Q1: NTA Test 02 (Single Choice)

The mean of a data set comprising of 16 observations is 16. If one of the observation valued 16 is deleted and three new observations valued 3, 4 and 5 are added to the data, then the mean of the resultant data is

(A) 14.0

(B) 16.8

(C) 16.0

(D) 15.8

Q2: NTA Test 05 (Single Choice)

The average of five consecutive odd numbers is 61. Then the difference between the highest and lowest numbers is

(A) 2

(B) 5

(C) 8

(D) Cannot be determined

Q3: NTA Test 07 (Single Choice)

The mean and variance of 20 observations are found to be 10 and 4, respectively. On rechecking, it was found that an observation 9 was incorrect and the correct observation was 11, then the correct variance is

(A) 3.99

(B) 4.01

(C) 4.02

(D) 3.98

Q4: NTA Test 08 (Single Choice)

The variance of the numbers 2, 3, 11 and x is $\frac{49}{4}$, then the values of x are

(A) $6 \text{ or } \frac{14}{3}$

(B) $6 \text{ or } \frac{14}{5}$

(C) $6 \text{ or } \frac{16}{3}$

(D) $4 \text{ or } \frac{13}{5}$

Q5: NTA Test 09 (Numerical)

If the variance of the following data :

6, 8, 10, 12, 14, 16, 18, 20, 22, 24 is K, then the value of $\frac{K}{11}$ is

Q6: NTA Test 10 (Single Choice)

Coefficient of variation of two distributions are 60% and 75%, and their standard deviation are 18 and 15 respectively, then their arithmetic means respectively are

(A) 30, 30

(B) 30, 20

(C) 20, 30

(D) 20, 20

Q7: NTA Test 11 (Single Choice)

The mean and standard deviation of 100 observations were calculated as 40 and 5.1, respectively by a student who took by mistake 50 instead of 40 for one observation, then the correct standard deviation is

(A) 4

(B) 6

(C) 3

(D) 5

Q8: NTA Test 12 (Single Choice)

For a group of 50 male workers, the mean and the standard deviation of their daily wages are Rs. 630 and Rs. 90 respectively and for a group of 40 female workers these are Rs. 540 and Rs. 60 respectively. Then, the standard deviation of all these 90 workers is

(A) 60

(B) 70

(C) 80

(D) 90

Q9: NTA Test 13 (Single Choice)

The mean of five numbers is 0 and their variance is 2 . If three of those numbers are $-1, 1$ and 2, then the other two numbers are

(A) -5 and 3

(B) -4 and 2

(C) -3 and 1

(D) -2 and 0

Q10: NTA Test 14 (Single Choice)

If both the mean and the standard deviation of 50 observations $x_1,\ x_2,\ \ldots,\ x_{50}$ are equal to 16, then the mean of $(x_1-4)^2,\ (x_2-4)^2,\ \ldots,(x_{50}-4)^2$ is

(A) 525

(B) 480

(C) 400

(D) 380

Q11: NTA Test 15 (Single Choice)

If the mean of 10 observations is 50 and the sum of the squares of the deviations of observations from the mean is 250, then the coefficient of variation of those observations is

(A) 25

(B) 50

(C) 10

(D) 5

Q12: NTA Test 16 (Numerical)

Let one observation equal to the mean is added to n observations. If the variance changes from 78 to 72, then n is equal to

Q13: NTA Test 17 (Single Choice)

The mean and variance of a data set comprising 15 observations are 15 and 5 respectively. If one of the observation 15 is deleted and two new observations 6 and 8 are added to the data, then the new variance of resulting data is

(A) 10.3715

(B) 11.8125

(C) 13.25

(D) 5.7516

Q14: NTA Test 18 (Single Choice)

In an experiment with 9 observations on x, the following results are available $\sum x^2=360$ and $\sum x=34$. One observation that was 8, was found to be wrong and was replaced by the correct value 10, then the corrected variance is

(A) $\frac{250}{9}$

(B) 28

(C) $\frac{240}{9}$

(D) 28

Q15: NTA Test 19 (Numerical)

If $\sum_{i=1}^{5}(x_i-6)=5$ and $\sum_{i=1}^{5}(x_i-6)^2=25$, then the standard deviation of observations $3x_1+2, 3x_2+2, 3x_3+2,\ 3x_4+2$ and $3x_5+2$ is equal to

Q16: NTA Test 20 (Single Choice)

The mean and variance of seven observations are 8 and 16 respectively. If five of the observations are $2,\ 4,\ 10,\ 12$ and 14, then the remaining two observations are

(A) 5, 7

(B) 3, 5

(C) 6, 8

(D) 4, 2

Q17: NTA Test 21 (Single Choice)

If $x_1,\ x_2,\ x_3,\ x_4,\ x_5\ldots\ldots x_n$ are n observations such that $\sum_{i=1}^{n}x_i^2=400$ and $\sum_{i=1}^{n}x_i=100$, then the possible value of n among the following is

(A) 18

(B) 20

(C) 24

(D) 27

Q18: NTA Test 22 (Single Choice)

The mean and variance of 20 observations are found to be 10 and 4 respectively. On rechecking, it was found that an observation 8 is incorrect. If the wrong observation is omitted, then the correct variance is

(A) 7

(B) $\frac{100}{19}$

(C) $\frac{1400}{361}$

(D) $\frac{1440}{361}$

Q19: NTA Test 23 (Single Choice)

The mean and variance of 10 observations are found to be 10 and 4 respectively. On rechecking it was found that an observation 8 was incorrect. If it is replaced by 18, then the correct variance is

(A) 7

(B) 8

(C) 9

(D) $\frac{55}{6}$

Q20: NTA Test 25 (Single Choice)

If for a sample size of 10, $\sum_{i=1}^{10}(x_i-5)^2=350$ and $\sum_{i=1}^{10}(x_i-6)=20$, then the variance is

(A) 23

(B) 24

(C) 25

(D) 26

Q21: NTA Test 27 (Single Choice)

If the standard deviation of $0,\ 1,\ 2,\ \ldots,\ 9$ is k, then the standard deviation of $10,\ 11,\ 12,\ \ldots\ ,\ 19$ is

(A) k

(B) $k+10$

(C) $\mathrm{k}+\sqrt{10}$

(D) $10k$

Q22: NTA Test 28 (Single Choice)

Let $x_1,\ x_2,\ x_3\ldots.x_k$ be k observations and $w_i=ax_i+b$ for $i=1,2,\ 3.\ldots.k$, where a and b are constants. If mean of x_i is 52 and their standard deviation is 12 and mean of w_i is 60 and their standard deviation is 15, then the value of a and b should be

(A) $a=1.25, b=-5$

(B) $a=-1.25, b=5$

(C) $a=2.5, b=-5$

(D) $a=2.5, b=5$

Q23: NTA Test 29 (Numerical)

If the variance of the first n natural numbers is 10 and the variance of the first m even natural numbers is $16,$ then the value of $m+n$ is equal to

Q24: NTA Test 30 (Numerical)

A number equal to 2 times the mean and with a frequency equal to k is inserted in a data having n observations. If the new mean is $\frac{4}{3}$ times the old mean, then the value of $\frac{k}{n}$ is

Q25: NTA Test 31 (Single Choice)

The means of two samples of size 40 and 50 were found to be 54 and 63 respectively. Their standard deviations were 6 and 9 respectively. The variance of the combined sample of size 90 is

(A) 90

(B) 7

(C) 9

(D) 81

Q26: NTA Test 33 (Single Choice)

The mean and standard deviation of 10 observations $x_1,\ x_2,\ x_3.\ldots.x_{10}$ are $\overline{x}$ and σ respectively. Let 10 is added to $x_1,\ x_2.\ldots.x_9$ and 90 is subtracted from x_{10}. If still, the standard deviation is the same, then $x_{10}-\overline{x}$ is equal to

(A) 35

(B) 45

(C) 55

(D) 50

Q27: NTA Test 34 (Single Choice)

If the mean of 10 observations is 50 and the sum of the squares of the deviations of observations from the mean is 250, then the coefficient of variation of these observations is

(A) 25

(B) 50

(C) 10

(D) 5

Q28: NTA Test 35 (Single Choice)

If $x_1,\ x_2,\ x_3 ... x_{34}$ are numbers such that $x_i = x_{i+1} = 150,\ \forall i \in \{1,2,3,4, ... 9\}$ and $x_{i+1} - x_i = -2,\ \forall i \in \{10,11, ... 33\}$, then median of $x_1,\ x_2,\ x_3 ...... x_{34}$ is

(A) 134

(B) 135

(C) 148

(D) 150

Q29: NTA Test 37 (Single Choice)

The variance of the first 20 positive integral multiples of 4 is equal to

(A) 532

(B) 133

(C) 266

(D) 600

Q30: NTA Test 38 (Numerical)

The ratio of the variance of first n positive integral multiples of 4 to the variance of first n positive odd numbers is

Q31: NTA Test 39 (Single Choice)

Let V_1 = variance of $\{13,16,19 .... 103\}$ and V_2 = variance of $\{20,26,32 .... 200\}$. Then $\mathrm{V}_1 : \mathrm{V}_2$ is

(A) $1:2$

(B) $1:1$

(C) $4:9$

(D) $1:4$

Q32: NTA Test 40 (Single Choice)

The mean square deviation of a set of observations $\mathrm{x}_1, \mathrm{x}_2 ...... \mathrm{x}_\mathrm{n}$ about a point m is defined as $\frac{1}{\mathrm{n}} \sum_{\mathrm{i}=1}^{\mathrm{n}} (\mathrm{x}_\mathrm{i} - \mathrm{m})^2$. If the mean square deviations about -1 and 1 of a set of observations are 7 and 3 respectively. The standard deviation of those observations is

(A) $\sqrt{2}$

(B) 2

(C) 5

(D) $\sqrt{3}$

Q33: NTA Test 42 (Single Choice)

If 2 data sets having 10 and 20 observations have coefficients of variation 50 and 60 respectively and arithmetic means 30 and 25 respectively, then the combined variance of those 30 observations is

(A) $\frac{2075}{3}$

(B) $\frac{2075}{9}$

(C) $\frac{1000}{9}$

(D) $\frac{1075}{3}$

Q34: NTA Test 43 (Single Choice)

If the mean and the variance of the numbers $a,\ b,\ 8$, 5 and 10 are 6 and 6.8 respectively, then the value of $a^3 + b^3$ is equal to

(A) 58

(B) 61

(C) 91

(D) 89

Q35: NTA Test 44 (Single Choice)

Two data sets each of size 10 has the variance as 4 and k and the corresponding means as 2 and 4 respectively. If the variance of the combined data set is $5 \cdot 5$, then the value of k is equal to

(A) 5

(B) 6

(C) 4

(D) 3

Q36: NTA Test 45 (Single Choice)

If the variance of first n even natural numbers is 133, then the value of n is equal to

(A) 19

(B) 24

(C) 21

(D) 20

Q37: NTA Test 46 (Numerical)

The mean of 40 observations is 20 and their standard deviation is 5. If the sum of the squares of the observations is k, then the value of $\frac{k}{1000}$ is

Q38: NTA Test 48 (Single Choice)

In ten observations, the mean of all 10 numbers is 15, the mean of the first six observations is 16 and the mean of the last five observations is 12. The sixth number is

(A) 6

(B) 9

(C) 12

(D) 3

Answer Keys

Q1: (A)	**Q2:** (C)	**Q3:** (A)
Q4: (A)	**Q5:** 3	**Q6:** (B)
Q7: (D)	**Q8:** (D)	**Q9:** (D)
Q10: (C)	**Q11:** (C)	**Q12:** 12
Q13: (B)	**Q14:** (B)	**Q15:** 6
Q16: (C)	**Q17:** (D)	**Q18:** (D)
Q19: (C)	**Q20:** (D)	**Q21:** (A)
Q22: (A)	**Q23:** 18	**Q24:** 0.5
Q25: (D)	**Q26:** (B)	**Q27:** (C)
Q28: (B)	**Q29:** (A)	**Q30:** 4
Q31: (D)	**Q32:** (D)	**Q33:** (B)
Q34: (C)	**Q35:** (A)	**Q36:** (D)
Q37: 17	**Q38:** (A)	

Solutions

Q1: (A) 14.0

Given, $\frac{\left(\sum_{i=1}^{15} x_i\right)+16}{16} = 16$

$\Rightarrow \sum_{i=1}^{15} x_i + 16 = 256$

$\sum_{i=1}^{15} x_i = 240$

Required mean $= \frac{\sum_{i=1}^{15} x_i + 3 + 4 + 5}{18} = \frac{240+3+4+5}{18}$

$= \frac{252}{18} = 14$

Q2: (C) 8

Let, the number are k, $k + 2,\ k + 4,\ k + 6,\ k + 8$
so, the difference between highest & lowest = 8

Q3: (A) 3.99

$\frac{\sum x_i}{20} = 10 \ldots \text{(i)}$
$\frac{\sum x_i^2}{20} - 100 = 4 \ldots \text{(ii)}$
$\sum x_i^2 = 104 \times 20 = 2080$
Actual mean $= \frac{200-9+11}{20} = \frac{202}{20}$
Variance $= \frac{2080-81+121}{20} - \left(\frac{202}{20}\right)^2$
$= \frac{2120}{20} - (10.1)^2 = 106 - 102.01 = 3.99$

Q4: (A) $6 \text{ or } \frac{14}{3}$

From the given data, we make the following table

x	x^2
2	4
3	9
11	121
x	x^2
$\sum x = 16 + x$	$\sum x^2 = 134 + x^2$

But we know that, variance $= \frac{\sum x^2}{n} - \left(\frac{\sum x}{n}\right)^2$
$\Rightarrow \frac{134+x^2}{4} - \left(\frac{16+x}{4}\right)^2 = \frac{49}{4}$ (given)
$\Rightarrow \frac{134+x^2}{4} - \frac{(256+x^2+32x)}{16} = \frac{49}{4}$
$\Rightarrow \frac{3x^2-32x+280}{16} = \frac{49}{4}$
$\Rightarrow 3x^2 - 32x + 280 = 196 \Rightarrow 3x^2 - 32x + 84 = 0$
$\Rightarrow (x-6)(3x-14) = 0 \Rightarrow x = 6, x = \frac{14}{3}$
Therefore, the values of x are 6 or $\frac{14}{3}$

Q5: 3

The given data is :

6, 8, 10, 12, 14, 16, 18, 20, 22, 24

$\therefore\ \bar{x} = \frac{6+8+10+12+14+16+18+20+22+24}{10}$

$= \frac{150}{10} = 15$

The table is as below :

x_i	$x_i - \bar{x}$	$\left(x_i - \bar{x}\right)^2$
6	-9	81
8	-7	49
10	-5	25

12	−3	9
14	−1	1
16	1	1
18	3	9
20	5	25
22	7	49
24	9	81
Total		330

Hence, Variance $\left(\sigma^2\right) = \frac{\Sigma\left(x_i - \bar{x}\right)^2}{n} = \frac{330}{10} = 33$.

Q6: (B) $30, 20$

Given, $\mathrm{CV}_1 = 60, \mathrm{CV}_2 = 75, \sigma_1 = 18$ and $\sigma_2 = 15$

Let $\bar{x}_1$ and $\bar{x}_2$ be the means of 1^{st} and 2^{nd} distribution respectively.

Then, $\mathrm{CV}_1 = \frac{\sigma_1}{\bar{x}_1} \times 100 \Rightarrow \bar{x}_1 = \frac{18 \times 100}{60} = 30$

$\mathrm{CV}_2 = \frac{\sigma_2}{\bar{x}_2} \times 100 \Rightarrow \bar{x}_2 = \frac{15 \times 100}{75} = 20$

Hence, $\bar{x}_1 = 30$ and $\bar{x}_2 = 20$

Q7: (D) 5

Standard deviation $(\sigma) = \sqrt{\frac{1}{n}\sum_{i=1}^{n} x_i^2 - \frac{1}{n^2}\left(\sum_{i=1}^{n} x_i\right)^2}$

$= \sqrt{\frac{1}{n}\sum_{i=1}^{n} x_i^2 - \left(\bar{x}\right)^2}$

$\Rightarrow 5.1 = \sqrt{\frac{1}{100} \times \text{Incorrect} \sum_{i=1}^{n} x_i^2 - (40)^2}$

or, $26.01 = \frac{1}{100} \times$ Incorrect $\sum_{i=1}^{n} x_i^2 - 1600$

Therefore,

Incorrect $\sum_{i=1}^{n} x_i^2 = 100(26.01 + 1600) = 162601$

Correct mean, $\bar{x} = \frac{3990}{100} = 39.9$

Now, Correct $\sum_{i=1}^{n} x_i^2 =$ Incorrect $\sum_{i=1}^{n} x_i^2 - (50)^2 + (40)^2$

$= 162601 - 2500 + 1600 = 161701$

Therefore correct standard deviation

$= \sqrt{\frac{\text{Correct} \sum x_i^2}{n} - (\text{Correctmean})^2}$

$= \sqrt{\frac{161701}{100} - (39.9)^2} = \sqrt{1617.01 - 1592.01} = \sqrt{25} = 5$

Q8: (D) 90

$n_1 = 50,\ \bar{x}_1 = 630,\ \sigma_1 = 90$

$n_2 = 40,\ \bar{x}_2 = 540,\ \sigma_2 = 60$

$\bar{x} = \frac{50 \times 630 + 40 \times 540}{50 + 40} = \frac{3150 + 2160}{9}$

$= \frac{5310}{9} = 590$

Now, $d_1 = \bar{x}_1 - \bar{x},\ d_2 = \bar{x}_2 - \bar{x}$

$d_1 = 630 - 590 = 40$

$d_2 = 540 - 590 = -50$

S.D. of the 90 workers

$$= \sqrt{\frac{n_1(\sigma_1^2+d_1^2)+n_2(\sigma_2^2+d_2^2)}{n_1+n_2}}$$

$$= \frac{\sqrt{50(8100+1600)+40(3600+2500)}}{90}$$

$$= \frac{\sqrt{5(9700)+4(6100)}}{9}$$

$$= \frac{\sqrt{48500+24400}}{9}$$

$$= \sqrt{\frac{72900}{9}} = \sqrt{8100} = 90$$

Q9: (D) -2 **and** 0

Let the other two numbers be x and y.
According to the question,
Mean$= \frac{-1+1+2+x+y}{5} = 0 \Rightarrow x + y = -2 \ldots$ (i)
Also, $\sigma^2 = 2$
$\Rightarrow \frac{(-1-0)^2+(1-0)^2+(2-0)^2+(x-0)^2+(y-0)^2}{5} = 2$
$\Rightarrow 1 + 1 + 4 + x^2 + y^2 = 10 \Rightarrow x^2 + y^2 = 4 \ldots$ (ii)
$\Rightarrow (x + y)^2 - 2xy = 4$
$\Rightarrow 4 - 2xy = 4 \Rightarrow xy = 0 \ldots$ (iii)
Now, $(x - y)^2 = x^2 + y^2 - 2xy = 4 - 0 = 4$ {using (ii) and (iii) } ... (iv)
$\Rightarrow x - y = \pm 2$
Solving (i) and (iv) , we get,
If $x - y = 2, x = 0, y = -2$
If $x - y = -2, x = -2, y = 0$
So, the other two numbers are $-2, 0$

Q10: (C) 400

For observations $x_1,\ x_2,\ \ldots\ldots\ldots\ldots x_{50}$
Mean, $\bar{x} = \frac{\sum x_i}{50} = 16 \ldots\ldots$ (i)
Variance, $\sigma^2 = \frac{\sum x_i^2}{50} - \left(\bar{x}\right)^2 = 16^2$
$\Rightarrow \frac{\sum x_i^2}{50} = 16^2 + \left(\bar{x}\right)^2 = 16^2 + 16^2 = 512 \ldots\ldots$ (ii)
So, the mean value of $(x_1 - 4)^2,\ (x_2 - 4)^2,\ \ldots\ldots\ (x_{50} - 4)^2$ will be
$= \frac{\sum (x_i-4)^2}{50} = \frac{\sum x_i^2 - 8\sum x_i + 16\times 50}{50}$
$= \frac{\sum x_i^2}{50} - 8\frac{\sum x_i}{50} + 16 = 512 - 8 \times 16 + 16 = 400$ (using (i) and (ii))

Q11: (C) 10

Given, $\bar{x} = 50$

$\sum \left(x_i - \bar{x}\right)^2 = 250\ [\sigma^2 = \frac{1}{10} \times 250 = 25]$

$C.V = \frac{S.D}{\bar{x}} \times 100 = \frac{5}{50} \times 100 = 10.$

Q12: 12

Adding mean to the observations does not change the value of $\sum\left(x_i-\bar{x}\right)^2$, hence,

$$\frac{\left(\frac{\sum_{i=1}^{n}\left(x_i-\bar{x}\right)^2}{n}\right)}{\left(\frac{\sum_{i=1}^{n-1}\left(x_i-\bar{x}\right)^2}{n+1}\right)}=\frac{78}{72}$$

$\Rightarrow \frac{n+1}{n}=\frac{78}{72} \Rightarrow n=12$

Q13: (B) 11.8125

Let 15 observations are $x_1, x_2 \ldots\ldots x_{15}$

$\frac{x_1+x_2+x_3\ldots\ldots x_{15}}{15}=15$

If $x_{15}=15$

$\bar{x}_{new}=\frac{x_1+x_2+x_3\ldots x_{15}-15+6+8}{16}=\frac{224}{16}=14$

$\frac{\sum x_i^2}{15}-(\bar{x})^2=5 \Rightarrow x_1^2+x_2^2\ldots\ldots x_{14}^2+(15)^2=230\times15$

$\Rightarrow x_1^2+x_2^2\ldots\ldots x_{14}^2=3225$

New variance $=\frac{x_1^2+x_2^2\ldots\ldots x_{14}^2+6^2+8^2}{16}-\left(\bar{x}_{new}\right)^2$

$=\frac{3325}{16}-196$

$=11.8125$

Q14: (B) 28

$\sum x^2=360,\ \sum x=34$

corrected $\sum x'=34-8+10=36$

corrected $\sum x'^2=360+100-64=396$

The corrected variance $=\frac{\sum x'^2}{9}-\left(\frac{\sum x}{9}\right)^2=\frac{396}{9}-\left(\frac{36}{9}\right)^2$

$=44-16=28$

Q15: 6

Variance of $(3x_i+2)=9\text{var}(x_i)$

$=9\left(\frac{\sum x_i^2}{5}-\left(\frac{\sum x_i}{5}\right)^2\right)$

$=9(5-1)$

$=36$

$\Rightarrow$ S. D $=6$

Q16: (C) 6, 8

Let x and y be remaining 2 observations

Mean $=8=\frac{2+4+10+12+14+x+y}{7}$

$\Rightarrow x+y=14$ ...(i)

Variance $= 16 = \frac{1}{7}\left(2^2 + 4^2 + 10^2 + 12^2 + x^2 + y^2\right) - (8)^2$
$\Rightarrow x^2 + y^2 = 100$ ...(ii)
now solving equation (i) and (ii), we get,

$x = 8,\ y = 6$ or $x = 6,\ y = 8$

Q17: (D) 27

We know that,
$\sigma^2 \geq 0$
$\Rightarrow \frac{\Sigma x_i^2}{n} - \left(\frac{\Sigma x_i}{n}\right)^2 \geq 0$
$\Rightarrow \frac{400}{n} - \frac{10000}{n^2} \geq 0$
$\Rightarrow n \geq 25$

Q18: (D) $\frac{1440}{361}$

We have $n = 20$, $\overline{x}_{old} = 10$, $Var_{old} = 4$
$\Rightarrow \overline{x} = \frac{\Sigma x_i}{20} \Rightarrow \Sigma x_i = 200$
$\Rightarrow (\Sigma x_i)_{new} = 192, \overline{X}_{new} = \frac{192}{9}$
$Var_{(old)} = \frac{\Sigma x_i^2}{20} - (\overline{x}_{old})^2$
$4 = \frac{\Sigma x_i^2}{20} - 100$
$\Sigma x_{i\,(old)}^2 = 2080$
$\Sigma x_{i\,new}^2 = 2080 - 64 = 2016$
$Var_{(new)} = \frac{2016}{19} - \left(\frac{192}{19}\right)^2 = \frac{1440}{361}$

Q19: (C) 9

$\overline{x}_{(old)} = 10 = \frac{\Sigma x_i}{10} \Rightarrow \Sigma x_{\mathrm{i}(old)} = 100$
$\Sigma x_{\mathrm{i}(new)} = 100 - 8 + 18 = 110$
$\overline{x}_{(new)} = \frac{110}{10} = 11$
$Var_{(old)} = 4 = \frac{\Sigma x_{\mathrm{i}(old)}^2}{10} - \left(\overline{x}_{(old)}\right)^2$
$\Sigma x_{\mathrm{i}(old)}^2 = 1040$
$\Sigma x_{\mathrm{i}(new)}^2 = 1040 - 64 + 324$
$= 1300$
$Var_{(new)} = \frac{1300}{10} - (11)^2 = 130 - 121 = 9$

Q20: (D) 26

$\sum_{i=1}^{10}(x_i - 6) = 20 \Rightarrow \Sigma x_i = 80$
$\sum_{i=1}^{10}\left(x_i{}^2 - 10x_i + 25\right) = 350$
$\Rightarrow \sum_{i=1}^{10} x_i{}^2 = 350 + 800 - 250 = 900$
Then, variance $= \frac{900}{10} - (8)^2$
$= 90 - 64 = 26$

Q21: (A) k

Here, we see that 10 is added in each observation of the first data.

Since we know that SD does not depend on change of origin.

Hence, SD of second data is k.

Q22: (A) $a = 1.25, b = -5$

$w_i = a x_i + b$
$\Rightarrow \overline{w} = a\overline{x} + b$
$\Rightarrow 60 = a\,(52) + b$ …. (i)

$\text{S. D of } w = |a|\,(\text{S. D of } x_i)$
$15 = |a|12$
$\Rightarrow a = \pm 1.25$ …. (ii)

From (i) and (ii), we get,
If $a = 1.25 \Rightarrow 60 = 65 + b \Rightarrow b = -5$
If $a = -1.25 \Rightarrow 60 = -65 + b \Rightarrow b = 125$

Q23: 18

$var\,(1, 2, \ldots n) = 10 \Rightarrow \frac{1^2+2^2+\ldots+n^2}{n} - \left(\frac{1+2+\ldots+n}{n}\right)^2 = 10$
$\Rightarrow \frac{(n+1)(2n+1)}{6} - \left(\frac{n+1}{2}\right)^2 = 10$
$\Rightarrow n^2 - 1 = 120 \Rightarrow n = 11$
$var\,(2, 4, 6 \ldots, 2m) = 16 \Rightarrow var\,(1, 2 \ldots, m) = 4$
$\Rightarrow m^2 - 1 = 48 \Rightarrow m = 7 \Rightarrow m + n = 18$

Q24: 0.5

$\overline{x}_{\text{new}} = \frac{4}{3}\overline{x}$
From given information
$\overline{x}_{\text{new}} = \frac{n\overline{x}+2k\overline{x}}{n+k} = \frac{4}{3}\overline{x}$
$\Rightarrow 3n + 6k = 4n + 4k$
$\Rightarrow 2k = n$
$\Rightarrow \frac{k}{n} = 0.5$

Q25: (D) 81

$n_1 = 40, n_2 = 50$
$\overline{x}_1 = 54, \overline{x}_2 = 63$
$\sigma_1 = 6, \sigma_2 = 9$
$\overline{x} = \frac{n_1\overline{x}_1 + n_2\overline{x}_2}{n_1+n_2} = \frac{40\times54+50\times63}{90} = 59$
$d_1 = \overline{x} - \overline{x}_1 = 5$
$d_2 = \overline{x}_2 - \overline{x} = 4$
Combined S. D $= \sqrt{\frac{n_1 d_1^2 + n_2 d_2^2 + n_1\sigma_1^2 + n_2\sigma_2^2}{n_1+n_2}}$
$= \sqrt{\frac{40\times25+50\times16+40\times36+50\times81}{90}}$
$= 9$
Variance $= 81$

Q26: (B) 45
$\sum_{i=1}^{10} \frac{(x_i-\bar{x})^2}{10} = \sigma^2 \ldots (1)$
$\frac{\sum_{i=1}^{9} (x_i+10-\bar{x})^2 + (x_{10}-90-\bar{x})^2}{10} = \sigma^2 \ldots (2)$

From (1) and (2)

$\frac{\sum_{i=1}^{10}(x_i-\overline{x})^2}{10}=\frac{\sum_{i=1}^{10}(x_i-\overline{x})^2+20\sum_{i=1}^{9}(x_i-\overline{x})-180(x_{10}-\overline{x})+100\times 9+8100}{10}$

$2\times\sum_{i=1}^{9}(x_i-\overline{x})+2(x_{10}-\overline{x})-20(x_{10}-\overline{x})+90+810=0$

$\Rightarrow 900=20(x_{10}-\overline{x})\Rightarrow x_{10}-\overline{x}=45$

Q27: (C) 10

Given, $\overline{x}=50$

$\sum\left(x_i-\overline{x}\right)^2=250\ \left[\sigma^2=\frac{1}{10}\times 250=25\right]$

$C.V=\frac{S.D}{\overline{x}}\times 100=\frac{5}{50}\times 100=10.$

Q28: (B) 135

Total no. of term $=34$

So mean of 17^{th} and 18^{th} term is median

$x_{10+n}=136, x_{18}=134$

Hence, median $=135$

Q29: (A) 532

The numbers are $4, 8, 12.\ldots\ldots.80$

Mean, $\left(\overline{x}\right)=\frac{4(1+2+3+\ldots\ldots20)}{20}=42$

$\Sigma x_i^2=4^2\left(1^2+2^2+\ldots\ldots 20^2\right)$

$=\frac{16\times 20\times 21\times 41}{6}=45920$

So, the variance is $=\frac{\Sigma x_i^2}{20}-\left(\overline{x}\right)^2=2296-1764=532$

Q30: 4

Let the variance of first n natural numbers is σ^2 then the variance of first n integral multiple of 4 is $16\sigma^2$ and the variance of first n odd natural numbers is $4\sigma^2$

Then, the required ratio is $\frac{16\sigma^2}{4\sigma^2}=4$

Q31: (D) 1 : 4

V_1 = variance of $\{13,16,19.\ldots\ldots\ldots.103\}$

= variance of $\{3,6,9.\ldots\ldots\ldots.93\}$

= 9 of variance of $\{1,2,3.\ldots\ldots\ldots.31\}$

V_2 = variance of $\{20,26,32.\ldots\ldots\ldots.200\}$

= variance of $\{6,12,18.\ldots\ldots\ldots.186\}$

= 36 of variance of $\{1,2,3.\ldots\ldots\ldots.31\}$

$\frac{V_1}{V_2}=\frac{1}{4}$

Q32: (D) $\sqrt{3}$

$\frac{\sum_{i=1}^{n}(x_i+1)^2}{n}=7$(given)

$\Rightarrow\sum x_i^2+2\sum x_i+n=7n$

$\Rightarrow\sum x_i^2+2\sum x_i=6n\ \ldots(1)$

Also, $\frac{\sum(x_i-1)^2}{n}=2$ (given)

$\Rightarrow \sum x_i^2 - 2\sum x_i + n = 3n$
$\Rightarrow \sum x_i^2 - 2\sum x_i = 2n \ldots (2)$
From (1) and (2)
$\sum x_i^2 = 4n, \ \sum x_i = n$
Standard deviation$= \sqrt{\frac{\sum x_i^2}{n} - \left(\frac{\sum x_i}{n}\right)^2}$
$= \sqrt{\frac{4n}{n} - 1} = \sqrt{3}$

Q33: (B) $\frac{2075}{9}$
Given,

$n_1 = 10, \ \bar{x}_1 = 30, \ CV_1 = 50$
$n_2 = 20, \ \bar{x}_1 = 25, \ CV_2 = 60$
$CV_1 = \frac{\sigma_1}{\bar{x}_1} \times 100 \Rightarrow 50 = \frac{\sigma_1}{30} \times 100 \Rightarrow \sigma_1 = 15$
$CV_2 = \frac{\sigma_2}{\bar{x}_2} \times 100 \Rightarrow 60 = \frac{\sigma_1}{25} \times 100 \Rightarrow \sigma_2 = 15$
Combined mean $= \frac{10\times30+20\times25}{30} = \frac{80}{3}$
$d_1 = \bar{x}_1 - \bar{x} = \frac{10}{3}, \ d_2 = \bar{x} - \bar{x}_2 = \frac{5}{3}$
Combined variance $= \frac{n_1\sigma_1^2+n_2\sigma_2^2+n_1d_1^2+n_2d_2^2}{n_1+n_2}$
$= \frac{2250+4500+\frac{1000}{9}+\frac{500}{9}}{30}$
$= \frac{6225}{27} = \frac{2075}{9}$

Q34: (C) 91

Mean $= 6 = \frac{a+b+8+5+10}{5} \Rightarrow a + b = 7$
Variance $= 6.8 = \frac{a^2+b^2+64+25+100}{5} - 36$
$\Rightarrow a^2 + b^2 = 25$
$2ab = (a+b)^2 - (a^2+b^2) \Rightarrow ab = 12$
Now, $(a^3+b^3) = (a+b)^3 - 3ab(a+b)$
$= 343 - 3 \times 12 \times 7$
$= 91$

Q35: (A) 5

Combined mean, $\bar{x} = \frac{2\times10+4\times10}{20} = 3$
$d_1 = \bar{x}_1 - \bar{x} = -1$
$d_2 = \bar{x}_2 - \bar{x} = 1$
Combined variance $= \frac{n_1\sigma_1^2+n_2\sigma^2+n_1d_1^2+n_2d_2^2}{n_1+n_2}$
$\Rightarrow \frac{11}{2} = \frac{10\times4+10\times k+10\times1+10\times1}{20}$
$\Rightarrow k = 5$

Q36: (D) 20

$Var(2,4,6.........2n) = 133$
$\Rightarrow 4Var(1,2,3.........n) = 133$
$\Rightarrow Var(1,2,3.........n) = \frac{133}{4}$
$\Rightarrow \frac{1^2+2^2+.......n^2}{n} - \left(\frac{1+2+3+.......n}{n}\right)^2 = \frac{133}{4}$
$\Rightarrow \frac{(n+1)(2n+1)}{6} - \frac{(n+1)^2}{4} = \frac{133}{4}$
$\Rightarrow \frac{(n+1)}{2}\left[\frac{2n+1}{3} - \frac{n+1}{2}\right] = \frac{133}{4}$
$\Rightarrow \frac{(n+1)}{2}\left[\frac{n-1}{6}\right] = \frac{133}{4}$
$\Rightarrow n^2 - 1 = 399 \Rightarrow n = 20$

Q37: 17

$n = 40$
$\overline{x} = 20$
$\sigma = 05$
$\sigma^2 = \frac{\sum x_i^2}{40} - (\overline{x})^2$
$25 = \frac{\sum x_i^2}{40} - 400 \Rightarrow \sum x_i^2 = 17000$

Q38: (A) 6

Let the mean of the last four observations be A_2. Then, by the formula for combined mean, we get,

$15 = \frac{6\times16+4\times A_2}{6+4}$

or $150 = 96 + 4A_2$

$\therefore A_2 = \frac{54}{4}$

Let the sixth number is x, then taking the sixth number as a collection, the combined mean of this collection and the collection of the last four is 12.

$\therefore$ By the definition of combined mean

$12 = \frac{1\times x+4\times\frac{54}{4}}{1+4}$

$\therefore 60 = x + 54$
$\therefore x = 6$

Hence, the sixth number $= 6$