


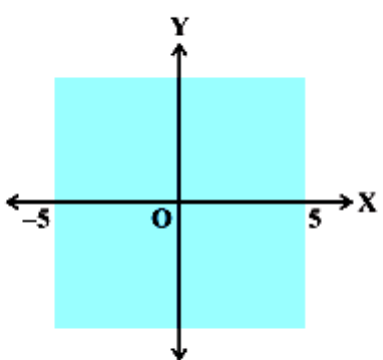





CHAPTER-6  
LINEAR INEQUALITIES  
02 MARK TYPE QUESTIONS

Q. NO	QUESTION	MARK								
1.	Find all pairs of consecutive even positive integers, both of which are larger than 5 such that their sum is less than 23.	2								
2.	Hari obtained 70 and 75 marks in first two unit tests. Find the number if minimum marks he should get in the third unit test to have an average of at least 60 marks.	2								
3.	The length of a rectangle is three times the breadth. If the minimum perimeter of the rectangle is 320 cm, then what is the minimum breadth?	2								
4.	To receive grade 'A' in a course, one must obtain an average of 90 marks or more in five examinations (each of 100 marks).  If Sunita's marks in first four examinations are 87, 92, 94 and 95, find the minimum mark in the fifth examination to get grade 'A' in the course.	2								
5.	A company manufactures Compact Disc. Its cost and revenue functions are $C(x) = 52000 + 30x$ and $R(x) = 43x$ , respectively, where $x$ is the number of Compact Disc produced and sold in a week.   How many Compact Disc must be sold by the company to realize some profit?	2								
6.	A store sells frozen foods, ice creams, cool drinks, milk and dairy products. The labels on these items show ideal temperature as follows. <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="padding: 5px;">Frozen foods</td> <td style="padding: 5px;"><math>4^{\circ}</math> to <math>20^{\circ}</math></td> </tr> <tr> <td style="padding: 5px;">Ice creams</td> <td style="padding: 5px;"><math>10^{\circ}</math> to <math>30^{\circ}</math></td> </tr> <tr> <td style="padding: 5px;">Cool drinks</td> <td style="padding: 5px;"><math>20^{\circ}</math> to <math>25^{\circ}</math></td> </tr> <tr> <td style="padding: 5px;">Dairy items</td> <td style="padding: 5px;"><math>20^{\circ}</math> to <math>30^{\circ}</math></td> </tr> </tbody> </table> <p>At what temperature should the store be maintained so that all items get required temperature.</p>	Frozen foods	$4^{\circ}$ to $20^{\circ}$	Ice creams	$10^{\circ}$ to $30^{\circ}$	Cool drinks	$20^{\circ}$ to $25^{\circ}$	Dairy items	$20^{\circ}$ to $30^{\circ}$	2
Frozen foods	$4^{\circ}$ to $20^{\circ}$									
Ice creams	$10^{\circ}$ to $30^{\circ}$									
Cool drinks	$20^{\circ}$ to $25^{\circ}$									
Dairy items	$20^{\circ}$ to $30^{\circ}$									
7.	A country has constructed an elevated expressway road which can cater to the vehicles speeds up to 200 Kmph. But the city has decided to optimize the fuel usage of vehicles plying so that the valuable foreign exchange spent on buying oil from foreign countries can be saved. What should be the common speed limit for vehicles containing up to 4 wheels. <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="padding: 5px;">Vehicle type</td> <td style="padding: 5px;">Speed ranges for max mileage</td> </tr> <tr> <td style="padding: 5px;">Motor cycles upto 110 cc</td> <td style="padding: 5px;">40 kmph to 60 kmph</td> </tr> <tr> <td style="padding: 5px;">Motor cycles upto 160 cc</td> <td style="padding: 5px;">50 to 65 kmph</td> </tr> <tr> <td style="padding: 5px;">Cars Low ground clearance</td> <td style="padding: 5px;">60 to 80 kmph</td> </tr> </tbody> </table>	Vehicle type	Speed ranges for max mileage	Motor cycles upto 110 cc	40 kmph to 60 kmph	Motor cycles upto 160 cc	50 to 65 kmph	Cars Low ground clearance	60 to 80 kmph	2
Vehicle type	Speed ranges for max mileage									
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	SUVs	55 to 85 kmph	
8.	<p>In the Ordered pairs given below the first value represents salary income and second value represents income from other sources of various individuals. As per a government scheme a person can take a loan up to the sum of two times his salary income and 3 times his additional income. To start a manufacturing unit one needs a 20 lakh of capital. Who among the following can start the manufacturing unit by taking a loan.</p> <p>Ravi (3 L , 1 L) Raju ( 5 L, 1 L) Khanum ( 8 L, 0L) Robert ( 3 L,6 L)</p>		2
9.	<p>The cost function and revenue function of a business is <math>C(X)=2x+200</math> and <math>R(x) =5x+150</math>. How many minimum items must manufacturer sell for realizing a profit.</p> <p>Clue To realize a profit the revenue must be more than cost</p>		2
10.	<p>In a guessing game a participant has to guess the numbers imagined by opponent by clues. The clues he got is that the opponent chose two consecutive even numbers both of which are less than 10 and sum of them is more than 13. What are the numbers.</p>		2
11.	<p>The cost and revenue functions of a product are given by <math>C(x) = 20x + 4000</math> and <math>R(x) = 60x + 2000</math>, respectively, where <math>x</math> is the number of items produced and sold.</p> <p>(i) How many items must be sold to realise some profit?</p> <p>(ii) if <math>C(x) = 2x + 400</math> and <math>R(x) = 6x + 20</math> respectively, where <math>x</math> is the number of items produced and sold.</p> <p>How many items must be sold to realise some profit?</p>		2
12.	<p><b>The inequality representing the following graph is:</b></p> <div style="text-align: center;">  <p><b>Fig 6.7</b></p> </div> <p>(A) <math> x  &lt; 5</math>      (B) <math> x  \leq 5</math>      (C) <math> x  &gt; 5</math>      (D) <math> x  \geq 5</math></p>		2

13.	 <p>To receive Grade 'A' in a course, one must obtain an average of 90 marks or more in five examinations (each of 100 marks). If Sunita's marks in first four examinations are 87, 92, 94 and 95.</p> <p>(i) Let Sunita got <math>x</math> marks in fifth exam, Find the average marks ?</p> <p>(ii) Find minimum marks that Sunita must obtain in fifth examination to get grade 'A' in the course.</p>	2
14.	<p>State which of the following statements is True or False</p> <p>(i) If <math> x  \leq 4</math>, then <math>x \in [-4, 4]</math> (T/F)</p> <p>(ii) If <math> x  &gt; 5</math>, then <math>x \in (-\infty, -5) \cup [5, \infty)</math> (T/F)</p>	2
15.	<p>Fill in the blanks in the following:</p> <p>(i) If <math>x \geq -3</math>, then <math>x + 5</math> <input type="text"/> 2</p> <p>(ii) If <math>-x \leq -4</math>, then <math>-2x</math> <input type="text"/> <math>-8</math></p>	2
16.	 <p>Minimum cost for 2 pen and 3 pencils is Rs 19 and for 5 pen and 4 pencil is Rs 37. Find the minimum cost of one pen and one pencil.</p>	2
17.	<p>Solve <math>\frac{1}{x-5} \geq 0.5</math>, <math>x \neq 5</math> when <math>x</math> is natural number.</p> <p>Also show the graph of the solutions on number line.</p>	2
18.	<p>Jitendra, Mahendra and Dharmendra together invest money into a new business. Mahendra gives twice of Jitendra and Dharmendra gives 20000 more than Mahendra. Find the minimum amount of money invested by Mahendra if at least 1 crore needed to start business.</p>	2
19.	<p>Solve <math>\frac{3x-2}{5} - \frac{2-x}{4} &lt; x</math>, when <math>x</math> is real number. Show the graph of the solutions on number line.</p>	2
20.	<p>Prajesh has started his journey by bike from Alampur to Bamungola which is 5km, after take turn gone straight to kadubari which is 4km away Bamungola. Find the minimum and</p>	2

	maximum possible distance from Alampur to Kadubari.	
21.	 <p>In a game, a person wins if he gets the sum greater than 20 in four throws of a die. In three throws he got numbers 6, 5, 4. What should be number in his fourth throw, so that he wins the game.</p>	2
22.	Solve $5x + 6 > 1$ when $x$ is real number?	2
23.	$50x < 540$ , where $x$ is the natural number?	2
24.	Solve the equation, $4x - 2 \leq 6$ and $9x + 3 \geq -15$ .	2
25.	Solve the inequalities, $2x - 1 \leq 3$ and $3x + 1 \geq -5$ is.	2
26.	Find all pairs of consecutive odd natural numbers both of which are larger than 10 such that their sum is less than 40.	2
27.	Solve $5x - 3 < 7$ when a) $X$ is an integer b) $X$ is a real number	2
28.	Solve the given inequality for real $x$ : $4x + 3 < 5x + 7$	2
29.	Solve the given inequality for real $x$ : $\frac{x}{3} > \frac{x}{2} + 1$	2
30.	<b>solve <math>-3x + 17 &lt; -13</math></b>	2
31.	<b>Solve: <math>4x + 3 &lt; 6x + 7</math></b>	2

**ANSWERS:**

Q. NO	ANSWER	MARKS
1.	Let $x$ be the smaller of the two positive consecutive even integers, then the other one is $(x + 2)$ Given $x > 5$ and $x + x + 2 < 23$ $2x + 2 < 23$ or $x < 10.5$ Value of $x$ may be 6, 8, 10 (even integers) The pairs may be (6, 8), (8, 10), (10, 12)	2
2.	$(70 + 75 + x)/3 \geq 60$ or $145 + x \geq 180$ or $x \geq 35$	2
3.	Let breadth be $b$ , so its length $l = 3b$ Thus $2(l + b) \geq 320$ or $2(3b + b) \geq 320$ or $8b \geq 320$ or $b \geq 40$ Therefore, minimum breadth is 40 cm.	2
4.	$(87 + 92 + 94 + 95 + x)/5 \geq 90$ or $368 + x \geq 450$ or $x \geq 82$ Sunita should obtain at least 82 marks in the fifth examination.	2
5.	$R(x) > C(x)$ Or $x > 4000$ More than 4000 Compact Discs must be produced to get profit.	2
6.	Frozen foods $4 \leq x \leq 20$ ice creams $10 \leq x \leq 30$ cool drinks $20 \leq x \leq 25$ and dairy items $20 \leq x \leq 30$ ( $\frac{1}{2}$ m) Mapping on number line (1 m) Solution $20^0$ ( $\frac{1}{2}$ m)	2
7.	Statements ( $\frac{1}{2}$ m) mapping (1m) solution 60 kmph ( $\frac{1}{2}$ m)	2
8.	Robert (3 L, 6 L) can take loan as $2(3,00,000) + 3(6,00,000) \geq 20,00,000$	2
9.	To realize a profit the revenue must be more than cost So $5x + 150 > 2x + 200$ which give solution $x > 50$	2
10.	$X < 10$ and $y < 10$ and $x + y > 13$ or $2x < 10$ $2x + 2 < 10$ and $4x + 2 > 13$ Solution 6 and 8	2

11.	(i) $x > 50$ (ii) $x > 95$	2
12.	(A)	2
13.	(i) $\frac{368+x}{5}$ (ii) $x \geq 82$	2
14.	(i) T (ii) F	2
15.	(i) $\geq$ (ii) $\leq$	2
16.	Let the cost price of one pen and one pencil are x and y respectively. $\therefore 2x + 3y \geq 19$ .....(i) $\therefore 5x + 4y \geq 37$ .....(ii) From (i) and (ii) we get, $(2x + 3y) + (5x + 4y) \geq 19 + 37$ $\Rightarrow 7(x + y) \geq 56$ $\Rightarrow x + y \geq 56/7$ $\Rightarrow x + y \geq 8$ Hence, minimum cost of one pen and one pencil is Rs 8	2
17.	$\frac{1}{x-5} \geq 0.5$ $\Rightarrow \frac{1}{x-5} \geq \frac{1}{2}$ $\Rightarrow \frac{1}{x-5} - \frac{1}{2} \geq 0$ $\Rightarrow \frac{2-(x-5)}{2(x-5)} \geq 0$ $\Rightarrow \frac{7-x}{2(x-5)} \geq 0$ $\Rightarrow \frac{7-x}{x-5} \geq 0$ $\therefore x \in (5, 7]$ and x is natural number. Therefore, $x = 6, 7$	2
18.	Let investment of Jitendra be x. Therefore, investment of Mahendra is 2x and investment of Dharmendra is 2x + 20000. ATQ, $\Rightarrow x + 2x + 2x + 20000 \geq 10000000$ $\Rightarrow 5x + 20000 \geq 10000000$ $\Rightarrow 5x \geq 9980000$ $\Rightarrow x \geq 9980000/5$ $\Rightarrow x \geq 1996000$ Hence investment of Mahendra is $2 \times 1996000 = 3992000$	2
19.	$\frac{3x-2}{5} - \frac{2-x}{4} < x$ $\Rightarrow \frac{3x-2}{5} - \frac{2-x}{4} - x < 0$ $\Rightarrow \frac{4(3x-2) - 5(2-x) - 20x}{20} < 0$ $\Rightarrow \frac{12x-8-10+5x-20x}{20} < 0$ $\Rightarrow \frac{-3x-18}{20} < 0$	2

	$\Rightarrow \frac{-3(x+6)}{20} < 0$ $\Rightarrow x+6 > 0$ $\Rightarrow x > -6$ $\therefore x \in (-6, \infty)$	
20.	<p>Let distance between Alampur and kadubari be x km.  If we join these three places by straight line then it forms a triangle whose sides are 5 km, 4 km and x km.  If 5 km is the longest side then <math>x+4 &gt; 5 \Rightarrow x &gt; 5 - 4 \Rightarrow x &gt; 1</math>  If x km is the longest side then <math>5+4 &gt; x \Rightarrow 9 &gt; x</math>  <math>\therefore 1 &lt; x &lt; 9</math>  Therefore, the minimum and maximum possible distance from Alampur to Kadubari 1km and 9 km respectively.</p>	2
21.	$x \geq 5$ that is, 6	2
22.	<p>Ans: <math>5x + 6 &gt; 1</math></p> $5x > -5$ $x > -1 \dots\dots \text{Dividing by } 5$ <p>Hence the solution <math>(-1, \infty)</math></p>	
23.	<p>Given: <math>50x &lt; 540</math></p> <p>Dividing both sides by 50</p> $x < 540/50$ $x < 54/5$ <p>Hence the solution set <math>\{1,2,3,4,5,6,7,8,9,10\}</math></p>	
24.	<p><math>4x-2 \leq 6</math> and <math>9x+3 \geq -15</math></p> <p>First,</p> $4x-2 \leq 6$ $2x - 1 \leq 3 \dots\dots \text{divide by } 2$ $2x \leq 4$ $x \leq 2 \dots\dots \text{divide } 2$ <p>Second,</p> $9x+3 \geq -15$ $3x+1 \geq -5 \dots\dots \text{Divide by } 3$ $3x \geq -6$ $x \geq -2 \dots\dots \text{divide by } 3$	

	<p>From both the solutions, <math>-2 \leq x \leq 2</math></p> <p>Hence the solution <math>[-2, 2]</math></p>	
25.	<p>We are given equations <math>2x-1 &lt; 3</math> and <math>3x+1 &gt; 5</math>, so now solving them we have</p> $2x-1 < 3$ $2x < 4$ $x < 2$ <p>So the solution set for this is <math>(-\infty, 2]</math></p> <p>Now,</p> $3x+1 > 5$ $3x > 4$ $x > \frac{4}{3}$ <p>So the solution set for this is <math>[\frac{4}{3}, \infty)</math></p> <p>Now the combined solution set for both the equations will be,</p> $[\frac{4}{3}, 2]$ <p>Hence, the solution set is <math>[\frac{4}{3}, 2]</math>.</p>	
26.	<p>Let the two consecutive odd positive integer be <math>x</math> and <math>x+2</math>.</p> <p>Both number are smaller than 10 Therefore</p> $x+2 < 10$ <p>Adding <math>-2</math> to both sides,</p> $x < 10-2$ $\Rightarrow x < 8$ <p>Also sum of the two integers is more than 40.</p> <p>So, <math>x+x+2 &gt; 40</math></p> $\Rightarrow 2x+2 > 40$ <p>adding <math>-2</math> to both sides,</p> $2x > 40-2$ $\Rightarrow 2x > 38$ <p>Divided by 2 both sides</p>	



	$x > 19$ Then the number greater than 10 and less than 19 are the consecutive odd number pair In (C) (11,13),(13,15) ,(15,17) ,(17,19) is right answer	
27.	a) .....-4,-3,-2,-1,0,1 b) $(-\infty, 2)$	2
28.	$(-4, \infty)$	2
29.	$(-\infty, -6)$	2
30.	<b>Solution:</b> Given, $-3x + 17 < -13$ Subtracting 17 from both sides, $-3x + 17 - 17 < -13 - 17$ $\Rightarrow -3x < -30$ $\Rightarrow x > 10$ {since the division by negative number inverts the inequality sign} $\Rightarrow x \in (10, \infty)$	2
31.	<b>Solution:</b> Given, $4x + 3 < 6x + 7$ Subtracting 3 from both sides, $4x + 3 - 3 < 6x + 7 - 3$ $\Rightarrow 4x < 6x + 4$ Subtracting $6x$ from both sides, $4x - 6x < 6x + 4 - 6x$ $\Rightarrow -2x < 4$ or $\Rightarrow x > -2$ i.e., all the real numbers greater than $-2$ , are the solutions of the given inequality. Hence, the solution set is $(-2, \infty)$ , i.e. $x \in (-2, \infty)$	2

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