

STATISTICS

Form 5

Vol 11

Part 3 - Standard Score

1. B	2. B	3. C	4. B	5. C	6. C	7. C
8. B	9. A	10. A	11. B	12. B		

1. From the curves, we can observe that:

The mean of $P <$ the mean of Q ;

The median of $P <$ the median of Q ;

P is more dispersed than Q .

So, the inter-quartile range of $P >$ the inter-quartile range of Q .

Thus, II only.

2. From the curves, we can observe that:

The mode of $P <$ the mode of Q ;

The median of $P <$ the median of Q ;

P is more dispersed than Q .

So, the standard deviation of $P >$ the standard deviation of Q .

Thus, II only.

3. Let q_I , q_{II} and q_{III} be the inter-quartile ranges of the three distribution I, II and III respectively.

From the figures, we have $q_{III} > q_I > q_{II}$.

Note that the larger the inter-quartile range of the distribution is, the larger its standard deviation.

Thus, the required arrangement is: III, I, II.

4. From the curves, we can observe that:

The range of $P <$ the range of Q ;

The median of $P <$ the median of Q ;

The inter-quartile range of $P <$ the interquartile range of Q .

Thus, I and III only.

5. Note that the less dispersed the distribution is, the smaller its standard deviation.
From the figures, III is the most dispersed while II is the least dispersed.
Thus, the required arrangement is: III, I, II.
6. Let μ marks and σ marks be the mean and the standard deviation of the examination scores.
Then, we have $80 - \mu = 0.5\sigma$ and $(80 - 15) - \mu = (0.5 - 1.5)\sigma$.
Solving, we have $\mu = 75$ and $\sigma = 10$.
Thus, the required mean is 75 marks.

7. The standard deviation of the test scores
- $$= \frac{85 - 67}{2.25}$$
- $$= 8 \text{ marks}$$

The required score

$$= 67 + 1.25(8)$$

$$= 77 \text{ marks}$$

8. The mean of the scores
- $$= 74 - 1.2(7.5)$$
- $$= 65 \text{ marks}$$

The required standard score

$$= \frac{53 - 65}{7.5}$$

$$= -1.6$$

9. Let μ marks and σ marks be the mean and the standard deviation of the examination scores respectively.
Then, we have $97 - \mu = 3\sigma$ and $57 - \mu = -2\sigma$.
Solving, we have $\mu = 73$ and $\sigma = 8$.
Thus, the mean of the examination scores is 73 marks.

10. Let μ marks and σ marks be the mean and the standard deviation of the examination scores respectively.
Then, we have $74 - \mu = 1.5\sigma$ and $62 - \mu = -0.5\sigma$.
Solving, we have $\mu = 65$ and $\sigma = 6$.

The required standard score

$$= \frac{47 - 65}{6}$$

$$= -3$$

11. The minimum score in the examination
 $= 93 - 47$
 $= 46$

Let σ be the standard deviation of the distribution of the scores.

Then, we have $93 - 83 > 2\sigma$.

So, we have $\sigma < 5$.

Let z be the standard score of the students who performs the worst in the examination.

Then, we have $z = \frac{46 - 83}{\sigma}$.

Since $\sigma < 5$, we have $z < -\frac{37}{(5)} = -7.4$.

Hence the standard score of the student who performs the worst in the examination is less than -7 .

Thus, I and III only.

12. Let $6k$ and $5k$ be the examination scores of Christine and Daisy respectively.

Then, we have $\frac{6k - 68}{5k - 68} = \frac{7}{3}$.

So, we have $k = 16$.

Thus, the required score is 80.

Part 4A - Box and Whisker Diagram

- | | | | | | | |
|------|------|------|------|------|------|------|
| 1. C | 2. B | 3. B | 4. D | 5. D | 6. B | 7. C |
|------|------|------|------|------|------|------|

1. The following table shows some statistics of the distribution of the data.

Minimum	Lower quartile	Median	Upper quartile	Maximum
13	17	18	21	23

Thus, C is the desired answer.

2. The following table shows some statistics of the distribution of the scores of the students in the English test.

Minimum	Lower quartile	Median	Upper quartile	Maximum
20	45	60	85	100

The highest score in the examination is 100.

The inter-quartile range of the distribution

$$= 85 - 45$$

$$= 40$$

Note that 50% of the students scored 60 or above.

So, at least half of the students whose scores in the test are more than 55.

Thus, II only.

3. The following table shows some statistics of the distribution of the data.

Minimum	Lower quartile	Median	Upper quartile	Maximum
42	42	53	64	64

Note that $53 - 42 = 11$ and $64 - 53 = 11$.

Thus, B is the desired answer.

4. The following table shows some statistics of the distribution of the heights of the students.

Minimum	Lower quartile	Median	Upper quartile	Maximum
131	138	146	163	181

Note that $138 - 131 < 181 - 163$ and $146 - 138 < 163 - 146$.

Thus, D is the desired answer.

5. From the curve, it is obvious that the difference between the lower quartile and the minimum is greater than the difference between the maximum and the upper quartile.

Also, the difference between the median and the lower quartile is greater than the difference between the upper quartile and the median.

Thus, D is the desired answer.

6. From the box-and-whisker diagrams, we have $q_1 > q_2$ and $r_1 > r_2$.
However, the statement " $\mu_1 < \mu_2$ " cannot be determined from the box-and-whisker diagrams.

Thus, II only.

7. Observe that the frequency increases as the height increases from 136 cm to 179 cm, while the frequency decreases as the height increases from 181 cm to 190 cm.

Note that $179 - 136 > 190 - 181$.

Thus, C is the desired answer.