Statistics

Activity Questions.

Topic
Dt:

AQ 3.1

WEEK 3

Q1. Table shows the frequency of outcome of rolling a dice?

What is the value of x?

Face NO	Freaquency	RF
1	5	0.125
2	4	0.1
3	x	0.15
4	9	0.255
6	8	0.2
6	8	0.2

Qualive frequency = $\frac{\text{Frequency}}{N}$

$0.125 + 0.1 + 0.15 + 0.255 + 0.2 + 0.2 = 1$

face 1 => $\frac{5}{0.125}$ => 40

face 3 => $\frac{x}{40}$ => 0.15

$x = \frac{0.15 \times 40}{5}$ = 6 dice

Topic
Dt:

Q2.

CI	F
1-20	5
20-40	10
[40-60	6]
60-80	8
80-100	6
	35

Q. How much % of total time, did the receive the cashback worth ₹40 to ₹60?

Percentage. ∠= $\left(\frac{6}{35}\right) \times 100 \Rightarrow$ 17.14 %

Q3. The number of wickets taken by bowler Sushant in this school cricket

↑ => 1 2 5 6 4 (3) 4 2 1 6 4 (3) 1 (3) 2

Total = 15

Find the PF to 3 wickets?

PF = $\frac{3}{15} =$ 0.2 %

OR

20%

Q4. The ratings of the given new newly launched Samsung mobile. How many were gave a rating > or = 3?

Only count the ration >= 3 =>

110 + 210 + 91 = 411 ₹

Q5. Histogram

Q CI [55, 60)

included ↳ not

Class Mark = $\frac{55+60}{2}$ = 57.5 %

Topic
Dt:

Q6. To which class does a student who got 65 marks belong?

65-70 → because marks are ⇒ (65)

3.2

Q1. approx mean?

Midpoint	Weights	No. of students
$\frac{60+75}{2}$ = 65	60-70	7
75	70-80	5
85	80-90	4
95	90-100	4
		20

Total weights
65 × 7 → 455
75 × 5 → 375
85 × 4 → 340
95 × 4 → 380
1550

mean → $\frac{1550}{20}$ = 77.5

Q2. Mean of the following data 26?

19.3 20.1 33.4 23.5 x 29.8.

Total = 129.1 + x

$\bar{x}$ = 26.

mean = $\frac{\Sigma x}{N}$

$26 = \frac{129.1 + x}{6}$ ⇒ 26 × 6 = 129.1 + x

156 − 129 = x

⇒ 29.9 = x Ans

Topic
Dt:

Q3. The no of wickets taken by bowler Sushant in the school wicket matches

1 2 5 6 4 3 4 2 1 6 4 3

1 3 2

Q. What is Avg marks of wickets taken by Sushant!

Total = 47
N = 15
⇒ Avg = $\frac{\text{Total}}{N} = \frac{47}{15} = 3.13$

Nearest int.

Q4. The ratings given by audience! What is Avg rating?

Fig 3.2.1

fi	xi	fixi
1	78	78
2	192	384
3	125	1275
4	220	880
5	65	310
977		2927

$\bar{x} = \frac{\Sigma x_i}{\Sigma f_i}$

$= \frac{2927}{977}$

$\Rightarrow$ 2.99, ? ✓

Q5.

Option 1 ✓ => Mean is affected by the outliers in the data
=> mean is calculated by summing all points

Option 2 => Mean value calculated for discrete data from a frequency
=> each point is distinct and exact.

Topic
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Q. Mean of continuous NV in table 3.2 ?

Midpoint	Class	f	fimi
15	10-20	20	300
25	20-30	25	625
35	30-40	40	1400
45	40-50	35	1575
55	50-60	30	1650
65	60-70	25	1625
		175	7175

$\frac{\Sigma f_i m_i}{\Sigma f_i}$

7175 (41)
175

41 Ans

3.3

Q1. Median of actual marks ?

66 68 70 82 78 67 79 81 75 95

Median

=> 66, 67, 68, 70, (75) (78) 79, 81, 82, 85.

Middle value

$\frac{75+78}{2} = \frac{153}{2} = 76.5$ Ans

Q2. Mode change of mode ?

No mode available in data

Topic
Dt:

Q4. Median of certain data set is 21! Now each value in the data set is increment by 4 and multiplied by 4. What is the median of final dataset!

Original Median of final data is 21 and transformed into by adding 16 to each element and multiply by 4.

Median of final dataset = $4 \times 21 + 16$

Q5 Stem and leaf plot
represent ages above
50 years for the person
living in colony? What is the median of ages!

=> 84 + 16
=> 100 Ans

Stem	Leaf
5	1 2 4 5 7
6	4 7 8 9
7	1 3 5 6 7 8
8	4 5 6 8 9

-> put in the ascending order

51 52 54 55 57
64 67 68 69 71 73
75 76 77 78 84 85
86 88 89

Total = 20

$\frac{N+1}{2}$

$\Rightarrow \frac{20}{2} 10+1 = 11^{th}$ term => 43 Ans

Q6. Given that the median of the original dataset $x_1, x_2 \ldots x_n$ is 45!

Original dataset $x_1, x_2, \ldots x_n = 45$

Transformed

$3x_1+1, 3x_2+1, 3x_3+1 \ldots 3x_n+1$

Topic
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Original median = 45

=> 9x45 + 1

=> 135+1

=> 136 ✓

Q8. The mode of the marks students in a class is 66!

Mode of original dataset = 66

adding 4 to each student.

66+4, 66+4, 66+4 ... 66+n

70, 70, 70, ---- n Mode = 70 ✓

Q9. Stem and leaf graph represent the temperatures!

Mode =>

Stem	Leaf
6	4 4 8 9 9
7	1 1 5 6 7 8
8	4 5 6 8 9

64, 69, 71 ✓

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Q10. The mode of the data $x_1 \ldots x_n$ is 45! What is the mode $2x_1+5, 2x_2+5, \ldots 2x_n+5$!

Transformed data

$2x_1+5, 2x_2+5 \ldots 2x_n+5$

$\because x_i = \boxed{45}$ -> original mode.

$2x_i + 5 = 2(45) + 5)$

$\Rightarrow \boxed{95}$ Ans

Q11. Fig 3.3.3.

Everyone knows that how to find mode

#(Highest occurance of number)

$\boxed{3}$ Ans

Activity 3.4

Q1. Calculate the sample variance (in kg^2) for the above data?

Ans

x_i	$(x_i - \bar{x})^2$
62	$\rightarrow (62-71.94)^2 \Rightarrow 99.53$
85	$\rightarrow 85-71.99)^2 \Rightarrow 0170.0116$
80	$\rightarrow$ 65.923
62.5	$\rightarrow$ 89.1016
82	$\rightarrow$ 102.0016
72.4	$\rightarrow$ 0.2116
68	$\rightarrow$ 15.6216
65	$\rightarrow$ 18.7236
78.5	$\rightarrow$ 2.422
69	$\rightarrow$ 8.6416
	602.6839

$\bar{x} \Rightarrow \frac{719.4}{10}$

$\bar{x} \Rightarrow 71.94$

Sample variance

$\Rightarrow \frac{\Sigma(\bar{x}_1 - \bar{x})^2}{N-1}$

$\Rightarrow \frac{602.6839}{9}$

$\Rightarrow 66.6249\ kg^2$

Q2. The gymnasium owner find the weighting machine is defective! The machine show less than 3kg its weight than the actual weight?

Calculate new($\bar{x}$) $\Rightarrow$ 65+88+83+65.5+85+75.4+71+68+76.5 +72 = 749.4 $\Rightarrow$ 74.94

$\Sigma(\bar{x}_1 - \bar{x})^2 = 602.6839$

$\Rightarrow \frac{602.6839}{9} = 66.6249\ kg^2$ same as above

Note [Adding or subtracting a constant value to each data point in a sample does not affect the sample variance].

Q5. Range of Data!

x_i	$(x_i - \bar{x})^2$
5.4	0.044
5.5	0.012
6	0.1521
6.1	0.2401
5.4	0.044
5.7	0.0081
5.9	0.0841
5.1	0.2601
5.3	0.0961
5.7	0.0081
56.1	0.949

Range = Max - Min

=> 6.1 - 5.1

1.0 feet

$\frac{56.1}{10} \Rightarrow 5.61$

Q6 Sample variance.

$\frac{0.949}{9} \Rightarrow 0.1054 \text{ feet}^2$

Q7 SD

$S.\sqrt{S^2} \Rightarrow \sqrt{0.1054} \Rightarrow 0.3247 \text{ feet}^2$

Q8.

Adding 0.1 to each → value

$\frac{5.5 + 5.6 + 6.1 + 6.2 + 5.5 + 5.8 + 6.0 + 5.2 + 5.4 + 5.8}{10} \Rightarrow$

$\Rightarrow \frac{57.1}{10} \Rightarrow 5.71$

$\Sigma(x_i - \bar{x}_{new}) \rightarrow 0.949$

$\frac{0.949}{9} \Rightarrow 0.1054 \text{ feet}^2$

$n-1$

$SD = \sqrt{0.1054} = 0.3247$

#[This we same as before no need worry that adding and substracting in the sample it's not affect on the sample, as is same]

Q9.

Standard D is affected by outliers

=> The main reason is that data point from the mean. Outliers ↑ when variance ↑

spread of Data ↑ when var ↑.

variance is affected by outliers

→ outliers ↑ when variance ↑

Activity 8.5

Q1. Which of the following is measures of dispersion!

IQR [interquartile Range]

Percentile

Quartile formula = IQR = Q3 - Q1

lower quartile

Q1 => 25th Percentile

Observation $\left(\frac{1}{4}\right)^{th}$

Even $\left(\frac{n}{4}\right)^{th}$

odd $\left(\frac{n+1}{4}\right)^{th}$

Q2 => Median 50th percentile

$\left(\frac{1}{2}\right)$

$\left(\frac{n}{2}\right)^{th}$

$\left(\frac{n+1}{2}\right)^{th}$

Q3 => upper / 75th quartile

$\left(\frac{3}{4}\right)$ 75th percentile

$\left(\frac{3n}{4}\right)^{th}$

$\left(\frac{3(n+1)}{4}\right)$

Q2. Median is 50th percentile

Q3

Stem	Leaf
1	3
2	5 6
3	(3) 8
4	2 5 7 9

50th percentile

11 observation $= \frac{11+1}{2} = \frac{12}{2}$

(odd)

6th observation

33 dr

Q4. Percentile formula

$\left[\frac{\text{Rank}}{100} \times \text{Total No. of Observation.}\right]$

(15) (25) 35 23 57 37 42 81 29

Arrange in ascending order

ath percentile => $\frac{9}{100} \times 9 = 0.81 \approx 1^{st}$

15 cm

Q1

$25^{th} \Rightarrow \frac{25}{100} \times 9 \Rightarrow 2.25$ ~ close to 2nd

=> 25 cm

Q3 $75^{th} \Rightarrow \frac{75}{100} \times 9 \Rightarrow 6.75$ close to 7^{th}

=> 37 cm

IQR = Q3 - Q1

37 - 25 = 12 cm

Q8. First Quartile

(Q1) Total Observations => 14

$\frac{14}{4}$ (3.5)th (4)th observation

(19) -> close to (20)

Ans

Q2 =>

Q10. Range of Data

Max - Min

-> 70 - 5 = 65 ans