Descriptive Statistics: 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/hlai/descriptive-statistics-exam-practice

1. **3 marks · Paper 1 style · calculator allowed**

The ages of ten runners are $23,\ 27,\ 31,\ 31,\ 34,\ 36,\ 38,\ 41,\ 45,\ 52$.

Find the mean, median and mode. **[3]**

2. **2 marks · Paper 1 style · calculator allowed**

The mean mass of 8 parcels is 3.5 kg. Two more parcels of 4.2 kg and 5.8 kg are added.

Find the new mean. **[2]**

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

A cumulative frequency curve for 80 exam marks gives: median 54, lower quartile 43, upper quartile 66.

Find the interquartile range and the number of students scoring above 66. **[2]**

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

For the ages $23,\ 27,\ 31,\ 31,\ 34,\ 36,\ 38,\ 41,\ 45,\ 52$:

Find the standard deviation and the interquartile range. **[3]**

5. **3 marks · Paper 1 style · calculator allowed**

A data set has mean 24 and standard deviation 3.5. Every value is multiplied by 2 and then increased by 5.

Find the new mean, standard deviation and variance. **[3]**

6. **3 marks · Paper 2 style · calculator allowed**

The frequency table shows the number of pets owned by 50 families.

Pets	0	1	2	3	4
Frequency	14	18	10	6	2

Find the mean and standard deviation. **[3]**

7. **3 marks · Paper 1 style · calculator allowed**

The mean of x, $2x$, $3x+1$ and 10 is 7.

Find x and the median of the four numbers. **[3]**

8. **4 marks · Paper 2 style · calculator allowed**

The times (minutes) taken by 60 people to finish a puzzle are grouped.

Time	$0 \le t < 10$	$10 \le t < 15$	$15 \le t < 20$	$20 \le t < 30$
Frequency	12	18	21	9

Find the frequency densities for a histogram and estimate the mean time. **[4]**

9. **4 marks · Paper 2 style · calculator allowed**

The scores of twelve players are $12,\ 15,\ 17,\ 18,\ 18,\ 20,\ 21,\ 23,\ 25,\ 26,\ 28,\ 40$.

Find the five-number summary and determine whether 40 is an outlier. **[4]**

10. **5 marks · Paper 2 style · calculator allowed**

A set of bivariate data (x, y) follows an exponential model $y = a \cdot b^x$. By taking the base-10 logarithm of y, the transformed data $(x, \log_{10} y)$ shows a strong linear correlation. The regression line for the transformed data is $\log_{10} y = 0.4x + 1.2$.

Find the exact values of the constants a and b for the original exponential model.

Answers and worked solutions

Question 1 — 3 marks

Answer: 35.8, 35, 31

mean 35.8 **A1**

median 35 **A1**

mode 31 **A1**

Question 2 — 2 marks

Answer: 3.8 kg

$\dfrac{28+10}{10}$ **M1**

3.8 kg **A1**

Question 3 — 2 marks

Answer: 23; 20 students

23 **A1**

20 **A1**

Question 4 — 3 marks

Answer: $\sigma = 8.18$; IQR 10

$\sigma = 8.18$ **A1**

$Q_1 = 31$, $Q_3 = 41$ **A1**

IQR $= 10$ **A1**

Question 5 — 3 marks

Answer: 53, 7, 49

53 **A1**

7 **A1**

49 **A1**

Question 6 — 3 marks

Answer: mean 1.28, $\sigma = 1.11$

mean 1.28 **A1**

GDC **(M1)**

$\sigma = 1.11$ **A1**

Question 7 — 3 marks

Answer: $x = \dfrac{17}{6}$; median 7.58

$6x + 11 = 28$ **M1**

$x = \dfrac{17}{6}$ **A1**

median $\dfrac{2x + (3x+1)}{2} = 7.58$

A1

Question 8 — 4 marks

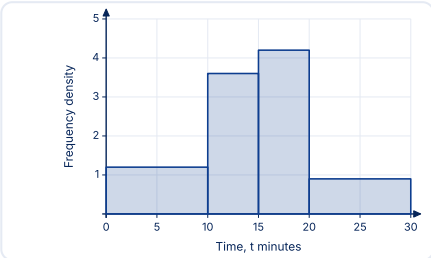
Answer: 14.6 minutes

$1.2,\ 3.6,\ 4.2,\ 0.9$ **A2**

$\dfrac{12(5) + 18(12.5) + 21(17.5) + 9(25)}{60}$

M1

14.6 min **A1**



Frequency density = frequency ÷ class width

Question 9 — 4 marks

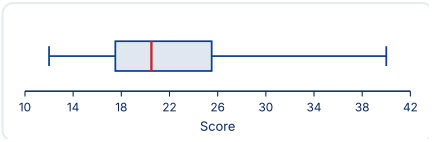
Answer:

$12,\ 17.5,\ 20.5,\ 25.5,\ 40$; an outlier

$12,\ 17.5,\ 20.5,\ 25.5,\ 40$ **A2**

$25.5 + 1.5(8) = 37.5$ **M1**

$40 > 37.5$: an outlier **A1**



Five-number summary 12, 17.5, 20.5, 25.5, 40

Question 10 — 5 marks

Answer: (a) 15.8; (b) 2.51

$\log_{10} y = (\log_{10} b)x + \log_{10} a$.

M1

So,

$\log_{10} a = 1.2 \implies a = 10^{1.2}$.

M1

$a \approx 15.8$ (accept $10^{1.2}$). **A1**

$\log_{10} b = 0.4 \implies b = 10^{0.4}$.

M1

$b \approx 2.51$ (accept $10^{0.4}$). **A1**

Model is $y = 10^{1.2} \cdot (10^{0.4})^x$.

Every solution is also on ibmathrevision.com/hlai/descriptive-statistics-exam-practice

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