IB MATHS AA HL · UNIT 4

Presentation of Data: exam practice

10 questions · 32 marks · worked solutions and markschemes

Name _____ Date _____ Score / 32

- Answer every question before you look at the solutions. They start after the last question, with the marks for each line: M for method, A for accuracy, R for reasoning.
- Online, with more practice: ibmathrevision.com/hlaa/presentation-of-data-exam-practice

1. **2 marks · Paper 1 style · no calculator**

A school has 400 students in year 12 and 350 in year 13. A stratified sample of 60 students is chosen by year group.

Find how many students from each year are in the sample. **[2]**

2. **3 marks · Paper 2 style · calculator**

The ages of 11 members of a club are $14,\ 18,\ 21,\ 22,\ 25,\ 27,\ 29,\ 31,\ 34,\ 38,\ 45$.

Find the five-number summary needed for a box plot. **[3]**

3. **3 marks · Paper 2 style · calculator**

The heights of plants are grouped in a histogram with class $10 \le h < 20$ (frequency 12), $20 \le h < 25$ (frequency 15) and $25 \le h < 40$ (frequency 18).

Find the frequency density of each class. **[3]**

4. **3 marks · Paper 2 style · calculator**

A box plot of reaction times has minimum 0.21 s, $Q_1 = 0.30$ s, median 0.35 s, $Q_3 = 0.42$ s and maximum 0.71 s.

Find the boundary above which a time is an outlier, and state whether the maximum is an outlier. **[3]**

5. **3 marks · Paper 1 style · no calculator**

State whether each variable is discrete or continuous: the number of cars in a car park; the time to run 100 m; a shoe size.

Classify each variable. **[3]**

6. **4 marks · Paper 2 style · calculator**

The masses of 80 eggs are grouped: $50 \le m < 55$: 12; $55 \le m < 60$: 26; $60 \le m < 65$: 30; $65 \le m < 70$: 12.

Estimate the median and the interquartile range by linear interpolation. **[4]**

7. **2 marks · Paper 1 style · no calculator**

A researcher surveys the first 50 people who leave a gym about how often people in the town exercise.

(a) Name the sampling method. **[1]**

(b) Explain why the sample is likely to be biased. **[1]**

8. 3 marks · Paper 1 style · no calculator

A factory names each item with a number from 1 to 2000 and checks every 40th item, starting from item 17.

(a) Name this sampling method. **[1]**

(b) Find the size of the sample and the number of the last item checked. **[2]**

9. 4 marks · Paper 2 style · calculator

The cumulative frequency table shows the times, t minutes, that 120 customers waited.

Time t	$t \leq 5$	$t \leq 10$	$t \leq 15$	$t \leq 20$	$t \leq 25$
Cumulative frequency	14	46	88	110	120

(a) Find the number of customers who waited more than 15 minutes. **[1]**

(b) Estimate the median waiting time by linear interpolation. **[3]**

10. 5 marks · Paper 2 style · calculator

The number of books read by 15 students in a year are $3, 5, 6, 6, 7, 8, 8, 9, 10, 11, 12, 13, 14, 15, 24$.

(a) Find the quartiles. **[3]**

(b) Determine whether 24 is an outlier. **[2]**

Answers and worked solutions

Question 1 — 2 marks

Answer: 32 and 28

year 12: $\frac{400}{750} \times 60 = 32$ **A1**

year 13: 28 **A1**

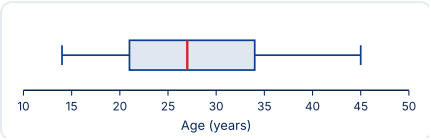
Question 2 — 3 marks

Answer: $14,\ 21,\ 27,\ 34,\ 45$

min 14, max 45 **A1**

median 27 **A1**

$Q_1 = 21$, $Q_3 = 34$ **A1**



Five-number summary 14, 21, 27, 34, 45

Question 3 — 3 marks

Answer: 1.2, 3, 1.2

1.2 **A1**

3 **A1**

1.2 **A1**

Question 4 — 3 marks

Answer: $0.60\ s$; yes, 0.71 is an outlier

IQR $= 0.12$ **A1**

$0.42 + 0.18 = 0.60$ **A1**

$0.71 > 0.60$, an outlier **A1**

Question 5 — 3 marks

Answer: discrete; continuous; discrete

discrete **A1**

continuous **A1**

discrete **A1**

Question 6 — 4 marks

Answer: median $60.4\ g$, IQR $7.13\ g$

median:

$55 + \frac{40 - 12}{26} \times 5 = 60.4$

$M1$**A1**

$Q_1 = 55 + \frac{8}{26} \times 5 = 56.5$,

$Q_3 = 60 + \frac{22}{30} \times 5 = 63.7$ **A1**

IQR $= 7.13$ **A1**

Question 7 — 2 marks

Answer: (a) convenience sampling

(a)

convenience sampling **A1**

(b)

gym users exercise more than the town as a whole **R1**

Question 8 — 3 marks

Answer: (a) systematic sampling; (b) 50 items; last 1977

(a)

systematic sampling **A1**

(b)

50 items **A1**

$17 + 49 \times 40 = 1977$ **A1**

Question 9 — 4 marks

Answer: (a) 32; (b) 11.7 minutes

(a)

$120 - 88 = 32$ **A1**

(b)

60th value in $10 < t \leq 15$ **M1**

$10 + \frac{60 - 46}{42} \times 5$ **A1**

11.7 min **A1**

Question 10 — 5 marks

Answer: (a) $Q_1 = 6$, median 9, $Q_3 = 13$; (b) yes, an outlier

(a)

$Q_1 = 6$ **A1**

median 9 **A1**

$Q_3 = 13$ **A1**

(b)

$13 + 1.5(7) = 23.5$ **M1**

$24 > 23.5$, so an outlier **A1**

Every solution is also on ibmathrevision.com/hlaa/presentation-of-data-exam-practice
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