## IB Statistics Questions 4

Name: $\qquad$

1. The heights in cm of the members of 4 volleyball teams $A, B, C$ and $D$ were taken and represented in the frequency histograms given below.


The mean $\bar{x}$ and standard deviation $\sigma$ of each team are shown in the following table.

|  | I | II | III | IV |
| :---: | :---: | :---: | :---: | :---: |
| $\bar{x}$ | 194 | 189 | 188 | 195 |
| $\sigma$ | 6.50 | 4.91 | 3.90 | 3.74 |

Match each pair of $\bar{x}$ and $\sigma$ (I, II, III, or IV) to the correct team (A, B, C or D).

| $\bar{x}$ and $\sigma$ | Team |
| :---: | :---: |
| I |  |
| II |  |
| III |  |
| IV |  |

2. A group of students has measured the heights of 90 trees. The class calculate the mean height to be $\bar{x}=$ 12.4 m with standard deviation $s=5.35 \mathrm{~m}$. One student notices that two of the measurements, 44.5 m and 43.2 m , are much too big and must be wrong.
(a) How many standard deviations away from the mean of 12.4 is the value 44.5 ?

The incorrect measurements of 44.5 m and 43.2 m must be removed from the data.
(b) Calculate the new value of $\bar{x}$ after removing the two unwanted values.


Answers:
(a)
(b)
3. A group of 25 females were asked how many children they each had. The results are shown in the histogram below.

Number of Children per Female

(a) Show that the mean number of children per female is 1.4.
(b) Show clearly that the standard deviation for this data is approximately 1.06 .
(c) Another group of 25 females was surveyed and it was found that the mean number of children per female was 2.4 and the standard deviation was 2 . Use the results from parts (a) and (b) to describe the differences between the number of children the two groups of females have.

## IB Statistics Standard deviation Questions

## Answers

1. 

| $\bar{x}$ and $\sigma$ | Team |
| :---: | :---: |
| I | B |
| II | C |
| III | D |
| IV | A |

(A6)
(C6)
Note: Award (A6) for all correct, (A4) for 2 correct or for 3 correct and 1 blank, (A2) for 1 correct but (A0) if the same letter appears 4 times.
2. (a) $\frac{44.5-12.4}{5.35}=6$
(M1)(A1)
(b) $90 \times 12.4=1116$
(M1)(A1) $1116-44.5-43.2=1028.3$
(M1)(A1)
$\frac{1028.3}{88}=11.7$
(M1)(A1)
Note: Award (M0)(A0) then ft for $88 \times 12.4$.
Award (M0)(A0) for $\frac{1028.3}{90}$.
3. (a) Mean $=\frac{5 \times 0+10 \times 1+6 \times 2+3 \times 3+1 \times 4}{25}=1.4$
(M2)(AG)
2
Note: Award (M1) for the numerator and (M1) for the denominator.
(b) $\quad \sum f(x-\bar{x})^{2}=5(0-1.4)^{2}+10(1-1.4)^{2}+6(2-1.4)^{2}$ $+3(3-1.4)^{2}+1(4-1.4)^{2}=28$

Note: Award (M1) for $(x-\bar{x})^{2}$ values, and (M1) for multiplying by the appropriate frequencies.

> S.D. $=\sqrt{\frac{28}{25}}$
> $\quad(\mathrm{M} 1)$
> $=1.06$
> $(\mathrm{AG})$
(c) Award (R1) for each acceptable reason, e.g.

Group 2 has more children in total.
Group 2 has a larger number of children per female.
Group 2 generally have larger families.

