

Q2

(a)

→ For men
overall mean consumption of Fresh Vegetables

$$\text{Mean} = \frac{204 + 259 + 266 + 217}{4}$$

$$= 236.5$$

→ Mean of Fruits

$$\text{Mean} = \frac{31 + 45 + 69 + 105}{4} = 62.5$$

→ Mean of Rice

$$\bar{X} = (367 + 337 + 269 + 246) / 4$$

$$= 304.75$$

→ Mean of Fish

$$\bar{X} = 23 + 28 + 31 + 44$$

$$= 31.5$$

→ Mean of meat

$$\bar{X} = \frac{70 + 61 + 69 + 77}{4}$$

$$= 69.25$$

→ For women

mean of fresh vegetables

$$\bar{X} = 178 + 235 + 266 + 304$$

Mean of Fruits

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$$\bar{x} = \frac{28 + 46 + 70 + 121}{4} \\ = 66.25$$

Mean of Rice:

$$\bar{x} = \frac{315 + 276 + 243 + 220}{4} \\ = 263.5$$

Mean of meat

$$\bar{x} = \frac{48 + 43 + 54 + 63}{4} \\ = 52$$

Mean of Fish:

$$\bar{x} = \frac{19 + 21 + 28 + 46}{4} = 28.5$$

Combined Mean

Combined mean For Men

C.M of Fresh Vegetables

$$\bar{x}_{comb} = \frac{\bar{x}_1 n_1 + \bar{x}_2 n_2 + \dots + \bar{x}_m n_m}{n_1 + n_2 + \dots + n_m}$$

$$= \frac{[(236.5)(204) + (236.5)(259) + (236.5)(266) + (236.5)(47)]}{204 + 259 + 266 + 217} \\ = 236.5$$

Com Mean of Rice:

$$\bar{x}_c = \frac{(367)(304.75) + (337)(304.75) + (269)(304.75) + (246)(304.75)}{367 + 337 + 269 + 246}$$

Com Mean
c.m of fish..

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$$\bar{x}_c = \frac{(23)(31.5) + (28)(31.5) + (31)(31.5) + (31.5)(44)}{23 + 28 + 31 + 44}$$

$$\bar{x}_c = 31.5$$

Com mean of meet..

$$\bar{x}_c = \frac{(69.25)(70) + (69.25)(61) + (69.25)(69) + (69.25)(70)}{70 + 61 + 69 + 70}$$

$$\bar{x}_c = 69.25$$

Combined Mean of womanz.

$$\bar{x}_c = \frac{[(245.75)(178) + (245.75)(235) + (245.75)(266) + (245.75)(304)]}{178 + 235 + 266 + 304}$$

$$\bar{x}_c = 245.75$$

Com. Mean of Meet

$$\bar{x}_c = \frac{(52)(48) + (52)(43) + (52)(54) + (52)(63)}{48 + 43 + 54 + 63}$$

$$\bar{x}_c = 52$$

C.m of fish:

$$\bar{x}_c = \frac{(28.5)(19) + (28.5)(21) + (28.5)(28) + (28.5)(46)}{19 + 21 + 28 + 46}$$

$$\bar{x}_c = 28.5$$

Com. mean of Rice:

$$\bar{x}_c = \frac{(223.5)(315) + (263.5)(276) + (263.5)(243)}{(263.5)(220)}$$

$$\bar{x}_c = 263.5$$

— α — α — α — α — α —

Q2)

(b)

Ans:

Milk, root vegetable and wheat Flour are very
low for both men and women - In Q4 and Q3
but it rises high in Q2 and Q1 so those
who eat most vegetable consume much more
milk root vegetable and wheat Flour than
those who eat less Fresh vegetable.

— α — α — α —

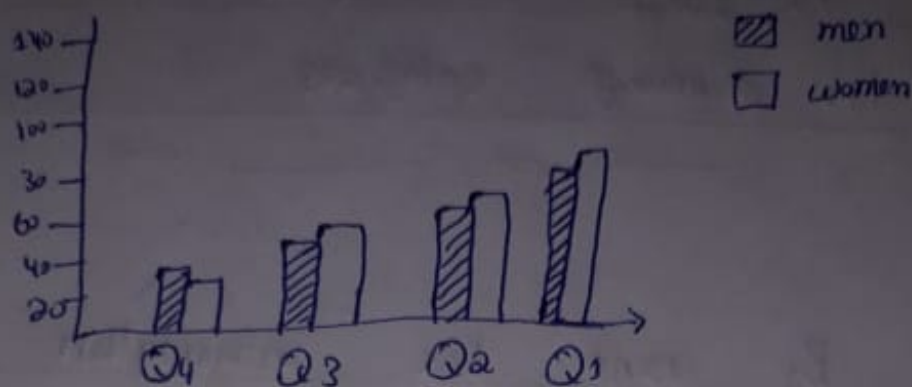
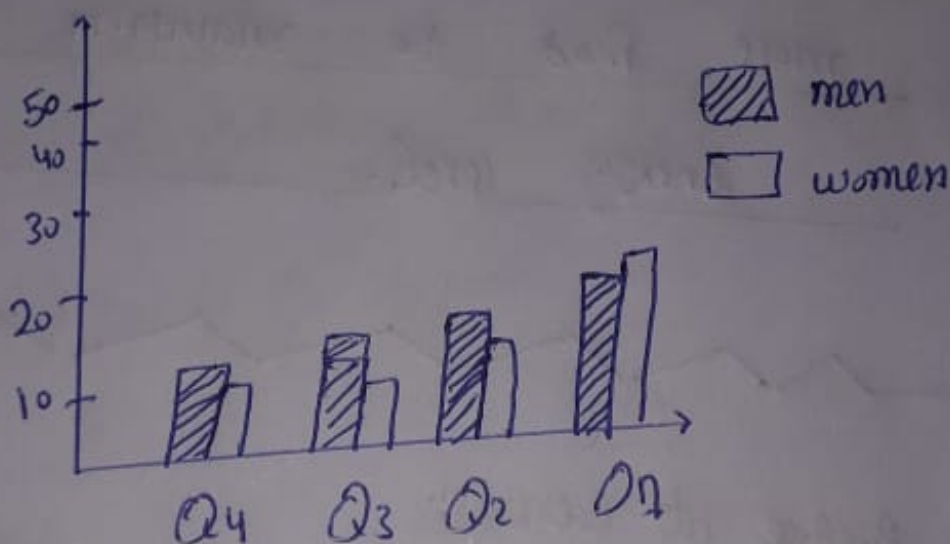
(c)

Ans

In bount and fish the value of mean
increasing from Q4 to Q1 in men and
women. But in Rice the value of
mean decreasing from Q4 to
Q1.

Q2 (d)

Draw a suitable diagram:

For FruitsFor Fish :

(F)

Ans

$$\text{Standard deviation} = S.E \times \sqrt{n}$$

By using above formula the value of standard deviation of men is more than women wheat flour, vegetable, fruit, wheat flour, whole grain

And value of standard deviation
is same for both men and women
in remaining categories.

Q1

(e)

By using the information of given
table it is true that men ~~need~~ needs
more food to maintain its ~~eat~~
energy level.

Q2

(a)

Purpose of census:

Ans Census is a survey conducted the whole set
of observation object which is belonging to
Population.

The purpose of census to count the
entire population or every object in given
observation. In census ask every type
data.

Q2 (b)

Difference from Sample Survey.

Ans In sample survey we go through some selected part from the population. our concern about information is totally based upon the selected data. The same procedure done by Government agencies, they get the data by picking some selected part of population but in census it is compulsory to go through from every object of population that is why census is different from sample survey.

(c)

Ans From the given information 2011 UK census attached a response rate of 94% which is good. But it can rise any

of an error. It may increase error

Further-

Q2
(d)

In the census about + asking a

Specific selection of group may cause of

harsh behavior of many mis happen -

It is possible that someone do not

like to answer of these kind of

questions:

(e)

There is a lot of Potential Problem

in conducting the 2021 UK census.

online, the first and main issue is

that the availability of online connection

and internet to every person of the

country is almost impossible.

The second thing that also can increase
is the personal behavior -

of persons, they may give the response
do not according to their own taste or
behaviour.

The only way to overcome this problem is
giving the connection to the whole country
and make sure and punctual to every
person to give the response.

(F)

Ans Census, itself mean the study of

every object under the observation.

And in real it is such a difficult ~~task~~
task to perform. Also it is quite difficult

to Government agencies to go to every

single person and collect the whole a

lot of things that have been done

by these agencies not only to

Rainfall	(f)	(x)	fx	f/x	$f \log(x)$	$x - \bar{x}$	$(x - \bar{x})^2$	$f(x - \bar{x})^2$
20-24	1	22 22	22	0.046	1.34	-14.8	219.04	288.12
25-29	3	27 27	81	0.12	4.29	-9.8	96.04	115.2
30-34	5	32	160	0.15	7.5	-4.8	23.04	0.32
35-39	8	37	296	0.21	12.48	0.2	0.04	135.2
40-44	5	42	210	0.11	8.1	5.2	27.04	208.04
45-49	2	47	94	0.04	3.34	10.2	104.04	0
50-54	0	52	0	0	0	15.2	231.04	0
55-59	1	57	57	0.017	1.75	20.2	408.04	0
Total	25		920	0.693	38.8			1373.96

①

Rainfall	(f) Number of years	$\sum (x - \bar{x})$	(C-L) Class boundaries	(C.f) Cumulative frequency
20-24	1	14.8	19.5 - 24.5	1
25-29	3	29.4	24.5 - 29.5	4
30-34	5	24	29.5 - 34.5	9
35-39	8	1.6	34.5 - 39.5	17
40-44	5	26	39.5 - 44.5	22
45-49	2	20.4	44.5 - 49.5	24
50-54	0	0	49.5 - 54.5	24
55-59	1	20.2	54.5 - 59.5	25
Total	25	136.4		

$$\textcircled{1} \quad A.M = \frac{\sum_{i=1}^n f_i x_i}{\sum_{i=1}^n f_i} = \frac{920}{25}$$

$$\boxed{A.M = 36.80}$$

$$\textcircled{2} \quad H.M = \frac{\sum_{i=1}^n f_i}{\sum_{i=1}^n \left[\frac{f_i}{x_i} \right]} = \frac{25}{0.693}$$

$$\boxed{H.M = 36.08}$$

$$\textcircled{3} \quad G.M = \text{Anti-log} \left\{ \frac{\sum_{i=1}^n f_i \log(x_i)}{\sum_{i=1}^n f_i} \right\}$$

$$= \text{Anti-log} \left[\frac{38.8}{25} \right]$$

$$= \text{Anti-log} (1.55)$$

$$\boxed{G.M = 35.48}$$

③

$$\begin{aligned}
 \textcircled{4} \quad \text{Median} &= \left(\frac{n}{2}\right)^{\text{th}} \\
 &= \left(\frac{25}{2}\right)^{\text{th}} \\
 &= (12.5)^{\text{th}}, \text{ which is lies b/w} \\
 &\text{in the class } 34.5 - 39.5. \text{ Therefore}
 \end{aligned}$$

$$\text{Median} = l + \frac{h}{f} \left(\frac{n}{2} - c.f \right)$$

$$= 34.5 + \frac{5}{8} (12.5 - 9)$$

$$= 34.5 + \frac{5}{8} (3.50)$$

$$= 34.5 + 2.19$$

So, Median = 36.69

$$\begin{aligned}
 \textcircled{5} \quad \text{Range} &= \text{Height class upper boundaries} \\
 &\quad - \text{lowest class lower boundaries}
 \end{aligned}$$

$$= 59.5 - 19.5$$

Range = 40

4

$$\textcircled{6} \quad \text{Mode} = l + \frac{f_m - f_1}{(f_m - f_1) + (f_m - f_2)} \times h$$

l = lower class boundaries of the modal class

f_m = Frequency of the modal class

f_1 = Frequency associated with the class preceding the modal class.

f_2 = Frequency associated with the class following the modal class.

h = width of class interval

So, the Mode, can be

$$\begin{aligned} \text{Mode} &= 34.5 + \frac{\cancel{34.5} - 5}{(8-5) + (8-5)} \times 5 \\ &= 34.5 + \frac{3}{3+3} \times 5 \end{aligned}$$

$$\boxed{\text{Mode} = 37}$$

$\textcircled{5}$

⑦ Quartiles: The Three value which divide the distribution into four equal parts are called the Quartiles.

These value are denoted by Q_1 , Q_2 and Q_3 . Q_1 is called the lower quartile and Q_3 are called upper quartile. Q_2 is called Median.

So, we shall calculate Q_1 and Q_3 .

$$Q_1 = \left(\frac{n}{4}\right)^{th}$$

$$= \left(\frac{25}{4}\right)^{th}$$

$= (6.25)^{th}$, which associated in the class $(29.5 - 34.5)$. Therefore

$$Q_1 = l + \frac{h}{f} \left(\frac{n}{4} - c.f \right)$$

$$= 29.5 + \frac{5}{5} (6.25 - 4)$$

$$= 29.5 + 2.25$$

$$\boxed{Q_1 = 31.75}$$

⑥

$$Q_3 = \left(\frac{3n}{4} \right) \bar{h}$$

$$= \left(\frac{3 \times 25}{4} \right) \bar{h}$$

$= (18.75) \bar{h}$, which corresponds in the class, (39.5 - unit). Therefore

$$Q_3 = l + \frac{h}{f} \left(\frac{3n}{4} - c.f \right)$$

$$= 39.5 + \frac{5}{5} (18.75 - 17)$$

$$= 39.5 + 1.75$$

$$\boxed{Q_3 = 41.25}$$

(7)

⑧ Deciles: which divide The distribution into ten equal parts, are called Deciles, which is denoted by

D_1, D_2, \dots, D_9 .

The calculation of each Decile to be calculated is too large and time consuming.

So, for The practice, we can calculate

D_2 .

$$D_2 = \left(\frac{2n}{10} \right) \bar{h}$$

$$= \left(\frac{2 \times 25}{10} \right) \bar{h}$$

$= 5\bar{h}$, which corresponds in the class, $(29.5 - 34.5)$. Therefore

$$D_2 = l + \frac{h}{f} \left(\frac{2n}{10} - c.f \right)$$

$$= 29.5 + \frac{5}{5} (5 - 4)$$

$$= 29.5 + 1$$

$$\boxed{D_2 = 30.5}$$

⑧

⑨ Percentile: which divide the distribution into hundred equal parts are called percentile, which is denoted by P_1, P_2, \dots, P_{99} .

As;

$$P_{30} = \left(\frac{30n}{100} \right) \bar{h}$$
$$= \left(\frac{30 \times 25}{100} \right) \bar{h}$$

$= (7.5) \bar{h}$, which associated in the class $(29.5 - 34.5)$. So

$$P_{30} = l + \frac{h}{f} \left(\frac{30n}{100} - c.f \right)$$

$$= 29.5 + \frac{5}{5} (7.5 - 4)$$

$$= 29.5 + 3.50$$

$$\boxed{P_{30} = 33}$$

⑨

⑬

Coefficient of Variation (C.V) =

$$\frac{S.D}{\bar{x}} \times 100$$
$$= \frac{7.41}{36.80} \times 100$$

$$\boxed{C.V = 20.14}$$

⑭ Quartile Deviation (Q.D) = $\frac{Q_3 - Q_1}{2}$

where, $Q_3 = 41.25$ and $Q_1 = 31.75$

so $Q.D = \frac{41.25 - 31.75}{2}$

$$\boxed{Q.D = 4.75}$$

⑮ Skewness (SK) = $\frac{\text{Mean} - \text{Mode}}{S.D}$

where, Mean = 36.80, Mode = 37

and S.D = 7.41

⑪

x	$1/x$	$0.2x$	$0.1x$	$0.05x$
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$$SK = \frac{36.80 - 37}{7.41}$$

$$= \frac{-0.20}{7.41}$$

$$\boxed{\text{Skewness} = -0.03}$$



x	$1/x$	$\log(x)$	$(x - \bar{x})$	$(x - \bar{x})^2$	$ x - \bar{x} $
22	0.045	1.34	-14.8	219.04	14.8
(27)	0.037	1.4313	-9.8	96.04	9.8
27	0.037	1.4313	-9.8	96.04	9.8
27	0.037	1.4313	-9.8	96.04	9.8
32	0.0312	1.5051	-4.8	23.04	4.8
32	0.0312	1.5051	-4.8	23.04	4.8
32	0.0312	1.5051	-4.8	23.04	4.8
32	0.0312	1.5051	-4.8	23.04	4.8
37	0.027	1.5682	0.2	0.04	0.2
37	0.027	1.5682	0.2	0.04	0.2
37	0.027	1.5682	0.2	0.04	0.2
37	0.027	1.5682	0.2	0.04	0.2
37	0.027	1.5682	0.2	0.04	0.2
37	0.027	1.5682	0.2	0.04	0.2
37	0.027	1.5682	0.2	0.04	0.2
37	0.027	1.5682	0.2	0.04	0.2
42	0.0238	1.6232	5.2	27.04	5.2
42	0.0238	1.6232	5.2	27.04	5.2
42	0.0238	1.6232	5.2	27.04	5.2
42	0.0238	1.6232	5.2	27.04	5.2
42	0.0238	1.6232	5.2	27.04	5.2
47	0.0212	1.6720	1.76	3.10	1.76
47	0.0212	1.6720	1.76	3.10	1.76
57	0.019	1.7558	20.2	408.04	20.2
Total	0.73	38.92		1172.12	136.40

$$\textcircled{1} \quad A.M = \frac{\sum_{i=1}^n X_i}{n} = \frac{920}{25}$$

$$\boxed{A.M = 36.8}$$

$$\textcircled{2} \quad H.M = \frac{n}{\sum_{i=1}^n (1/x_i)} = \frac{25}{0.73}$$

$$\boxed{H.M = 34.25}$$

$$\textcircled{3} \quad G.M = \text{Anti-log} \left[\frac{\sum_{i=1}^n \log(x_i)}{n} \right]$$

$$= \text{Anti-log} \left[\frac{38.92}{25} \right]$$

$$= \text{Anti-log} (1.56)$$

$$\boxed{G.M = 36.04}$$

$\textcircled{4}$ Mode : Most repeated value is called Mode :

So,

$$\boxed{\text{Mode} = 37}$$

(5)

Median :

Median is the mid-value of a data set.

$$\text{Median} = \left[\left(\frac{n}{2} \right) + 1 \right] \text{th}$$

$$= \left[\left(\frac{25}{2} \right) + 1 \right] \text{th}$$

$$= (12 + 1) \text{th}$$

$$\text{Median} = 13 \text{th, integer } \} \text{ a data set}$$

$$\boxed{\text{Median} = 37}$$

(6)

Quartiles :

$$Q_1 = \left[\left(\frac{n}{4} \right) + 1 \right] \text{th}$$

$$= \left[\left(\frac{25}{4} \right) + 1 \right] \text{th}$$

$$= (6.25 + 1) \text{th}$$

$$= (7.25) \text{th}$$

$$= 7 \text{th}$$

$$\boxed{Q_1 = 32}$$

(15)

$$\begin{aligned}
 Q_3 &= \left[\left(\frac{3n}{4} \right) + 1 \right] \bar{h} \\
 &= \left[\left(\frac{3 \times 25}{4} \right) + 1 \right] \bar{h} \Rightarrow (19.75) \bar{h} \\
 &= (20) \bar{h}, \text{ Integer} \\
 \boxed{Q_3 = 42}
 \end{aligned}$$

(7) Deciles:

$$\begin{aligned}
 \text{As, } D_2 &= \left[\left(\frac{2n}{10} \right) + 1 \right] \bar{h} \Rightarrow \left[\left(\frac{2 \times 25}{10} \right) + 1 \right] \bar{h} \\
 &= (5+1) \bar{h} \Rightarrow 6 \bar{h}, \text{ Integer} \\
 \boxed{D_2 = 32}
 \end{aligned}$$

(8) Percentile:

$$\begin{aligned}
 \text{As, } P_{30} &= \left[\left(\frac{30n}{100} \right) + 1 \right] \bar{h} \\
 &\Rightarrow \left[\left(\frac{30 \times 25}{100} \right) + 1 \right] \bar{h} \\
 &= (7.50+1) \bar{h} \Rightarrow (8.50) \bar{h} \\
 P_{30} &= 9 \bar{h}, \text{ Integer}
 \end{aligned}$$

$$\boxed{P_{30} = 32}$$

$$\textcircled{9} \quad \text{Range} = \text{Largest value} - \text{Smallest value} \\ = 57 - 22$$

$$\boxed{R = 35}$$

$$\textcircled{10} \quad Q.D = \frac{Q_3 - Q_1}{2}$$

$$= \frac{42 - 32}{2}$$

$$\boxed{Q.D = 5}$$

$$\textcircled{11} \quad \text{Skewness} = \frac{\text{mean} - \text{mode}}{S.D}$$

$$= \frac{36.8 - 37}{7.41}$$

$$= \frac{-0.20}{7.41}$$

$$\boxed{\text{Skewness} = -0.03}$$

$$\textcircled{12} \quad \text{Coefficient of Variation (C.V)} =$$

$$= \frac{S.D}{\bar{x}} \times 100$$

$$= \frac{7.41}{36.8} \times 100$$

$$\boxed{C.V = 20.14}$$

(17)

$$(13) \text{ Mean Deviation} = \frac{\sum_{i=1}^n |x - \bar{x}|}{n}$$

$$= \frac{136.40}{25}$$

$$\boxed{M.D = 5.46}$$

$$(14) \text{ Variance} = \frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n}$$

$$= \frac{1172.12}{25}$$

$$\boxed{\text{Variance} = 46.88}$$

$$(15) \text{ S.D} = \sqrt{\text{Var}}$$

$$= \sqrt{46.88}$$

$$\boxed{S.D = 6.85}$$

(18)

Q.1.8. D.
 = Grouped data to Ungrouped data.
 For this.

C.I	X	$\bar{X} - \bar{X}$	$1/x$	$(X_i - \bar{X})^2$
20-24	22	-17.5	$1/22 = 0.045$	306.25
25-29	27	-12.5	$1/27 = 0.037$	156.25
30-34	32	-7.5	$1/32 = 0.031$	56.25
35-39	37	-2.5	$1/37 = 0.027$	6.25
40-44	42	2.5	$1/42 = 0.023$	6.25
45-49	47	7.5	$1/47 = 0.021$	56.25
50-54	52	12.5	$1/52 = 0.019$	156.25
55-59	57	17.5	$1/57 = 0.017$	306.25

$$\Sigma X = 316$$

$$\Sigma 1/x = 0.22 \quad \Sigma (X_i - \bar{X})^2 = 1050$$

First we find A.M

$$\bar{X} = \Sigma X = 316$$

$$\text{Hence } \Sigma X = 316$$

$$n = 8$$

Median:- As $n=8$ even so
The median =

$$\text{median} = \frac{1}{2} \left(\frac{n}{2}^{\text{th}} + \frac{n+1}{2}^{\text{th}} \right) \text{ value}$$

$$= \frac{1}{2} \left(\frac{8}{2}^{\text{th}} + \frac{10}{2}^{\text{th}} \right) = \frac{1}{2} (4^{\text{th}} + 5^{\text{th}}) \text{ value}$$

$$= \frac{1}{2} (37 + 42)$$

$$\text{median} = 39.5$$

Quartile: $Q_1 = \left(\frac{n+1}{4} \right)^{\text{th}} \text{ item}$

$$= \left(\frac{8+1}{4} \right) = \frac{9}{4} = 2.25$$

$$Q_1 = 2^{\text{nd}} + \frac{1}{4} (3^{\text{rd}} - 2^{\text{nd}}) \text{ item}$$

$$= 27 + \frac{1}{4} (32 - 27)$$

$$= 27 + \frac{1}{4} (5) = 27 + 1.25$$

$$Q_1 = 28.5$$

$$Q_3 = 3 \left(\frac{n+1}{4} \right)^{\text{th}}$$

$$= 3 \left(\frac{9}{4} \right) = 3(2.25) = 6.75$$

$$Q_3 = 6^{\text{th}} + \frac{3}{4} (7^{\text{th}} - 6^{\text{th}}) \text{ item}$$

$$= 47 + \frac{3}{4} (52 - 47)$$

$$Q_3 = 47 + \frac{15}{4} = 47 + 3.75 = 50.75$$

$$\text{Range} = 57 - 22 = 35$$

Decile:

$$D_3 = 3\left(\frac{n+1}{10}\right) \text{th item}$$

$$D_3 = 3\left(\frac{8+1}{10}\right) = (2.7) \text{th item}$$

$$D_3 = 2\text{nd} + \frac{7}{10}(3\text{rd} - 2\text{nd})$$

$$= 27 + \frac{7}{10}(32 - 27)$$

$$= 27 + \frac{7}{2} = 30.5$$

$$D_3 = 30.5$$

$$D_7 = 7\left(\frac{n+1}{10}\right) = 7(0.9) = 6.3$$

$$D_7 = 6\text{th} + \frac{3}{10}(7 - 6) \text{th item}$$

$$= 47 + \frac{3}{10}(52 - 47)$$

$$= 47 + \frac{3}{2} = 48.5$$

$$\boxed{D_7 = 48.5}$$

$$\text{Variance} = \frac{\sum (x_i - \bar{x})^2}{n} = \frac{1050}{8} = 131.25$$

$$\text{Standard deviation} = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n}} = \sqrt{131.25}$$

$$\text{S.D} = 11.45$$

Q.3: B: we have to change the grouped data to ungrouped data.

C.I	X	$\bar{x} - \bar{y}$	$1/x$
20-24	22	-17.5	$1/22 = 0.045$
25-29	27	-12.5	$1/27 = 0.037$
30-34	32	-7.5	$1/32 = 0.031$
35-39	37	-2.5	$1/37 = 0.027$
40-44	42	2.5	$1/42 = 0.023$
45-49	47	7.5	$1/47 = 0.021$
50-54	52	12.5	$1/52 = 0.019$
55-59	57	17.5	$1/57 = 0.017$
$\Sigma x = 316$		$\Sigma 1/x = 0.22$	

First we find A.M

$$A.M = \bar{x} = \frac{\Sigma x}{n} = \frac{316}{8}$$

Hence $\Sigma x = 316$
 $n = 8$

$$\bar{x} = \frac{\Sigma x}{n} = \frac{316}{8} = 39.5$$

G.M: General formula of G.M for ungrouped data:

$$x_1, x_2, x_3, \dots, x_n$$

$$G.M = \sqrt[n]{x_1 \times x_2 \times x_3 \times x_4 \times \dots \times x_n}$$

Now

$$G.M = \sqrt[8]{22 \times 27 \times 32 \times 37 \times 42 \times 47 \times 52 \times 57}$$

$$H.M = \frac{n}{\Sigma 1/x} = \frac{8}{0.22} = 36.36$$