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Q.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 Chronical age. If $80 \leq IQ \leq 140$ for a group of 12 years old children, find the range of their mental age.

Soln. It is given that $80 \leq IQ \leq 140$ — (I)

Putting $IQ = \frac{MA}{CA} \times 100$ in eqn(I)

$$\Rightarrow 80 \leq \frac{MA}{CA} \times 100 \leq 140$$

$$\Rightarrow 80 \leq \frac{MA}{12} \times 100 \leq 140 \quad [\because CA = 12 \text{ years}]$$

Multiplying by 12 in each term,

$$\Rightarrow 80 \times 12 \leq \frac{MA}{12} \times 100 \times 12 \leq 140 \times 12$$

$$\Rightarrow 960 \leq MA \times 100 \leq 1680$$

Dividing by 100 in each term,

$$\Rightarrow \frac{960}{100} \leq \frac{MA \times 100}{100} \leq \frac{1680}{100}$$

$$\Rightarrow 9.6 \leq MA \leq 16.8$$

$$\Rightarrow MA \in [9.6, 16.8]$$

Hence, mental age should be greater than equal to 9.6 but less than equal to 16.8.

B.Sc, class-XI. Sets. (~~Set~~ The Set Theory)
Miscellaneous Exercise 10

Q.1. Decide among the following sets, which sets are subsets of one and another.

$$A = \{x: x \in \mathbb{R} \text{ and } x \text{ satisfy } x^2 - 8x + 12 = 0\}$$

$$B = \{2, 4, 6\}, C = \{2, 4, 6, 8, \dots\}, D = \{6\}$$

Soln: It is given that $A = \{x: x \in \mathbb{R} \text{ and } x \text{ satisfy } x^2 - 8x + 12 = 0\}$

$$\therefore x^2 - 8x + 12 = 0$$

$$\Rightarrow x^2 - 6x - 2x + 12 = 0$$

$$\Rightarrow x(x-6) - 2(x-6) = 0$$

$$\Rightarrow (x-2)(x-6) = 0$$

$$\Rightarrow x-2=0 \text{ or } x-6=0$$

$$\Rightarrow x=2 \text{ or } x=6$$

$$\Rightarrow x = 2, 6$$

$$\therefore A = \{6, 2\}, B = \{2, 4, 6\} \text{ and } C = \{2, 4, 6, 8, \dots\} \text{ and } D = \{6\}$$

It is clear that every element of A is in B and C.

$$\therefore A \subset B \text{ and } A \subset C$$

Again, every element of B is in C

$$\therefore B \subset C$$

Also, every element of D is in A, B and C.

$$\therefore D \subset A, D \subset B \text{ and } D \subset C$$

Q.2. Show that if $A \subset B$, then $C - B \subset C - A$.

Soln: Let $x \in C - B$

$$\Rightarrow x \in C \text{ and } x \notin B$$

$$\Rightarrow x \in C \text{ and } x \notin A \quad [\because A \subset B]$$

$$\Rightarrow x \in C - A$$

$$\Rightarrow x \in C - A$$

$$\therefore C - B \subset C - A$$

Proved.