Exercise 4.3

(ii) $\frac{1}{x+4}-\frac{1}{x-7}=\frac{11}{30}$ *where* $x\neq -4,7$

$\Rightarrow \frac{(x-7)-(x+4)}{(x-4)(x-7)}=\frac{11}{30}$

$\Rightarrow \frac{-11}{(x-4)(x-7)}=\frac{11}{30}$

$\Rightarrow -30 = x^2-7x+4x-28$

$\Rightarrow x^2-3x+2=0$

Comparing equation $x^2-3x+2=0$ with general form $ax^2+bx+c=0$,

We get $a=1$, $b=-3$ and $c=2$

Using quadratic formula $x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$ to solve equation,

$x=\frac{3\pm\sqrt{(3)^2-4(1)(2)}}{2\times 1}$

$\Rightarrow x=\frac{3\pm\sqrt{1}}{2}$

$\Rightarrow x=\frac{3+\sqrt{1}}{2},\frac{3-\sqrt{1}}{2}$

$\Rightarrow x=2,1$

Q4. The sum of reciprocals of Rehman's ages (in years) 3 years ago and 5 years from now is 13. Find his present age.

Ans. Let present age of Rehman = x years

Age of Rehman 3 years ago = $(x-3)$ years.

Age of Rehman after 5 years = $(x+5)$ years

According to the given condition:

$$\frac{1}{x-3}+\frac{1}{x+5}=\frac{1}{3}$$

$$\Rightarrow \frac{(x+5)+(x-3)}{(x-3)(x+5)}=\frac{1}{3}$$

$$\Rightarrow 3\,(2x+2)=(x-3)\,(x+5)$$

$$\Rightarrow 6x+6=x^2-3x+5x-15$$

$$\Rightarrow x^2-4x-15-6=0$$

$$\Rightarrow x^2-4x-21=0$$

Comparing quadratic equation $x^2-4x-21=0$ 0 with general form $ax^2+bx+c=0$,

We get $a=1$, $b=-4$ and $c=-21$

Using quadratic formula $x=\dfrac{-b\pm\sqrt{b^2-4ac}}{2a}$

$$x=\frac{4\pm\sqrt{(4)^2-4(1)(-21)}}{2\times1}$$

$$\Rightarrow x=\frac{4\pm\sqrt{16+84}}{2}$$

$$\Rightarrow x=\frac{4\pm\sqrt{100}}{2}=\frac{4\pm10}{2}$$

$$\Rightarrow x=\frac{4+10}{2},\frac{4-10}{2}$$

$$\Rightarrow x=7,-3$$

We discard $x=-3$. Since age cannot be in negative.

Therefore, present age of Rehman is 7 years.

Q5. In a class test, the sum of Shefali's marks in Mathematics and English is 30. Had she got 2 marks more in Mathematics and 3 marks less in English, the product of their marks would have been 210. Find her marks in the two subjects.

Ans. Let Shefali's marks in Mathematics $= x$

Let Shefali's marks in English $= 30 - x$

If, she had got 2 marks more in Mathematics, her marks would be $= x + 2$

If, she had got 3 marks less in English, her marks in English would be $= 30 - x - 3 = 27 - x$

According to given condition:

$(x + 2)(27 - x) = 210$

$\Rightarrow 27x - x^2 + 54 - 2x = 210$

$\Rightarrow x^2 - 25x + 156 = 0$

Comparing quadratic equation $x^2 - 25x + 156 = 0$ with general form $ax^2 + bx + c = 0$,

We get $a = 1$, $b = -25$ and $c = 156$

Applying Quadratic Formula $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$$x = \frac{25 \pm \sqrt{(25)^2 - 4(1)(156)}}{2 \times 1}$$

$$\Rightarrow x = \frac{25 \pm \sqrt{625 - 624}}{2}$$

$$\Rightarrow x = \frac{25 \pm \sqrt{1}}{2}$$

$$\Rightarrow x = \frac{25 + 1}{2}, \frac{25 - 1}{2}$$

$\Rightarrow x = 13, 12$

Therefore, Shefali's marks in Mathematics = 13 or 12

Shefali's marks in English $= 30 - x = 30 - 13 = 17$

Or Shefali's marks in English $= 30 - x = 30 - 12 = 18$

Therefore, her marks in Mathematics and English are (13, 17) or (12, 18).

********** END **********