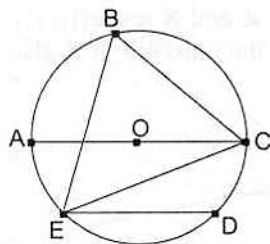


**Directions for Questions 59 and 60:** Answer the questions independently of each other.

**59.** In the adjoining figure, chord ED is parallel to the diameter AC of the circle. If  $\angle CBE = 65^\circ$ , then what is the value of  $\angle DEC$ ?



1.  $35^\circ$

2.  $55^\circ$

3.  $45^\circ$

4.  $25^\circ$

**Sol.** Since  $AC \parallel ED$

$$\angle DEC = \angle ECA$$

Join AE

$$\angle AEC = 90^\circ \text{ (Angle in a Semicircle)}$$

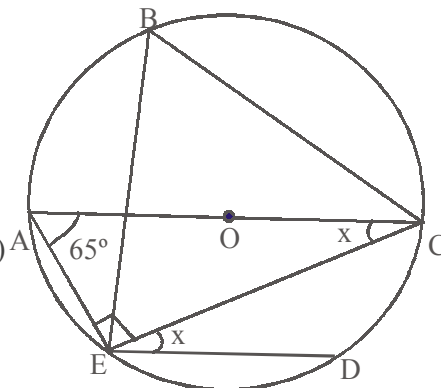
$$\angle EBC = 65^\circ \text{ (given)}$$

$$\therefore \angle EAC = 65^\circ \text{ (angle by same arc EDC on the circumference)}$$

Now in  $\triangle AEC$

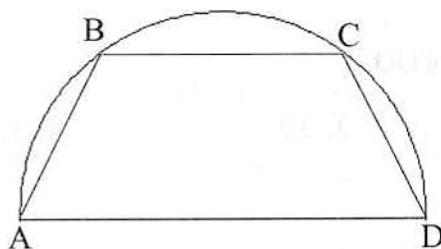
$$65^\circ + 90^\circ + x^\circ = 180^\circ$$

$$\therefore x = 25^\circ. \text{ Ans. (4)}$$



*An absolute sitter. Remember solving a verbatim question in PT's Excel Sheet # 13 "Circles and Polygons"*

**60.** On a semicircle with diameter AD, chord BC is parallel to the diameter. Further, each of the chords AB and CD has length 2, while AD has length 8. What is the length of BC?



1. 7.5

2. 7

3. 7.75

4. None of the above

**Sol.** Let O be the centre of the semicircle.

$$AD = 8 \text{ (given). Hence } OB = OC = 4$$

$$\text{Let } EO = OF = x.$$

Drop  $\perp$  BE and CF

$$\text{Let } BE = CF = a. AB = CD = 2 \text{ (given)}$$

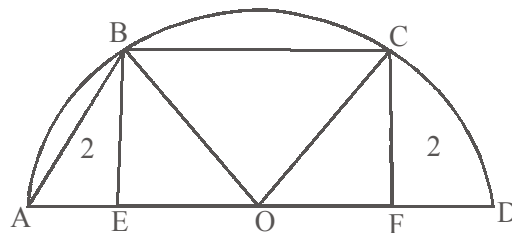
$$\text{Hence, } AE = FD = 4 - x$$

$$\therefore EF = 8 - 2x$$

$$\text{From } \triangle ABE, 4 = a^2 + (4 - x)^2 \dots (1)$$

$$\text{Also from } \triangle BEO, 16 = a^2 + x^2 \dots (2)$$

$$\text{Solving (1) \& (2), we get, } x = 3.5. \text{ Therefore } EF = BC = 7. \text{ Ans. (2)}$$



**Directions for Questions 61 and 62:** Answer the questions on the basis of the information given below.

$$\begin{aligned} f_1(x) &= x & 0 \leq x \leq 1 \\ &= 1 & x \geq 1 \\ &= 0 & \text{otherwise} \end{aligned}$$

$$\begin{aligned} f_2(x) &= f_1(-x) & \text{for all } x \\ f_3(x) &= -f_2(x) & \text{for all } x \\ f_4(x) &= f_3(-x) & \text{for all } x \end{aligned}$$

**61.** How many of the following products are necessarily zero for every  $x$ :

$$f_1(x)f_2(x), f_2(x)f_3(x), f_2(x)f_4(x)?$$

1. 0

2. 1

3. 2

4. 3

**Sol.** Take values of 1, -1 and 2 and check for the results

for  $x = 1$

$$f_1(1) = 1, f_2(1) = f_1(-1) = 0$$

$$\therefore f_3(1) = -f_2(1) = -f_1(-1) = 0$$

$$f_4(1) = f_3(-1) = -f_2(-1) = -f_1(1) = -1$$

$$\therefore f_1(1) \cdot f_2(1) = 1 \times 0 = 0$$

$$f_2(1) f_3(1) = 0 \times 0 = 0$$

$$f_2(1) f_4(1) = 0 \times -1 = 0$$

Now for  $x = -1$

$$f_1(-1) = 0: f_2(-1) = f_1(1) = 1$$

$$f_3(-1) = -f_2(-1) = -f_1(1) = -1$$

$$f_4(-1) = f_3(1) = -f_2(1) = -f_1(-1) = 0$$

$$\therefore f_1(-1) \cdot f_2(-1) = 0: f_2(-1) f_3(-1) = 1 \times -1 = -1$$

$$f_2(-1) f_4(-1) = 0$$

Hence only  $f_1(x)f_2(x)$  and  $f_2(x)f_4(x)$  are necessarily zero always . **Ans.(3)**

**62.** Which of the following is necessarily true?

1.  $f_4(x) = f_1(x)$  for all  $x$

3.  $f_2(-x) = f_4(x)$  for all  $x$

2.  $f_1(x) = -f_3(-x)$  for all  $x$

4.  $f_1(x) + f_3(x) = 0$  for all  $x$

**Sol.**  $f_2(x) = f_1(-x)$

$$f_3(x) = -f_2(x) = -f_1(-x)$$

$$f_4(x) = f_3(-x) = -f_2(-x) = -f_1(x)$$

from above we can observe that only option [2] is correct. **Ans.(2)**

*A must to do set , lots of similar questions were solved in PT's class room*

**Directions for Questions 63 and 64:** Answer the questions on the basis of the information given below.

In an examination, there are 100 questions divided into three groups A, B and C such that each group contains at least one question. Each question in group A carries 1 mark, each question in group B carries 2 marks and each question in group C carries 3 marks. It is known that the questions in group A together carry at least 60% of the total marks.

**63.** If group B contains 23 questions, then how many questions are there in group C?

1. 1  
3. 3

2. 2  
4. Cannot be determined

**Sol.**  $A + B + C = 100$  (total number of questions)

$$\text{Total marks} = A + 2B + 3C$$

$$B = 23$$

**Check by options**

$$C = 1, B = 23, A = 76$$

$$A = 76 \text{ questions} \Rightarrow 76 \text{ marks}$$

$$A + 2B + 3C = 76 + 46 + 3 = 125$$

$$60\% \text{ of total} = 12.5 \times 6 = 75$$

Satisfies option (1). **Ans.(1)**

**64.** If group C contains 8 questions and group B carries at least 20% of the total marks, which of the following best describes the number of questions in group B?

1. 11 or 12

2. 12 or 13

3. 13 or 14

4. 14 or 15

**Sol.**  $C = 8$

$$B = 12 \text{ (option 2)}$$

$$\text{Total marks} = 80 + 24 + 24 = 128$$

$$B = 24, 20\% \text{ of } 128 = 25.6$$

$\therefore$  (12) not satisfying

$$\text{Option(3)} C = 8, B = 13, A = 79$$

$$\text{Total Marks} = 79 + 26 + 24 = 129$$

$$20\% \text{ of } 129 = 12.9 \times 2 = 25.8$$

$$\text{Marks of } B = 13 \times 2 = 26$$

$$C = 8, B = 14, A = 78$$

$$\text{Total Marks} = 78 + 28 + 24 = 130$$

$$20\% \text{ of } 130 = 26$$

$$\text{Marks of } B = 2 \times 14 = 28$$

$$\text{Check for } A \text{ (60\% of total)} = 130 \times 0.6 = 78$$

Option (4)

$$C = 8, B = 15, A = 77$$

$$\text{Total Marks} = 77 + 30 + 24 = 131$$

$$20\% = 26.2 \text{ and not } 26.1$$

B marks = 30 satisfying

$$60\% \text{ of total} = 0.6 \times 131 = 78.6$$

$\therefore$  not satisfying since less than 60%. **Ans.(3)**