

MARKS
5
(3, 2)

1. You want to compare the 'size' of several statistics textbooks.
- (a) Give three (3) possible numerical variates that make precise the vague idea of the 'size' of a book; for each variate, give the *units* of measurement and the *measuring instrument* required.
- (b) Explain briefly which variate is most appropriate for estimating how long it would take you to read the book; for deciding whether it would fit into your bag.

(a) (1)	<u>Height or width or thickness</u> Variate	<u>cm</u> Units	<u>Ruler</u> Measuring instrument
(a) (2)	<u>Weight</u> Variate	<u>grams</u> Units	<u>Balance or scale</u> Measuring instrument
(a) (3)	<u>Number of pages, words or chapters</u> Variate	<u>integer</u> Units	<u>Counting</u> Measuring instrument

- (b) Read: Variates of type (3) would be most appropriate for reading, because they measure the *content* of a book.
- (b) Fit in bag: Variates of type (1) would be most appropriate for fitting in a bag, because they measure the *physical dimensions* of a book.

MARKS
4
(2, 2)

2. All the members of a physical education class are asked to measure their pulse rate as they sit in a classroom. The students use several methods, among which are:
- Method 1:** count heart beats for 6 seconds and multiply by 10 to get beats per minute;
- Method 2:** count heart beats for 30 seconds and multiply by 2 to get beats per minute.
- (a) Which method is likely to yield a more accurate measurement? Explain briefly.
- (b) One student proposes **Method 3:** starting exactly on a heart beat, measure the time for the next 50 beats and then convert this time into beats per minute. Is Method 3 likely to yield a more or less accurate measurement than 1 and 2? Explain briefly.

(a) Method 2 is preferred.
 Inaccuracies involving *fractions* of a beat in the time interval will have *less* influence on the result for 30 seconds multiplied by 2 than for 6 seconds multiplied by the much larger 10; the result from the longer interval will also be less sensitive to irregularities in pulse rate.

2

(a)
Method preferred

(b) Method 3 is likely to yield a *more* accurate measurement than Methods 1 and 2.
 Method 3 overcomes the difficulty of fractions of a *beat* in a specified time interval and uses instead a whole number of beats; the fraction of a *second* at the end of the interval can be measured quite accurately with a suitable stopwatch.
 Also, 50 beats is closer to the resting pulse rate of around 70 beats per minute, with the advantages associated with a smaller multiplier being required to scale the result up to 60 seconds.

More

(b)
More or Less