

**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 integers. 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.

$$\begin{aligned} \therefore & x + 2 < 10 \text{ and, } x + (x + 2) > 11 \\ \Rightarrow & x < 10 - 2 \text{ and } 2x + 2 > 11 \\ \Rightarrow & x < 8 \text{ and } 2x > 9 \\ \Rightarrow & x < 8 \text{ and } x > \frac{9}{2} \\ \Rightarrow & \frac{9}{2} < x < 8 \\ \Rightarrow & x = 5, 7 \qquad [\because x \text{ is an odd integer}] \end{aligned}$$

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.

$$\begin{aligned} \therefore & x > 10 \text{ and, } x + x + 2 < 40 \\ \Rightarrow & x > 10 \text{ and } 2x < 38 \\ \Rightarrow & x > 10 \text{ and } x < 19 \\ \Rightarrow & 10 < x < 19 \\ \Rightarrow & x = 11, 13, 15, 17 \qquad [\because x \text{ is an odd number}] \end{aligned}$$

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.

$$\therefore x > 5 \text{ and, } x + x + 2 < 23$$

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

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

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

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

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,

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

$$\Rightarrow 195 \leq 135 + x$$

$$\Rightarrow 195 - 135 \leq x$$

$$\Rightarrow 60 \leq x$$

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

#### **Linear Inequations Ex 15.4 Q5**

We have,

$$F_1 = 86^\circ F$$

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

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

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

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

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

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

$$\Rightarrow C_1 = 5 \times 6 = 30^\circ C$$

Now,  $F_2 = 95^\circ F$

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

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

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

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

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

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

$$\Rightarrow C_2 = 7 \times 5 = 35^\circ C$$

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

We have,

$$C_1 = 30^\circ C$$

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

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

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

$$\Rightarrow F_1 = 54 + 32$$

$$\Rightarrow F_1 = 86^\circ F$$

Now,  $C_2 = 35^\circ C$

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

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

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

$$\Rightarrow F_2 = 63 + 32$$

$$\Rightarrow F_2 = 95^\circ F$$

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

#### Linear Inequations Ex 15.4 Q7

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

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

$$\Rightarrow 90 \times 5 \leq 182 + 186 + x$$

$$\Rightarrow 450 \leq 368 + x$$

$$\Rightarrow 450 - 368 \leq x$$

$$\Rightarrow 82 \leq x$$

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

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

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

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

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

$$\Rightarrow x > 600$$

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 the longest side and third side of the triangle are  $3x$  and  $3x - 2$  respectively.

According to question,

perimeter of triangle  $\geq 61$

$$\Rightarrow x + 3x - 2 + 3x \geq 61$$

$$\Rightarrow 7x \geq 61 + 2$$

$$\Rightarrow 7x \geq 63$$

$$\Rightarrow x \geq \frac{63}{7}$$

$$\Rightarrow x \geq 9$$

$\therefore$  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.

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

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

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

$$\Rightarrow 1125 + x < 45 \times 45$$

$$\Rightarrow 1125 + x < 2025$$

$$\Rightarrow x < 2025 - 1125$$

$$\Rightarrow x < 900$$

and  $45\% \text{ of } 1125 < 30\%(1125 + x)$

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

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

$$\Rightarrow \frac{3}{2} \times 1125 < 1125 + x$$

$$\Rightarrow 1.5 \times 1125 < 1125 + x$$

$$\Rightarrow 1687.5 < 1125 + x$$

$$\Rightarrow 1687.5 - 1125 < x$$

$$\Rightarrow 562.5 < x \dots\dots\dots (ii)$$

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  $x$ .

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

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

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

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

$$\Rightarrow 6.27 < x < 8.07$$

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