt{23}$

(iii) $\frac{2\sqrt{7}}{7\sqrt{7}}$

(iv) $\frac{1}{\sqrt{2}}$

(v) 2π

Ans: (i) $2-\sqrt{5}$

We know that

$\sqrt{5}=2.236....$, which is an irrational number.

$2-\sqrt{5}=2-2.236....$

$=-0.236....,$

which is also an irrational number.

Therefore, we conclude that $2-\sqrt{5}$ is an irrational number.

(ii) $\left(3+\sqrt{23}\right)-\sqrt{23}$

$\left(3+\sqrt{23}\right)-\sqrt{23}=3+\sqrt{23}-\sqrt{23}$

$=3$

Therefore, we conclude that $\left(3+\sqrt{23}\right)-\sqrt{23}$ is a rational number.

(iii) $\frac{2\sqrt{7}}{7\sqrt{7}}$

We can cancel $\sqrt{7}$ in the numerator and denominator, as $\sqrt{7}$ is the common number in numerator as well as denominator, to get

$$\frac{2\sqrt{7}}{7\sqrt{7}}=\frac{2}{7}$$

Therefore, we conclude that $\frac{2\sqrt{7}}{7\sqrt{7}}$ is a rational number.

(iv) $\frac{1}{\sqrt{2}}$

We know that

$\sqrt{2}=1.414....$, which is an irrational number .

We can conclude that, when 1 is divided by $\sqrt{2}$, we will get an irrational number.

Therefore, we conclude that $\frac{1}{\sqrt{2}}$ is an irrational number.

(v) 2π

We know that
$\pi = 3.1415....$, which is an irrational number.

We can conclude that 2π will also be an irrational number.

Therefore, we conclude that 2π is an irrational number.

Q2. Simplify each of the following expressions:

(i) $\left(3+\sqrt{3}\right)\left(2+\sqrt{2}\right)$

(ii) $\left(3+\sqrt{3}\right)\left(3-\sqrt{3}\right)$

(iii) $\left(\sqrt{5}+\sqrt{2}\right)^2$

(iv) $\left(5-\sqrt{2}\right)\left(5+\sqrt{2}\right)$

Ans: (i) $\left(3+\sqrt{3}\right)\left(2+\sqrt{2}\right)$

We need to apply distributive law to find value of $(3+\sqrt{3})(2+\sqrt{2})$.

$$(3+\sqrt{3})(2+\sqrt{2}) = 3(2+\sqrt{2}) + \sqrt{3}(2+\sqrt{2})$$

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

Therefore, on simplifying $(3+\sqrt{3})(2+\sqrt{2})$, we get $6 + 3\sqrt{2} + 2\sqrt{3} + \sqrt{6}$.

(ii) $(3+\sqrt{3})(3-\sqrt{3})$

We need to apply distributive law to find value of $(3+\sqrt{3})(3-\sqrt{3})$.

$$(3+\sqrt{3})(3-\sqrt{3}) = 3(3-\sqrt{3}) + \sqrt{3}(3-\sqrt{3})$$

$$= 9 - 3\sqrt{3} + 3\sqrt{3} - 3$$

Therefore, on simplifying $(3+\sqrt{3})(3-\sqrt{3})$, we get 6.

(iii) $(\sqrt{5}+\sqrt{2})^2$

We need to apply the formula

$(a+b)^2 = a^2 + 2ab + b^2$ to find value of $\left(\sqrt{5}+\sqrt{2}\right)^2$

$\left(\sqrt{5}+\sqrt{2}\right)^2 = \left(\sqrt{5}\right)^2 + 2\times\sqrt{5}\times\sqrt{2} + \left(\sqrt{2}\right)^2$

$= 5 + 2\sqrt{10} + 2$

$= 7 + 2\sqrt{10}.$

$= 6$

Therefore, on simplifying $\left(\sqrt{5}+\sqrt{2}\right)^2$, we get

$7 + 2\sqrt{10}$.

(iv) $\left(\sqrt{5}-\sqrt{2}\right)\left(\sqrt{5}+\sqrt{2}\right)$

We need to apply the formula

$(a-b)(a+b) = a^2 - b^2$ to find value of $\left(\sqrt{5}+\sqrt{2}\right)^2$.

$\left(\sqrt{5}-\sqrt{2}\right)\left(\sqrt{5}+\sqrt{2}\right) = \left(\sqrt{5}\right)^2 - \left(\sqrt{2}\right)^2$

$= 5 - 2$

$= 3$

Therefore, on simplifying $\left(\sqrt{5}-\sqrt{2}\right)\left(\sqrt{5}+\sqrt{2}\right)$, we get 3.

Q3. Recall, π is defined as the ratio of the circumference (say c) of a circle to its diameter

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