SOLUTIONS

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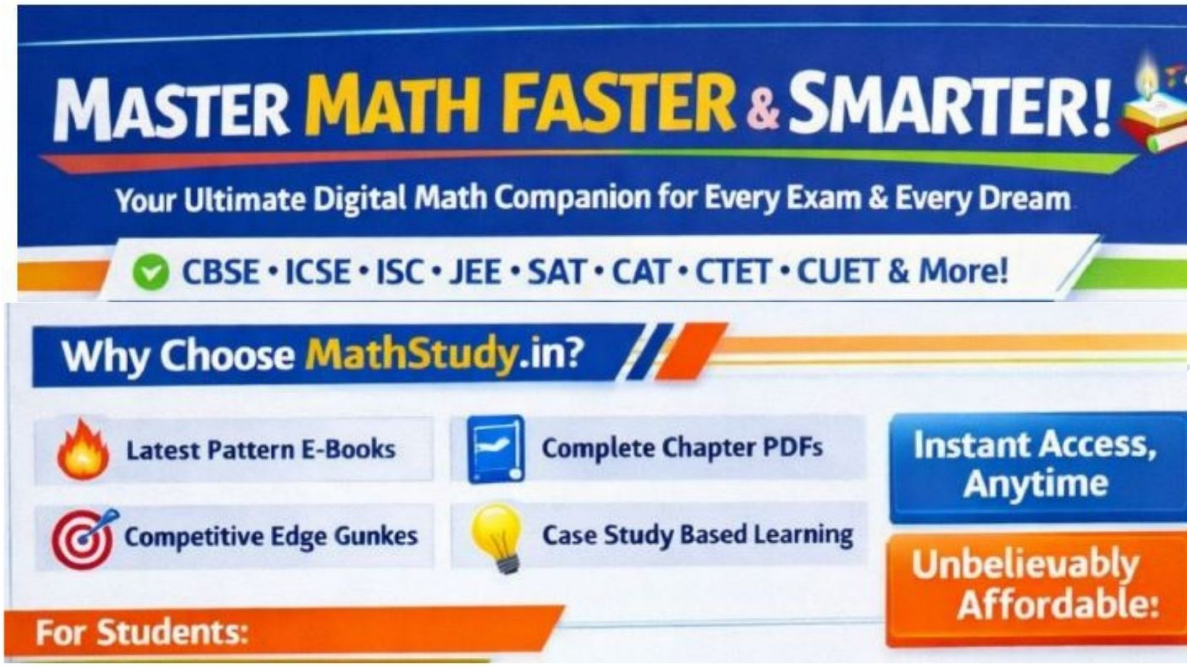

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SOLUTIONS: STATISTICS CHAPTER TEST

Mathematics | Class IX (2026/STATIS/09/001)

Section A: Multiple Choice Questions (Detailed Solutions)

1. **Answer: (c) 26**
   Solution: Range = Max value - Min value. Max = 32, Min = 6. Range = $32 - 6 = 26$.

2. **Answer: (b) 7**
   Solution: Lower limit = Mid-value - (Width/2) = $10 - (6/2) = 10 - 3 = 7$.

3. **Answer: (d) 38**
   Solution: Sum of 5 nos = $30 \times 5 = 150$. Sum of 4 nos = $28 \times 4 = 112$. Excluded no = $150 - 112 = 38$.

4. **Answer: (c) The frequency of the corresponding class interval.**
   Solution: In a histogram with equal class intervals, height represents frequency, and area is proportional to frequency.

5. **Answer: (b) 105**
   Solution: Class Mark = $(90 + 120)/2 = 210/2 = 105$.

6. **Answer: (d) Standard Deviation**
   Solution: Mean, Median, and Mode are measures of central tendency. Standard deviation is a measure of dispersion.

7. **Answer: (a) 4**
   Solution: $\frac{x+x+3+x+5+x+7+x+10}{5} = 9 \implies 5x + 25 = 45 \implies 5x = 20 \implies x = 4$.

8. **Answer: (c) Adjusted frequency**
   Solution: For unequal class widths, Frequency Density or Adjusted Frequency is used: $\frac{\text{Frequency}}{\text{Class Size}} \times$ Min Class Size.

Section B: Very Short Answer Questions

1. **Solution:** First six prime numbers: 2, 3, 5, 7, 11, 13.
   Mean = $\frac{2+3+5+7+11+13}{6} = \frac{41}{6} \approx 6.83$.

2. **Solution: Primary Data:** Data collected by the investigator personally for a specific purpose. *Ex: Census data collected by govt.*
   Secondary Data: Data collected by someone else and used by the investigator. *Ex: Data from a newspaper report.*

3. **Solution:** Sum of 10 obs = $10 \times 40 = 400$.
   Correct Sum = $400 - 15(\text{wrong}) + 45(\text{correct}) = 430$.
   Correct Mean = $430/10 = 43$.

4. **Solution:** Class size = Difference between consecutive class marks = $52 - 47 = 5$.
   First Class interval: Lower limit = $47 - (5/2) = 44.5$; Upper limit = $47 + (5/2) = 49.5$.
   Interval = $44.5 - 49.5$.

Section C: Short Answer Questions

1. **Discrete Frequency Table:**

Children (x)	Tally Marks	Frequency (f)
1	IIII I	6
2	IIII IIII	9
3	IIII	4
4	I	1
Total		20

2. **Mean Calculation:**
   $\sum f_i = 7 + k + 8 + 4 + 5 = 24 + k$
   $\sum f_i x_i = (5\times7)+(10\times k)+(15\times8)+(20\times4)+(25\times5) = 35+10k+120+80+125 = 360+10k$
   Mean $= 15 \implies \frac{360+10k}{24+k} = 15 \implies 360 + 10k = 360 + 15k \implies 5k = 0 \implies k = 0.$

3. **Graph Solutions:**
   (i) **2023** (Highest bar height of 4.5 units = 450 tons).
   (ii) Difference $= 400(2021) - 250(2020) = 150$ tons.
   (iii) Avg $= (250 + 400 + 320 + 450)/4 = 1420/4 = 355$ tons.

Section D: Long Answer Questions

1. **Neon Lamps:**
   (i)
   (ii) Lamps > 700 hours: $74(700 - 800) + 62(800 - 900) + 48(900 - 1000) = 184$ lamps.

2. **Assumed Mean Method ($A = 25$):**

x_i	f_i	$d_i = x_i - 25$	$f_i d_i$
5	4	-20	-80
15	6	-10	-60
25	10	0	0
35	15	10	150
45	5	20	100
Total	40		110

   Mean $= A + \frac{\sum f_i d_i}{\sum f_i} = 25 + \frac{110}{40} = 25 + 2.75 = 27.75.$
   Verification (Direct): $\sum f_i x_i = 20+90+250+525+225 = 1110$. Mean $= 1110/40 = 27.75$.

Case Study Solutions

1. **Answer: (B) 35**
   Modal class is 30-40 (Highest freq 6). Class mark $= (30 + 40)/2 = 35$.

2. **Answer: (C) The mean increases by 5 cm.**
   Adding a constant k to all values increases the mean by k.

3. **Answer: (C) Mean**
   Mean is the most sensitive measure and is pulled towards the outliers in skewed data.

4. **Answer: (D) The class mark**
   Frequency polygons join points plotted at class marks.

5. **Answer: (B) 9^{th} observation**
   For $N = 17$ (odd), Median $= (\frac{17+1}{2})^{th} = 9^{th}$ term.