

## Lesson 10

## A-level Statistics : Year 1 Partitioning Data

### 10.1 Histograms #1

A Histogram is **NOT** the same as a Bar Chart.

Bar Chart : *Height* is directly proportional to frequency

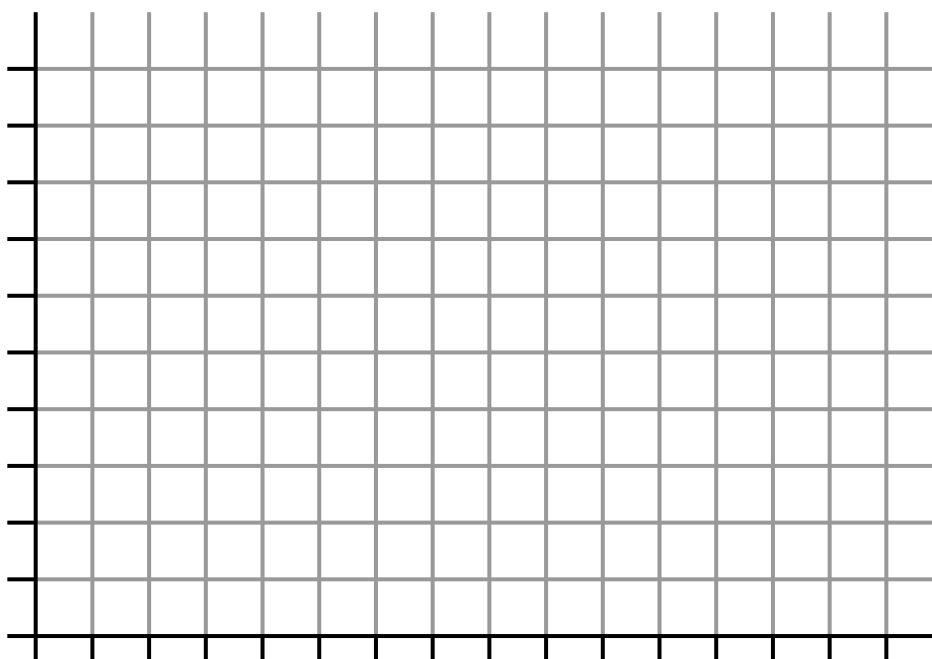
Histogram : *Area* is directly proportional frequency

### 10.2 Example

At a call centre the times taken to deal with 1000 calls were as follows:

Duration of call (minutes)	Number of calls Frequency = Area	Width	Height
$0 \leq t < 2$	200		
$2 \leq t < 6$	300		
$6 \leq t < 10$	200		
$10 \leq t < 30$	300		

Plot a histogram to show the distribution of the 1000 call times at the centre.  
Be sure to number and label the axes and give the histogram a title.

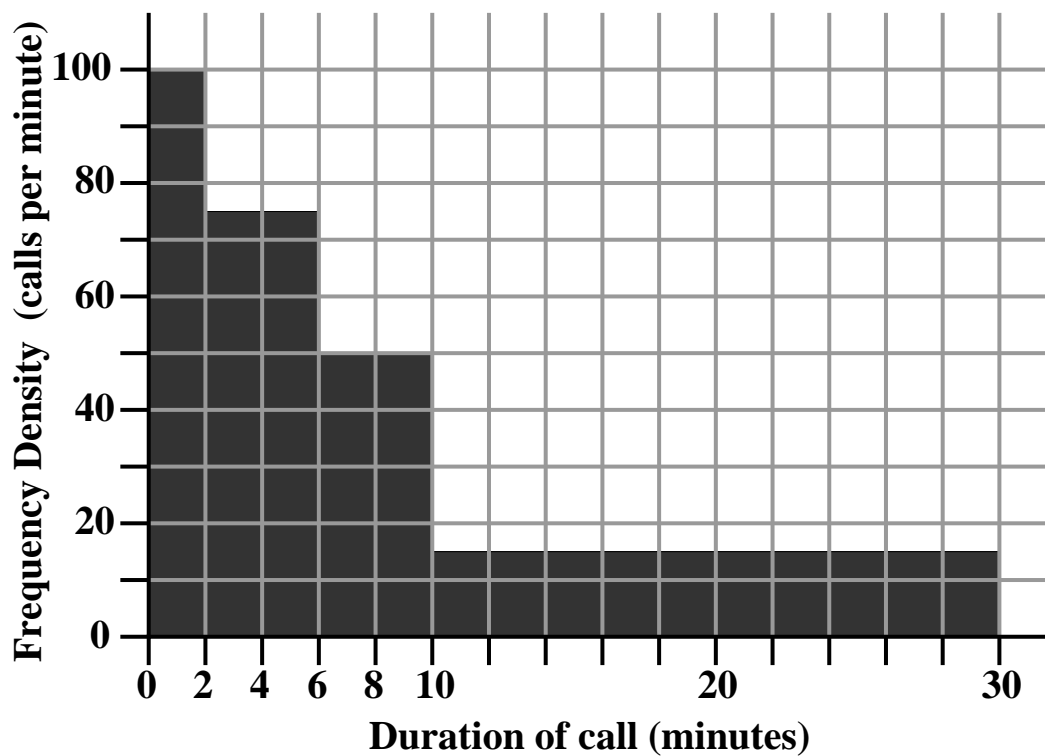


### 10.3 Solution to the example

Duration of call (minutes)	Number of calls Frequency = Area	Width	Height
$0 \leq t < 2$	200	2	100
$2 \leq t < 6$	300	4	75
$6 \leq t < 10$	200	4	50
$10 \leq t < 30$	300	20	15

[ 2 marks ]

A histogram to show the distribution of call times at a call centre



- Suitable title [ 1 mark ]
- An  $x$ -axis that is numbered, labelled, and with the units clearly stated [ 1 mark ]
- A  $y$ -axis that is numbered, labelled, and with the units clearly stated [ 1 mark ]
- For each bar that is of the correct width and height [ 3 marks ]

**Total : 8 marks**

## 10.4 Exercise

### Question 1

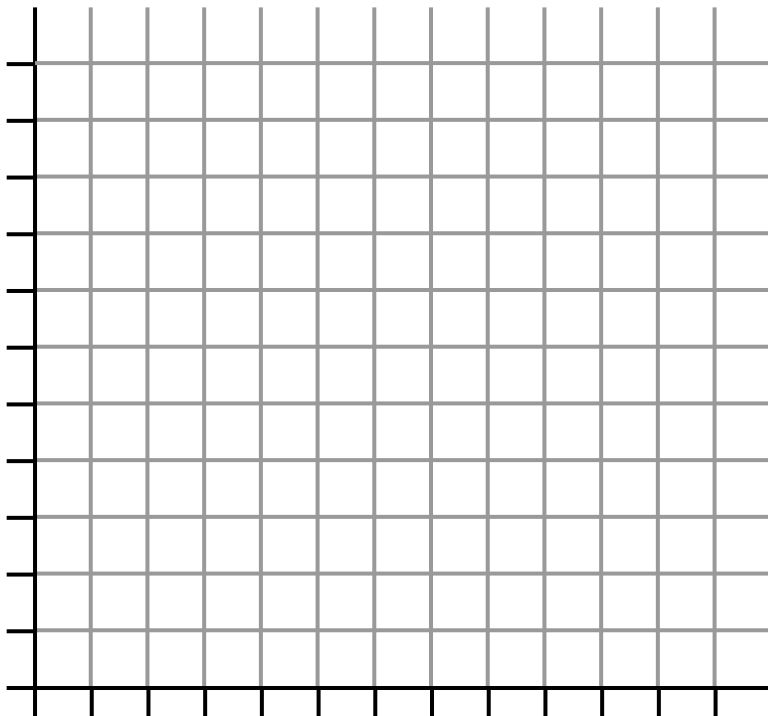
In a government survey, a questionnaire is emailed to 15000 people who have previously agreed to take part.

The time taken, in hours, to return the questionnaire is logged.

The following table presents a summary.

Response time (hours)	Number of questionnaires Frequency = Area	Width	Height
$0 \leq h < 2$	700		
$2 \leq h < 4$	1100		
$4 \leq h < 6$	2200		
$6 \leq h < 8$	1700		
$8 \leq h < 15$	3500		
$15 \leq h < 24$	2700		

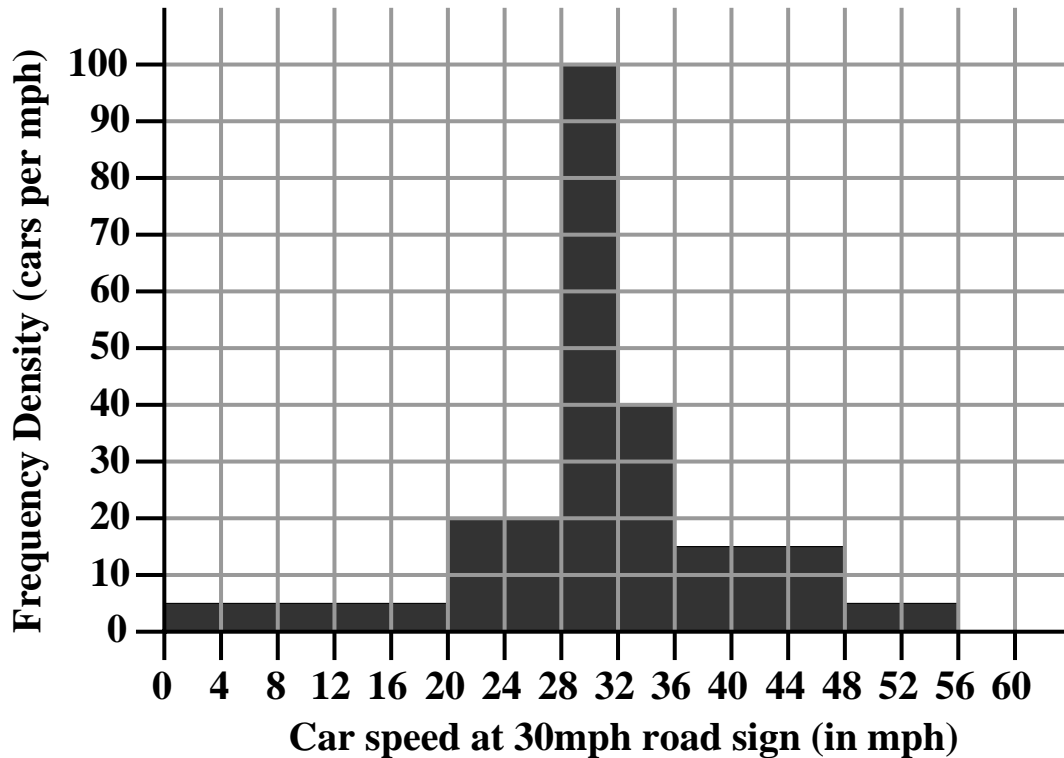
- (i) How many questionnaires have not generated a response ?
- (ii) Plot a histogram to show the distribution of the times taken in responding to the questionnaire. Complete the columns headed Width and Height in the table above, to help you do this.



### Question 2

In trying to decide if a speed camera is required in the town of Numberville, a consultant provides the following histogram which shows the distribution of car speeds as cars pass the 30mph sign heading into Numberville.

**A histogram to show the distribution of car speeds at a 30mph road sign**



(i) Use the histogram to complete the following table :

Car speed (miles per hour, mph)	Number of cars Frequency = Area	Width	Height
$0 \leq m < 20$			
$20 \leq m < 28$			
$28 \leq m < 32$			
$32 \leq m < 36$			
$36 \leq m < 48$			
$48 \leq m < 56$			

(ii) How many cars in total had their speed recorded entering Numberville ?

(iii) What percentage of cars were travelling within 2mph of the speed limit ?

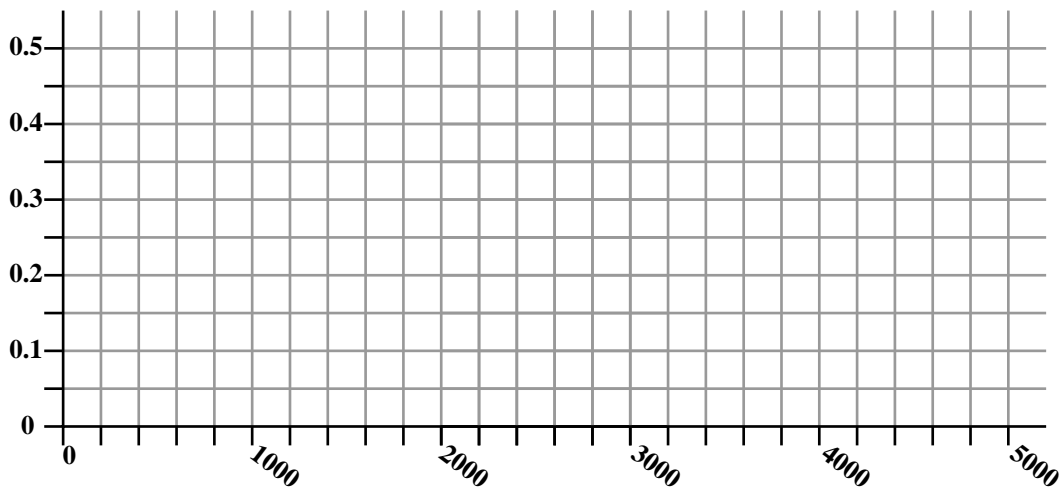
### Question 3

As part of a quality control test, 1100 light bulbs are left on continuously and the time taken before they fail is recorded.

The results are summarised in the table below.

Bulb lifetime (in hours)	Number of bulbs Frequency	Width	Height
$0 \leq t < 100$	50		
$100 \leq t < 1000$	180		
$1000 \leq t < 2000$	100		
$2000 \leq t < 4000$	500		
$4000 \leq t < 4500$	250		
$4500 \leq t < 4600$	20		

Plot a histogram to show the distribution of the life-times of the bulbs. Complete the columns headed Width and Height in the table above, to help you do this.



Be sure to number and label the axes and give the histogram a title.

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In October 2020, Shrewsbury School was voted "**Independent School of the Year 2020**"

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Teachers may obtain detailed worked solutions to the exercises by email from [mhh@shrewsbury.org.uk](mailto:mhh@shrewsbury.org.uk)