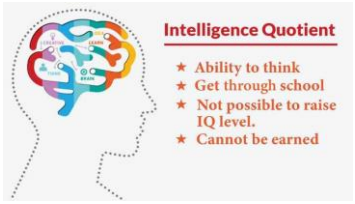
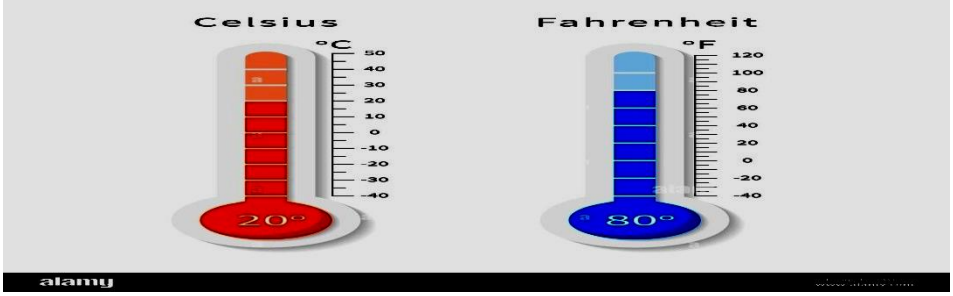
CHAPTER-6

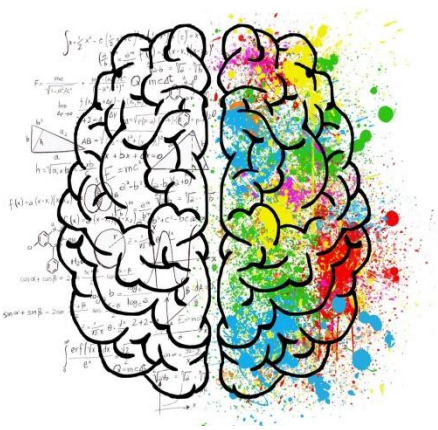
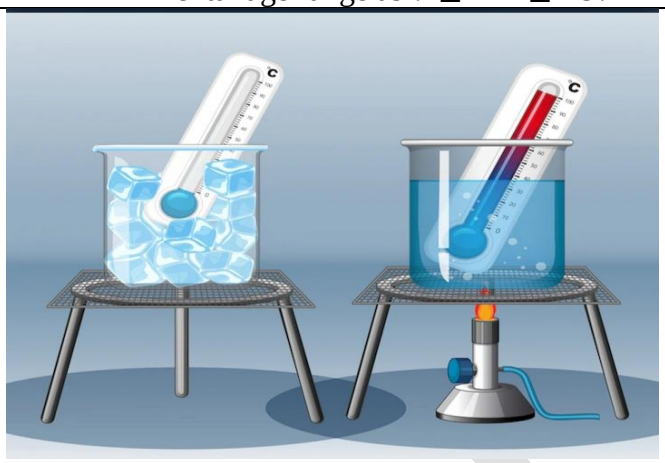
LINEAR INEQUALITIES

04 MARK TYPE QUESTIONS

Q. NO	QUESTION	MARK
1.	IQ of a person is given by the formula $IQ = \frac{MA}{CA} \times 100$, where MA is the mental age and CA is chronological age.  If $100 \leq IQ \leq 160$ for a group of 10 year old children, find the range of their mental age.	4
2.	An electrician can be paid under two schemes as given below: (i) ₹500 and ₹70 per hour (ii) ₹120 per hour  If the job takes n hours, then for what values of n does the (i) scheme I (ii) scheme II, give the electrician the better wages.	4
3.	Geologists knew that the temperature (T) as you drill inside earth is given by the equation T=30+25(x-3), 3≤x≤15 where x is the depth in km below earth. They are searching for a particular mineral ore which is likely to be obtained where the temperature stays in 155 to 205^{0}C range. How deep inside earth should they check for the mineral.	4
4.	Grandfather while visiting his grandchildren wished to take with him some fruits as good will gesture. He know that there will be some more kids in the house playing with his grandchildren. He bought 4 fruits more than twice the number of kids. He handed over the fruits basket to his to kids and asked them to share among themselves. One kid who doesn't want to eat fruits didn't take any fruits and the remaining shared the fruits among themselves. If it is known that the each kid got more than 5 fruits how many kids were there in the house when grand father visited the house.	4
5.	 (i) A solution is to be kept between 86° F and 95° F. What is the range of temperature in degree Celsius (C). **if the Celsius / Fahrenheit (F) conversion**	4

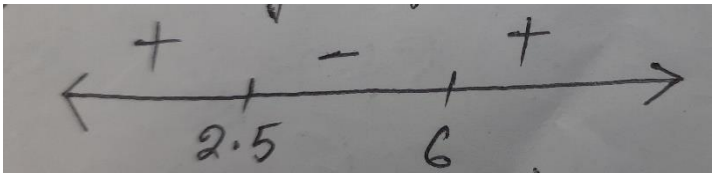
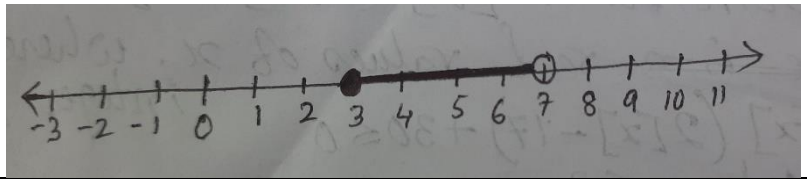
	formula is given by F = $\frac{9}{5}$ C + 32 ? A solution is to be kept between 40°C and 45°C. What is the range of temperature in degree Fahrenheit.	
6.	 A solution of 8% boric acid is to be diluted by adding a 2% boric acid solution to it. The resulting mixture is to be more than 4% but less than 6% boric acid. If we have 640 litres of the 8% solution, (i) What will be the range of a solution containing 2% boric acid which is added with a solution containing 8% boric acid . (ii) Also Write the range using brackets .	4
7.	Debu goes from Gazole to Rathbari by bus and from Rathbari to Daulatpur by e-riksha. Speed of e-riksha is one forth of the speed of bus.   Distance from Gazole to Rathbari is 27 km and Rathbari to Daulatpur is 6 km. If he starts journey at 6:20AM and wants to reach between 7:20AM to 7:50AM, then what is the minimum and maximum of speed of bus?	4
8.	Solve: [x] (2[x] - 17) +30 ≤0, for real values of x, where [x] is greatest integer function. Also represent on number line.	4
9.	 A company produces certain items.The manager in the company used to make a data record on daily basis about the cost and revenue of the items separately.The cost and revenue functions of a product are given by $C(x) = 20x + 4000$ *and* $R(x) = 60x + 2000$ respectively.Where x is the number of items produced and sold. The company manager wants to know	4

	1)How many items must be sold to realize some profit a)x<50 b)x>50 c) $x \geq 50$ $d) x \leq 50$ 2)Also if the cost and revenue functions of a product are given by $c(x) = 6x + 20$ respectively.Where x is the number of items produced by the manufacture.The minimum number of items that the manufacturer must sell to realize some profit is a)95 b)96 c)102 d)123 3)Solve for x :$12x + 7 < -11$ Or $5x - 8 > 40$	
10.	 Saptam works in a chemical factory .He regularly needs to keep some chemical at different temperatures for storage.Suppose boiling point of one of the chemical is less than $144°F$.He knows the relation between Fahrenheit temperature and Celsius temperature as $\frac{C}{5} = \frac{F-32}{9}$ a)Form the linear inequality from this situation. b)He needs to keep a solution between $40°C$ $to 50°C$ What could be the range of the temperature in Fahrenheit? c)He wants to dilute a 500 litres acid solution of 30% concentration by adding water to it . What could be the range of water to be added if he wants acid in solution to keep between 20% and 25%	4
11.	A solution is to be kept between 40 C and 45 C What is the range of temperature in degree Fahrenheit, if the conversion formula is F=9/5C + 32 ?	**4**

12.	The IQ of a person is given by the formula, IQ=m/c x 100, where m is the mental age and c is the chronological age. If 80≤IQ≤140 for a group of 12-year children, find the range of the mental age.	**4**
13.	 Shima is a psychology students and now a days she is learning about intelligence Quotient. She know the result IQ=$\frac{Mental\ age}{chronological\ age} \times 100$ On the basis of the above case answer the following questions i) What could be the range of mental age if a group of children with chronological age of 15 years have the IQ range as $90 \leq IQ \leq 150$? ii) What could be the range of IQ if a group of children with age of 12 years have the mental age range as $9 \leq MA \leq 15$?	4
14.	 Rakesh works in a chemical factory. He regularly needs to keep some chemical at different temperatures for storage . He knows the relation between Fahrenheit temperature and Celsius temperature as $F = \frac{9}{5}C + 32$. On the basis of the above case answer the following questions i)He needs to keep a solution between 40℃ and 50℃ .What could be the range of the temperature in Fahrenheit? ii)If the temperature of solution is 113℉ . Thn find the temperature in Celsius scale .	4

ANSWERS:

Q. NO	ANSWER	MARKS
1.	Given that 100≤ IQ ≤ 160 Putting $IQ = \frac{MA}{CA} \times 100$ We have 100≤ $\frac{MA}{CA} \times 100 \leq 160$ or 100≤ $\frac{MA}{10} \times 100 \leq 160$ or 1000≤ MA ×100 ≤1600 or 10≤ MA ≤ 16 or MA ∈ [10, 16] Mental should be greater than or equal to 10 but less than or equal to 16.	4
2.	Under scheme I, wage of the electrician = ₹(500 + 70n) Under scheme II, wage of the electrician = ₹120 n (i) 500 + 70 n > 120 n or n < 10 Number of hours should be less than 10 hours. (ii) According to the given condition 500 + 70 n < 120 n or 500 < 50 n or n > 10 Number of hours should be greater than 10 hours.	4
3.	155 < 30+25(x-3), < 205 5 < x-3 < 7 8 < x < 10 they must check between 8 an 10 m depth	4
4.	Let the number of kids be x No of fruits bought = 2x+4 No of kids who took fruits = x-1 No of fruits per kid = $\frac{2x+4}{x-1}$ $\frac{2x+4}{x-1} > 5$: 3x<9 : x< 3	4
5.	(i) Between 30° C and 35°C Between 104° F and 113° F	4
6.	(i) 320 $litre < x < 1280$ $litre$ $(320,1280)$	4
7.	Let the speed of the bus be x km /hr. Therefore, speed of the e-riksha is x/4 km /hr. Time taken by bus = 27 /x hr Time taken by e-riksha = 6 ÷ x/4 = 24/x hr Time from 6:20AM to 7:20AM is 1hr and from 6:20AM to 7:50AM is 1hour 30 minutes = 3/2 hr	4

	Therefore, $$1 \leq \frac{27}{x} + \frac{24}{x} \leq \frac{3}{2}$$ $\Rightarrow 1 \leq \frac{27+24}{x} \leq \frac{3}{2}$ $\Rightarrow 1 \leq \frac{51}{x} \leq \frac{3}{2}$ $\Rightarrow \frac{2}{3} \leq \frac{x}{51} \leq 1$ $\Rightarrow \frac{2\times 51}{3} \leq x \leq 1 \times 51$ $\Rightarrow 34 \leq x \leq 51$ Hence minimum and maximum speed of the bus are 34km/hr and 51 km/hr respectively.	
8.	[x] (2[x] - 17) +30 ≤0 Let y = [x] ⇒ y (2y - 17)+30 ≤0 ⇒ 2y² - 17y +30 ≤0 ⇒ 2y² - 12y - 5y +30 ≤0 ⇒ 2y(y-6) -5(y - 6) ≤0 ⇒ (2y-5) (y - 6) ≤0 ⇒ 2(y-2.5) (y - 6) ≤0 ⇒ (y-2.5) (y - 6) ≤0 ⇒ 2.5≤y ≤ 6 Now, 2.5 ≤ y ⇒ 2.5≤ [x] ⇒ 3≤ x..... (i) Again, y≤ 6 ⇒ [x] ≤ 6 ⇒ x<7..... (ii) From (i) and (ii) we get 3≤ x < 7 ⇒ x ∈ [3, 7)   	4
9.	i)b ii)b iii)d	4
10.	a)x<144°F b)$144 < F < 122$ c)$100 < x < 250$	4
11.	F= 9 5 C+32 --> C = 5/9 * (F - 32) . 40 < C < 45 40 < 5/9 * (F - 32) < 45 40 < 5/9 * (F - 32) and 5/9 * (F - 32) < 45 40 * 9/5 < F - 32 and F - 32 < 45 * 9/5 72 < F - 32 and F - 32 < 81	

	72 + 32 < F and F < 81 + 32 104 < F and F < 113 104 < F < 113 Hence, the solution is to be kept between 104°F and 113°F.	
12.	When c = 12 we have IQ = (m/12 * 100) = (25m)/3 80<=1Q<=140 Right arrow 80 <= (25m)/3 <= 140 80 <= (25m)/3 and (25m)/3 <= 140 1 3/25 * 80 <= m and m <= 140 * 3/25 Right arrow 48/5 <= m: and m <= 84/5 9.6 <= m <= 16.8 Hence, the required mental age for a group of 12-year children is 9.6 years or more and 16.8 years or less.	
13.	Solution : i) Given, $90 \leq IQ \leq 150$ $\Rightarrow 90 \leq \frac{MA}{15} \times 100 \leq 150$ $\Rightarrow \frac{90\times15}{100} \leq MA \leq \frac{15\times150}{100}$ $\Rightarrow \frac{27}{2} \leq MA \leq \frac{45}{2}$ ii) $9 \leq MA \leq 15$ $\Rightarrow 9 \leq \frac{IQ}{100} \times 12 \leq 15$ $\Rightarrow 75 \leq IQ \leq 125$	4
14.	Solution : i) Given , $40℃ < T < 50℃$ $\Rightarrow 40 < \frac{5}{9}(F-32) < 50$ $\Rightarrow 104 < F < 122$ ii)45℃	4