HIGHER

4.1 Histograms and Frequency Density: 30-minute Pack

EDEXCEL 4MA1 · Calculator allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A histogram shows information about the masses, m kg, of parcels at a depot.
Bar heights (frequency density): $0 < m \leq 30$: height 2.8; $30 < m \leq 40$: height 1.2; $40 < m \leq 60$: height 2; $60 < m \leq 80$: height 0.6; $80 < m \leq 100$: height 0.2.
Calculate an estimate of the mean. Give your answer to 1 decimal place if it is not exact.

(Total for Question 1 is 4 marks)

2 A histogram shows information about the ages, a years, of people at a club.
Bar heights (frequency density): $0 < a \leq 10$: height 2.8; $10 < a \leq 20$: height 2; $20 < a \leq 30$: height 0.4; $30 < a \leq 40$: height 0.6; $40 < a \leq 70$: height 1.4; $70 < a \leq 80$: height 2.4.
Estimate the median. Give your answer to 1 decimal place if it is not exact.

(Total for Question 2 is 5 marks)

© Revision Library | revisionlibrary.co.uk

3 The table gives information about the distances, d km, travelled by workers to get to a bank.
Class and frequency: $20 < d \leq 50$: 60; $50 < d \leq 70$: 60; $70 < d \leq 80$: 20; $80 < d \leq 110$: 60; $110 < d \leq 120$: 28.
A histogram is to be drawn. Work out the frequency density for each class.

(Total for Question 3 is 3 marks)

---

4 A histogram shows information about the heights, h cm, of plants in a nursery.
Bar heights (frequency density): $10 < h \leq 15$: height 0.6; $15 < h \leq 25$: height 1.4; $25 < h \leq 30$: height 1.6; $30 < h \leq 50$: height 3; $50 < h \leq 70$: height 0.2.
Work out the frequency of the class $25 < h \leq 30$.

(Total for Question 4 is 2 marks)

© Revision Library | revisionlibrary.co.uk

5 A histogram shows information about the ages, a years, of people at a gym.
Bar heights (frequency density): $0 < a \leq 10$: height 2.6; $10 < a \leq 30$: height 2.6; $30 < a \leq 50$: height 2.4; $50 < a \leq 70$: height 2.2.
One item is chosen at random. Estimate the probability that $a \leq 9$.

(Total for Question 5 is 4 marks)

---

6 A histogram shows a bar for $100 \leq x < 140$ with height 0.75. A researcher asks for the estimated number in $110 \leq x < 120$. Explain how to estimate this number and calculate it, assuming uniform distribution within the class.

(Total for Question 6 is 4 marks)

© Revision Library | revisionlibrary.co.uk

Mark scheme · 4.1 Histograms and Frequency Density: 30-minute Pack

Question 1

frequencies = frequency density x width: 84, 12, 40, 12, 4	**M1**
midpoints: 15, 35, 50, 70, 90	**M1**
sum of midpoint x frequency = 4880, divided by the total frequency 152	**M1**
mean = 32.1	**A1**

Answer: 32.1

Question 2

frequencies = frequency density x width: 28, 20, 4, 6, 42, 24	**M1**
total frequency 124, so the median is the 62nd value	**M1**
median lies in the class $40 < a \leq 70$, with 58 values before it	**M1**
interpolates: 40 + (62 - 58) / 1.4	**M1**
median = 42.9	**A1**

Answer: 42.9

Question 3

uses frequency density = frequency / class width	**M1**
at least two frequency densities correct, e.g. 2 and 3	**A1**
frequency densities: 2, 3, 2, 2, 2.8	**A1**

Answer: 2, 3, 2, 2, 2.8

Question 4

uses frequency = frequency density x class width	**M1**
1.6 x 5 = 8	**A1**

Answer: 8

Question 5

frequencies = frequency density x width: 26, 52, 48, 44	**M1**
total frequency = 170	**M1**
estimates the number with $a \leq 9$ as 23.4 using the proportion of the class $0 < a \leq 10$	**M1**
probability = 23.4/170 = 117/850	**A1**

Answer: 117/850

Question 6

states method: find full class frequency by area then take proportion corresponding to sub-interval width	**M1**
calculates full class width = 40 and full frequency = 0.75 * 40 = 30	**M1**
calculates sub-interval width = 10 and proportional frequency = 30 * (10/40) = 7.5	**M1**
gives estimate 7.5 and comment that this may be rounded or reported as 7 or 8, cao	**A1**

Answer: Estimate = 7.5 (about 8 people if rounded)

© Revision Library | revisionlibrary.co.uk