GER1000 Quiz 4

1- Are the statements below true or false?

I) Bias is a kind of random error

II) Random error is a kind of bias

III) Measurements are usually affected by both bias and random error

A) True, True, True

B) False, False, False

C) False, False, True

D) False, True, True

Answer: C

Random error and systematic error or bias are two different kinds of error. The third statement is always true.

2- Going back to slide 5 of unit 3, relative to Thermocouple 1, Thermocouple 2 is…

A) reliable but biased.

B) not reliable and biased.

C) reliable and not biased.

D) not reliable but not biased.

Answer: A

Based on the definition of reliability, thermocouple 1 is reliable. However, all the readings are higher than the true value. Hence, it is biased.

3- This question is with regard with slide number 4 of the first unit of measurement chapter. Which of the following statements is/are true?

I) Compared to Education Next public Opinion poll, a larger percentage of participants in PDK/Gallup poll has a neutral opinion or have refused to answer the questions.

II) The question asked by the Education Next Public Opinion Poll has a deliberate bias in it.

A) (I)

B) (II)

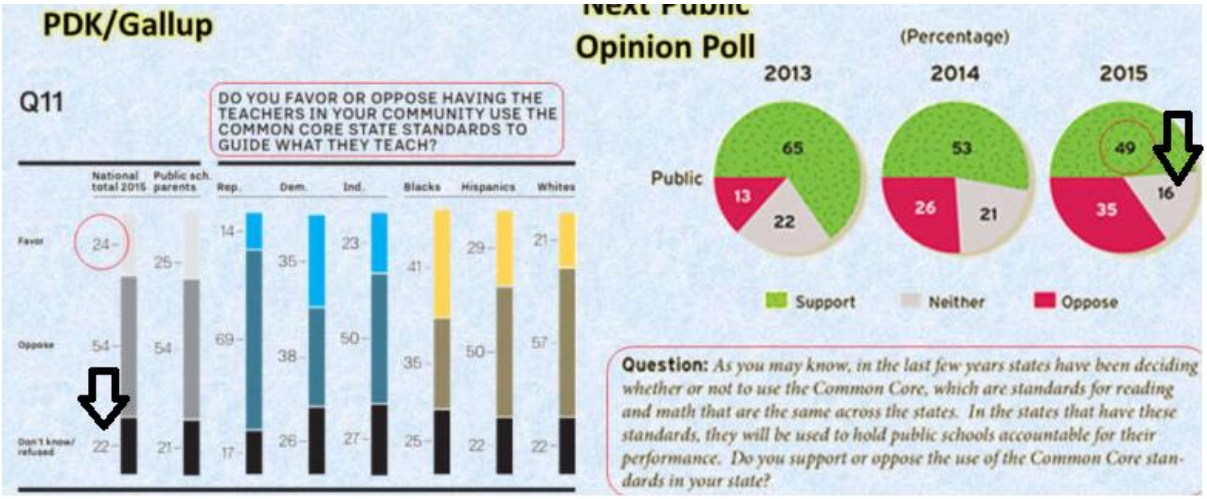
C) (I) and (II)

D) Neither (I) and (II)

Answer: C

The two quantitative date are shown by arrow in the figure below hence, (I) is true.

In the question asked by the Education Next Public Opinion Poll, the question is deliberately worded to indicate a desired answer which is to support Common Core standards. Hence, (II) is also true.



4- True or false?

“If a measurement method is unbiased, it implies that the result of each measurement of the same thing must be the same.”

A) True

B) False

Answer: B

If a method is unbiased, we still may face with random error and hence the result of each measurement of the same thing may not be the same.

5- In second chapter you learnt about standard deviation. Imagine that the height of every student in a class is measured using two instruments: A and B. The graph shows the frequency plot for both measurements. Note that the spread in A and B graphs is coming from both the variability of students’ height and the random error. Which of the following statements must be true?

(I) Bias is more prominent in measurement B than A.

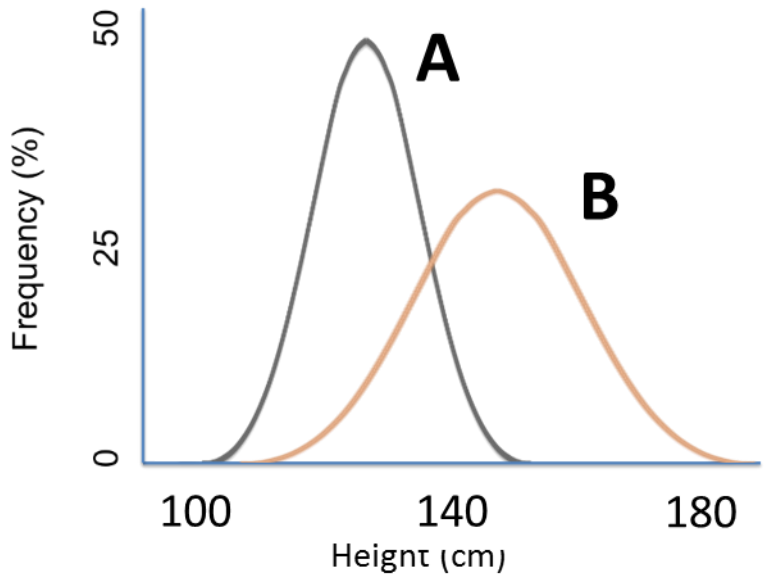
(II) Random error is more prominent in measurement B than A.

A) (I) only

B) (II) only

C) (I) and (II)

D) Neither (I) nor (II)



Answer: B

In chapter 2 we learnt that standard deviation indicates the variability or spread of the data around the average. Hence, if a data is more variable, it will have a larger standard deviation. From the graph, it is visually clear that B has a larger standard deviation and hence the data related to measurement B should have more variability. As mentioned in the question, the spread in A and B graphs is coming from both the variability of students' height and the random error. Since measurements A and B are done on all students from the same class, more variability in B should be due to more prominent random error compared to A. Hence (II) is true.

To be able to comment about the bias, we need to compare the average students' height measured by A or B with the true value of the average height of the students. Since we don't know the true value of the average height of the students of the class, hence (I) may not always be true.