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4. A group of 100 adults recorded the amount of time, t minutes, they spent exercising each day. Their results are summarised in the table below.

Time (t minutes)	Frequency (f)	Time midpoint (x)
$0 \leqslant t < 15$	25	7.5
$15 \leqslant t < 30$	17	22.5
$30 \leqslant t < 60$	28	45
$60 \leqslant t < 120$	24	90
$120 \leqslant t \leqslant 240$	6	180

[You may use $\sum fx^2 = 455\,512.5$]

A histogram is drawn to represent these data.

The bar representing the time $0 \leqslant t < 15$ has width 0.5 cm and height 6 cm.

(a) Calculate the width and height of the bar representing a time of $60 \leqslant t < 120$

(3)

(b) Use linear interpolation to estimate the median time spent exercising by these adults each day.

(2)

(c) Find an estimate of the mean time spent exercising by these adults each day.

(2)

(d) Calculate an estimate for the standard deviation of these times.

(2)

(e) Describe, giving a reason, the skewness of these data.

(1)

Further analysis of the above data revealed that 18 of the 25 adults in the $0 \leqslant t < 15$ group took no exercise each day.

(f) State, giving a reason, what effect, if any, this new information would have on your answers to

(i) the estimate of the median in part (b),

(ii) the estimate of the mean in part (c),

(iii) the estimate of the standard deviation in part (d).

(3)

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Question 4 continued

(Total 13 marks)

Q4