RD Sharma Solutions Class 11 Maths Chapter 15 Ex 15.4

Linear Inequations Ex 15.4 Q1

Let x be the smaller of the two consecutive odd positive intgers. Then the other odd integer is $x+2$.
It is given that both the integers are smaller than 10 and their sum is more than 11.

$\therefore \quad x+2<10$ and, $x+(x+2)>11$

$\Rightarrow \quad x<10-2$ and $2x+2>11$

$\Rightarrow \quad x<8$ and $2x>9$

$\Rightarrow \quad x<8$ and $x>\frac{9}{2}$

$\Rightarrow \quad \frac{9}{2}<x<8$

$\Rightarrow \quad x=5,7 \qquad [\because x \text{ is an odd integer}]$

Hence, the required pairs of odd integers are $(5,7)$ and $(7,9)$.

Linear Inequations Ex 15.4 Q2

Let x be the smaller of the two consecutive odd natural numbers. Then the other odd integer is $x+2$.

It is given that both the natural number are greater than 10 and their sum is less than 40.

$\therefore \quad x>10$ and, $x+x+2<40$

$\Rightarrow \quad x>10$ and $2x<38$

$\Rightarrow \quad x>10$ and $x<19$

$\Rightarrow \quad 10<x<19$

$\Rightarrow \quad x=11,13,15,17 \qquad [\because x \text{ is an odd number}]$

Hence, the required pairs of odd natural numbers are $(11,13),(13,15),(15,17)$ and $(17,19)$.

Linear Inequations Ex 15.4 Q3

Let x be the smaller of the two consecutive even positive integers.
Then the other even integer is $x+2$.
It is given that both the even integers are greater than 5 and their sum is less than 23.

$\therefore \quad x > 5$ and, $x + x + 2 < 23$

$\Rightarrow \quad x > 5$ and $2x < 21$

$\Rightarrow \quad x > 5$ and $x < \frac{21}{2}$

$\Rightarrow \quad 5 < x < \frac{21}{2} = 10.5$

$\Rightarrow \quad x = 6, 8, 10 \qquad [\because x$ is an even integer$]$

Hence, the required pairs of even positive integer are $(6,8), (8,10)$ and $(10,12)$.

Linear Inequations Ex 15.4 Q4

Suppose Rohit scores x marks in the third test then,

$$65 \le \frac{65 + 70 + x}{3}$$

$\Rightarrow \quad 195 \le 135 + x$

$\Rightarrow \quad 195 - 135 \le x$

$\Rightarrow \quad 60 \le x$

Hence, the minimum marks Rohit should score in the third test is 60.

Linear Inequations Ex 15.4 Q5

We have,

$F_1 = 86°F$

$\therefore \quad F_1 = \frac{9}{5}C_1 + 32 \qquad \left[\because F = \frac{9}{5}C + 32\right]$

$\Rightarrow \quad 86 = \frac{9}{5}C_1 + 32$

$\Rightarrow \quad 86 - 32 = \frac{9}{5}C_1$

$\Rightarrow \quad 54 = \frac{9}{5}C_1$

$\Rightarrow \quad 9C_1 = 5 \times 54$

$\Rightarrow \quad C_1 = \frac{5 \times 54}{9}$

$\Rightarrow \quad C_1 = 5 \times 6 = 30°C$

Now, $F_2 = 95°F$

$\therefore \quad F_2 = \frac{9}{5}C_2 + 32$

$\Rightarrow \quad 95 = \frac{9}{5}C_2 + 32$

$\Rightarrow \quad 95 - 32 = \frac{9}{5}C_2$

$\Rightarrow \quad 63 = \frac{9}{5}C_2$

$\Rightarrow \quad 9C_2 = 63 \times 5$

$\Rightarrow \quad C_2 = \frac{63 \times 5}{9}$

$\Rightarrow \quad C_2 = 7 \times 5 = 35°C$

$\therefore$ The range of temperature of the solution is from $30°C$ to $35°C$.

Linear Inequations Ex 15.4 Q6

We have,

$C_1 = 30°C$

$\therefore \quad F_1 = \frac{9}{5}C_1 + 32 \qquad \left[\because F = \frac{9}{5}C + 32\right]$

$\Rightarrow \quad F_1 = \frac{9}{5} \times 30 + 32$

$\Rightarrow \quad F_1 = 9 \times 6 + 32$

$\Rightarrow \quad F_1 = 54 + 32$

$\Rightarrow \quad F_1 = 86°F$

Now, $C_2 = 35°C$

$\therefore \quad F_2 = \frac{9}{5}C_2 + 32$

$\Rightarrow \quad F_2 = \frac{9}{5} \times 35 + 32$

$\Rightarrow \quad F_2 = 9 \times 7 + 32$

$\Rightarrow \quad F_2 = 63 + 32$

$\Rightarrow \quad F_2 = 95°F$

$\therefore$ Hence, the temperature of the solution lies between $86°F$ to $95°F$.

Linear Inequations Ex 15.4 Q7

Suppose Shikha scores x marks in the fifth paper. Then,

$$90 \le \frac{87 + 95 + 92 + 94 + x}{5}$$

$\Rightarrow \quad 90 \times 5 \le 182 + 186 + x$

$\Rightarrow \quad 450 \le 368 + x$

$\Rightarrow \quad 450 - 368 \le x$

$\Rightarrow \quad 82 \le x$

Hence, the minimum marks is required in the last paper is 82.

Linear Inequations Ex 15.4 Q8

We have,

Profit = Revenue – Cost

Therefore, to earn some profit, we must have

Revenue > Cost

$\Rightarrow \quad 2x > 300 + \frac{3}{2}x$

$\Rightarrow \quad 2x - \frac{3}{2}x > 300$

$\Rightarrow \quad \frac{4x - 3x}{2} > 300$

$\Rightarrow \quad x > 300 \times 2$

$\Rightarrow \quad x > 600$

Hence, the manufacturer must sell more than 600 cassettes to realize some profit.

Linear Inequations Ex 15.4 Q9

Let the length of the shortest side be x.
Then, the length of te longest side and third side of the triangle are $3x$ and $3x-2$ respectively.

According to question,
perimeter of triangle ≥ 61

$\Rightarrow \quad x+3x-2+3x \geq 61$
$\Rightarrow \quad 7x \geq 61+2$
$\Rightarrow \quad 7x \geq 63$
$\Rightarrow \quad x \geq \frac{63}{7}$
$\Rightarrow \quad x \geq 9$

$\therefore$ The minimum length of the shortest side is 9cm.

Linear Inequations Ex 15.4 Q10

Let the quantity of water to be added to solution $= x$ liters.

$\therefore \quad 25\%(1125+x) < 45\%\text{ of } 1125$

$\Rightarrow \quad \frac{25}{100}(1125+x) < \frac{45}{100} \times 1125$

$\Rightarrow \quad 1125+x < \frac{45}{25} \times 1125$

$\Rightarrow \quad 1125+x < 45 \times 45$
$\Rightarrow \quad 1125+x < 2025$
$\Rightarrow \quad x < 2025-1125$
$\Rightarrow \quad x < 900$

and 45% of $1125 < 30\%(1125+x)$
$\Rightarrow \quad \frac{45}{100} \times 1125 < \frac{30}{100}(1125+x)$

$\Rightarrow \quad \frac{45}{30} \times 1125 < 1125+x$

$\Rightarrow \quad \frac{3}{2} \times 1125 < 1125+x$
$\Rightarrow \quad 1.5 \times 1125 < 1125+x$
$\Rightarrow \quad 1687.5 < 1125+x$
$\Rightarrow \quad 1687.5-1125 < x$
$\Rightarrow \quad 562.5 < x \quad \ldots\ldots\ldots\ldots\ldots\ldots (ii)$

Using (i) and (ii), we get $562.5 < x < 900$

Hence, quantity of water lies between 562.5 litres and 900 litres.

Linear Inequations Ex 15.4 Q11

Let x liters of 2% solution will have to be added to 640 liters of the 8% solution of acid.

Total quantity of mixture = $(640+x)$

Total acid in the $(640+x)$ liters of mixture

$$\frac{2}{100}x+\frac{8}{100}640$$

It is given that acid content in the resulting mixture must be more than 4% but less than 6%.

$$\frac{4}{100}[640+x]<\left(\frac{2}{100}x+\frac{8}{100}640\right)<\frac{6}{100}[640+x]$$

$$\Rightarrow 4[640+x]<(2x+8640)<6[640+x]$$

$$\Rightarrow 2560+4x<2x+8640 \text{ and } 2x+8640<3840+6x$$

$$\Rightarrow 2560-8640<2x-4x \text{ and } 2x-6x<3840-8640$$

$$\Rightarrow x<1280 \text{ and } x>320$$

More than 320 litres but less than 1280 liters of 2% is to be added.

Linear Inequations Ex 15.4 Q12

Let the pH value of third reading be x.

$$\therefore \quad 7.2<\frac{7.48+7.85+x}{3}<7.8$$

$$\Rightarrow \quad 21.6<7.48+7.85+x<23.4$$

$$\Rightarrow \quad 21.6<15.33+x<23.4$$

$$\Rightarrow \quad 21.6-15.33<x<23.4-15.33$$

$$\Rightarrow \quad 6.27<x<8.07$$

$\therefore$ The range of pH value for the third reading is lies between 6.27 and 8.07.