Name: _Solution_____

The frequency distribution shows the number of magazine subscriptions per household for 60 households of Macomb.

Number of magazines	0	1	2	3	4
Frequency	15	9	21	10	5

1. Identify the <u>population</u> and the <u>sample</u>.

Population: Households of the town.

Sample: The 60 households of the town surveyed.

2. Determine whether the data is qualitative or quantitative. Explain your reasoning.

Quantitative. There are numbers and they are meaningful as numbers.

3. Determine the level of measurement of the data set. Explain your reasoning.

Ratio. A household with 4 magazine subscriptions has twice as more magazine subscriptions as a household with 2 magazine subscriptions.

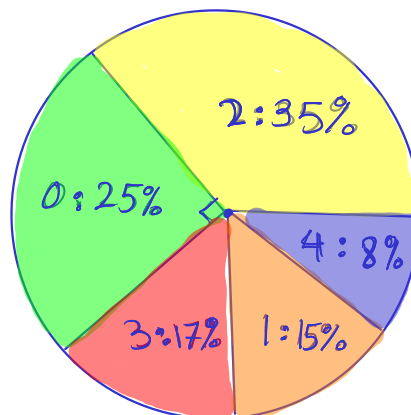4. Find the <u>mean</u>, <u>median</u>, and the <u>mode</u> of the data set.

Mean: $\bar{x} = \dfrac{0 \cdot 15 + 1 \cdot 9 + 2 \cdot 21 + 3 \cdot 10 + 4 \cdot 5}{15 + 9 + 21 + 10 + 5} = \dfrac{101}{60} \approx 1.7$

Median: 30th element: 2
31st element: 2 $\Bigr\} \to$ median $= \dfrac{2+2}{2} = 2$.

Mode: 2, with $f = 21$

5. Draw a pie chart for the given data set. Show your calculations.

x	f	rel. f	angle
0	15	.25	90°
1	9	.15	54°
2	21	.35	126°
3	10	.17	61°
4	5	.08	29°

$n = \Sigma f = 60$
$\Sigma f/n = 1$
Σ angle $= 360°$

2: 35%
0: 25%
4: 8%
3: 17% 1: 15%

magazine subscriptions per household for 60 households in a town.

Same table for reference:

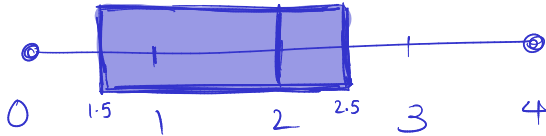| Number of magazines	0	1	2	3	4
Frequency	15	9	21	10	5

6. Find a 5 number summary of the data set.

$Min = 0$

$max = 4$

$\dfrac{60}{4} = 15 \longrightarrow$

$Q_1 = \dfrac{\overset{15^{th}}{0} + \overset{16^{th}}{1}}{2} = 0.5$

$Q_2 = \dfrac{\overset{30^{th}}{2} + \overset{31^{st}}{2}}{2} = 2$

$Q_3 = \dfrac{\overset{45^{th}}{2} + \overset{46^{th}}{3}}{2} = 2.5$

7. Draw a box-and-whisker plot for the data set.

8. Find the <u>variance</u>, and the <u>standard deviation</u> of the sample data set. Show your calculations.

$$\left(\text{formulas: } s = \sqrt{\dfrac{\sum(x - \bar{x})^2}{n-1}}, \quad \sigma = \sqrt{\dfrac{\sum(x - \mu)^2}{n}} \right)$$

x	f	$x \cdot f$	$x - \bar{x}$	$(x-\bar{x}) \cdot f$	$(x-\bar{x})^2$	$(x-\bar{x})^2 \cdot f$
0	15	0	−1.68	−25.2	2.82	42.3
1	9	9	−0.68	−6.12	0.46	4.1
2	21	42	0.32	6.72	0.10	4.2
3	10	30	1.32	13.2	1.74	17.4
4	5	20	2.32	11.6	5.38	26.9

$\underset{\overset{\shortparallel}{n}}{\Sigma f = 60}$ $\Sigma x \cdot f = 101$

$\Sigma(x-\bar{x}) \cdot f = 0.2$
$\approx 0 \uparrow$
rounding error

$\Sigma(x-\bar{x})^2 \cdot f = 94.9 = SS_x$

$\bar{x} = \dfrac{101}{60} \approx 1.68$

You don't need to calculate this part.

$\boxed{\Rightarrow S^2 = \dfrac{SS_x}{(n-1)} = \dfrac{94.9}{59} \approx 1.61}$ Variance

$\Rightarrow \boxed{S \approx 1.27}$ st. dev.