



**Starter:**

What is the difference between a histogram and a frequency diagram?

**Top Tips!**

**Interpreting a histogram:** Remember the frequency of a bar is the area of the bar so multiply the width of the bar by its height.

**Drawing a histogram:** You will need to work out the frequency density before you can draw a histogram. Remember frequency density is the frequency divided by the width of the group.

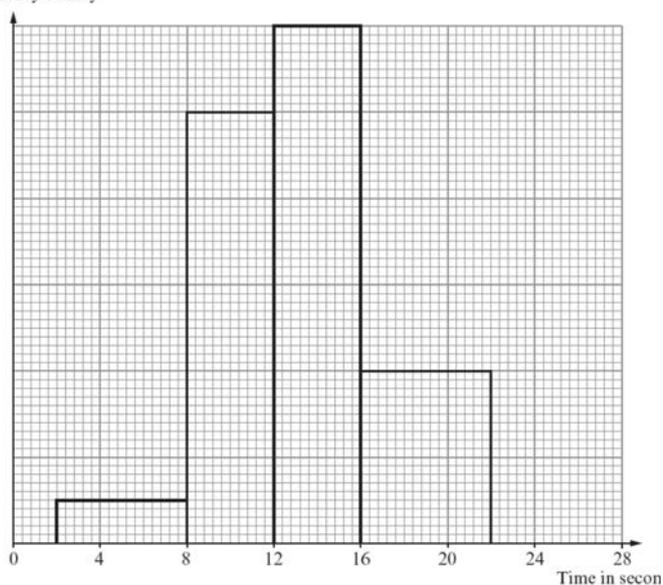
**Examination Question:**

**2013 January Link Applications U1 Higher Q11**

a) As part of a quality control exercise in a supermarket, the time taken to scan 20 items was measured for each worker under the age of 40.

A printout of each histogram that illustrates the results obtained is shown below.

Frequency density



Unfortunately, the labelling of the frequency density axis was missing from the printout. It is known that there were 12 workers under the age of 40 that took more than 16 seconds to scan the 20 items.

- (i) Complete the labelling of the scale on the frequency density axis. (3)
- (ii) Calculate how many workers under the age of 40 took part in this quality control exercise. (2)

(iii) Calculate an estimate of the median time taken by a worker under the age 40 to scan items. (4)

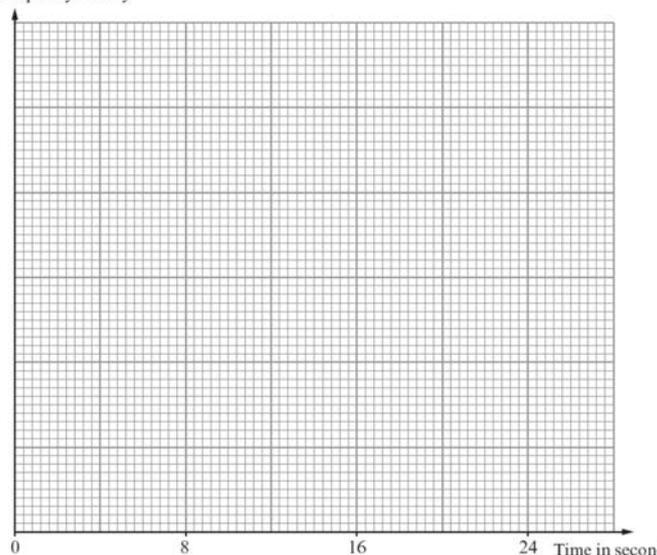
b) As part of the quality control exercise in a supermarket, the time taken to scan 20 items was measured for each worker aged 40 or over.

The table below shows the results.

Time in seconds, $t$	$0 < t \leq 4$	$4 < t \leq 8$	$8 < t \leq 12$	$12 < t \leq 16$	$16 < t \leq 24$
Number of workers	0	2	36	24	8

Complete the scale on the frequency density axis and draw a histogram to illustrate the distribution on the graph paper below. (3)

Frequency density



c) Which of the two groups of workers is, on average, quicker at scanning 20 items in the supermarket? You must give a reason for your answer.



**Starter:**

What is the difference between a histogram and a frequency diagram?

A frequency diagram shows the frequency with the height of the bars whereas a histogram represents the frequency with the area of each bar

**Top Tips!**

**Interpreting a histogram:** Remember the frequency of a bar is the area of the bar so multiply the width of the bar by its height.

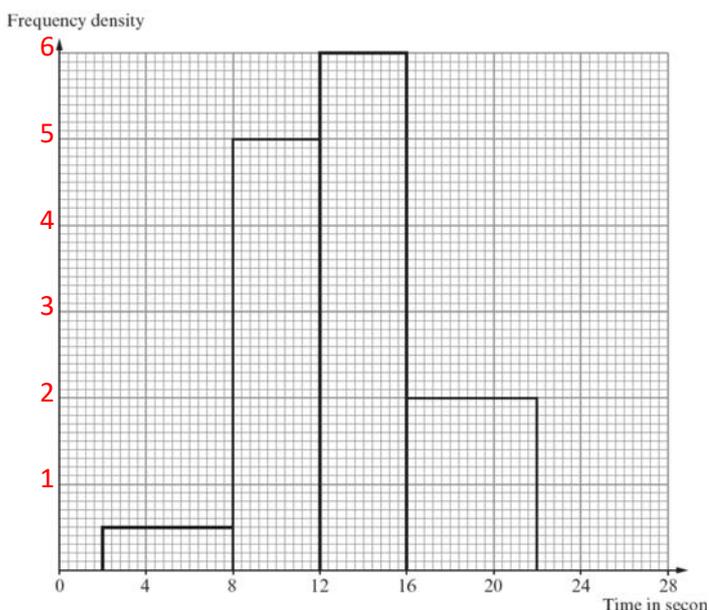
**Drawing a histogram:** You will need to work out the frequency density before you can draw a histogram. Remember frequency density is the frequency divided by the width of the group.

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A printout of each histogram that illustrates the results obtained is shown below.



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(i) Complete the labelling of the scale on the frequency density axis. (3)

$6 \times ? = 12$

(ii) Calculate how many workers under the age of 40 took part in this quality control exercise. (2)

$4 \times 0.5 = 3$

$4 \times 5 = 20$

$4 \times 6 = 24$

$6 \times 2 = 12$

= 59 workers

(iii) Calculate an estimate of the median time taken by a worker under the age 40 to scan items. (4)

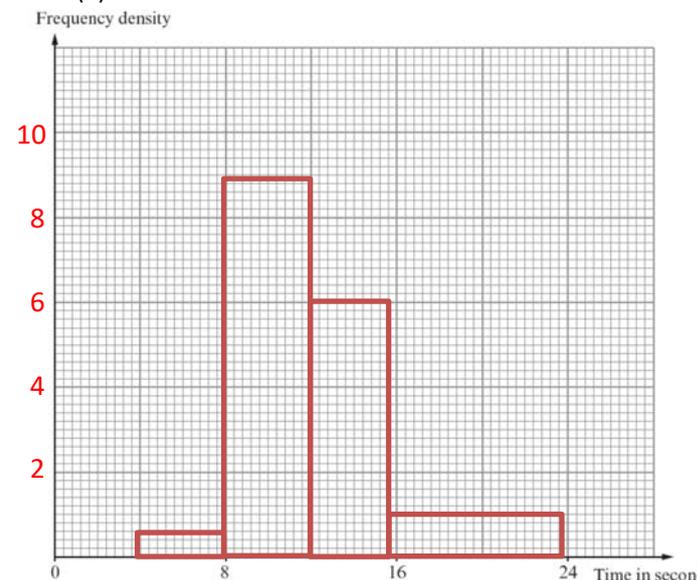
30<sup>th</sup> worker for the median. 1<sup>st</sup> two bars represent 23 workers so need another 7 from the third bar, so  $6 \times ? = 7$ ,  $? = 1.17$ , 12 seconds + 1.17 = 13.17 seconds

b) As part of the quality control exercise in a supermarket, the time taken to scan 20 items was measured for each worker aged 40 or over.

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Number of workers	0	2	36	24	8

Complete the scale on the frequency density axis and draw a histogram to illustrate the distribution on the graph paper below. (3)



c) Which of the two groups of workers is, on average, quicker at scanning 20 items in the supermarket? You must give a reason for your answer.

40 and over as the shape of the histograms indicates that more under the age of 40 took more than 12 seconds than the 40 and over.

Another reason could be to look at the median – the median for the 40 and over must be between 8 and 12 seconds whereas the median for the under 40 is 13.17 seconds

