Dr Oliver Mathematics
Worked Examples
Histograms 1

From: AQA 2015 November Paper 2 (Calculator)

1. 70 people gave information about the number of hours they worked in one week. (6)
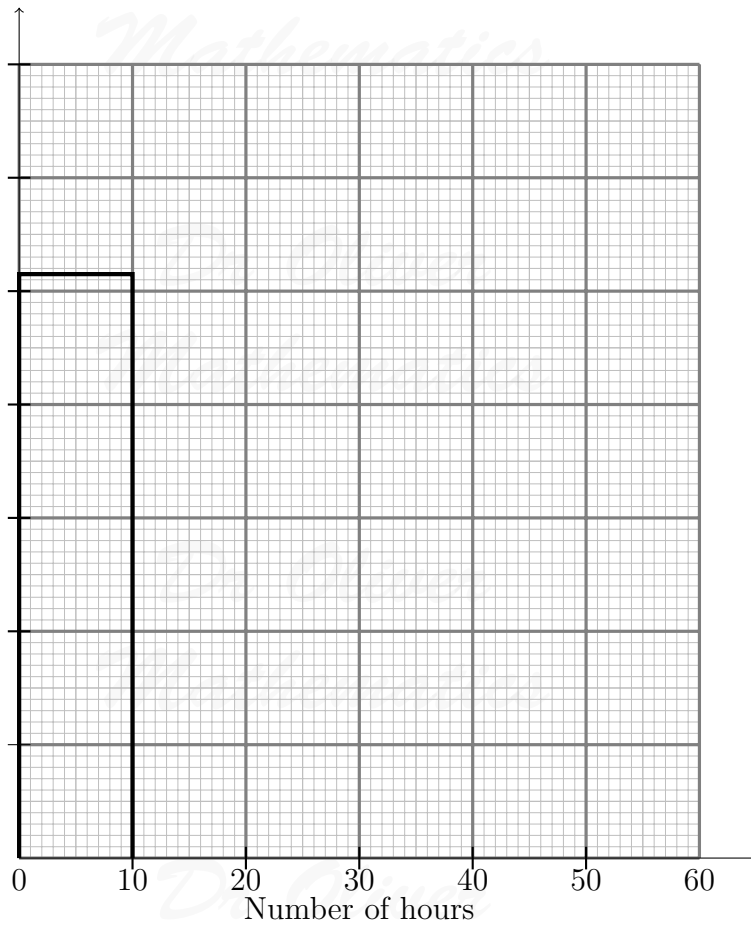   The table and histogram show some of that information.

Number of hours, n	Frequency
$0 < n \leqslant 10$	21
$10 < n \leqslant 20$	x
$20 < n \leqslant 40$	y
$40 < n \leqslant 50$	17

   $$x : y = 3 : 5.$$

   Complete the histogram.
   Remember to label the **scale** on the frequency density axis.

Frequency density

Number of hours

Solution

Well,

$$21 + x + y + 17 = 70 \Rightarrow x + y + 38 = 70$$
$$\Rightarrow x + y = 32.$$

Now,

$$3 + 5 = 8$$

and

$$x = \tfrac{3}{8} \times 32 = 12$$
$$y = \tfrac{5}{8} \times 32 = 20.$$

Let us complete the table:

Number of hours, n	Frequency	Width	Frequency Density
$0 < n \leqslant 10$	21	10	$\frac{21}{10} = 2.1$
$10 < n \leqslant 20$	12	10	$\frac{12}{10} = 1.2$
$20 < n \leqslant 40$	20	20	$\frac{20}{20} = 1$
$40 < n \leqslant 50$	17	10	$\frac{17}{10} = 1.7$

Count them: 52.5 little squares (check this: it is!) is the height of the first bar and its frequency density is 2.1. Now,

$$52.5 \text{ little squares} \leftrightarrow \text{Frequency density of } 2.1$$

$$\Rightarrow \quad 1 \text{ little square} \leftrightarrow \text{Frequency density of } \frac{2.1}{52.5} = 0.04$$
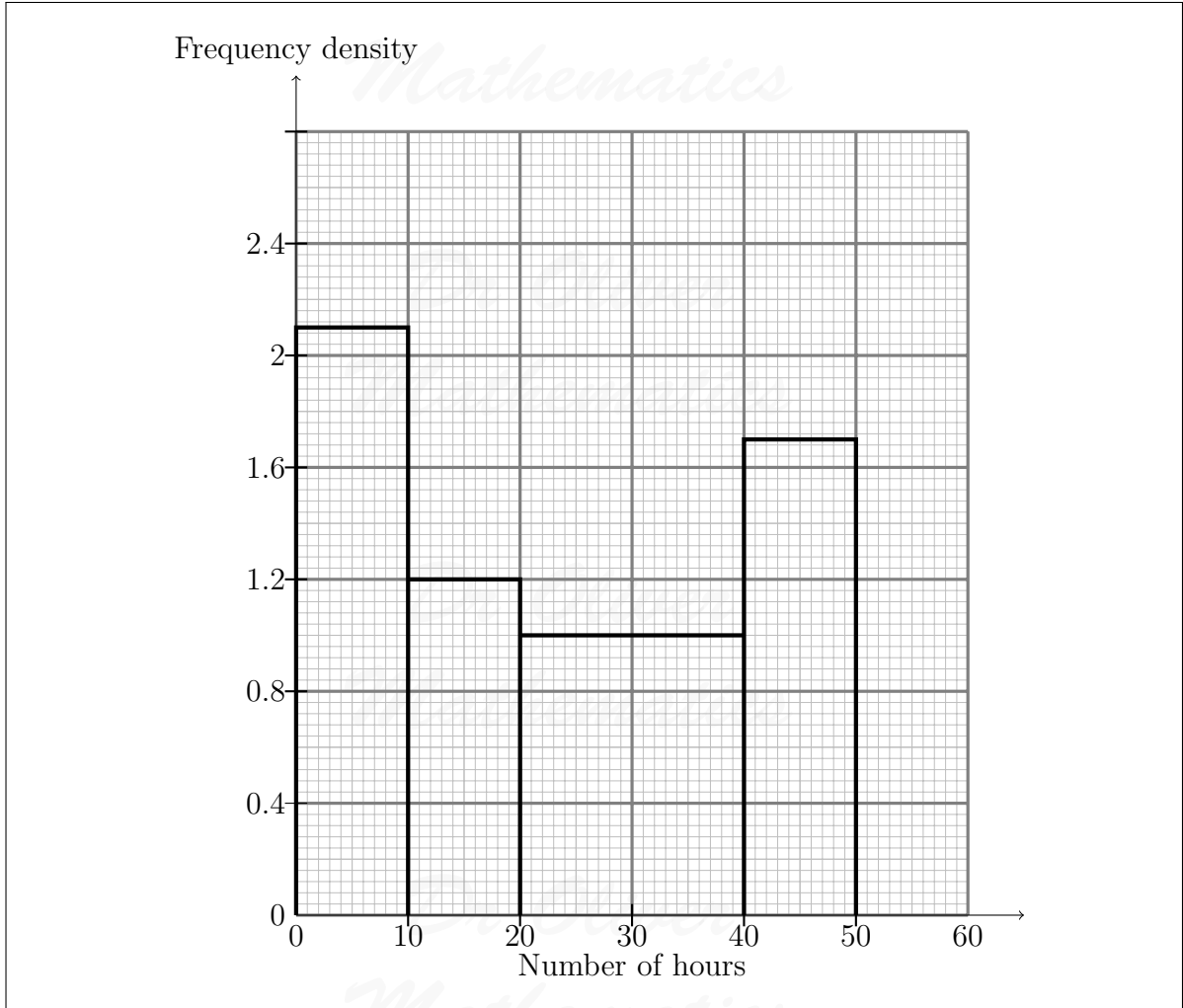
$$\Rightarrow \quad 10 \text{ little squares} \leftrightarrow \text{Frequency density of } 0.4.$$

So we want 10 little squares to represent 0.4 on the frequency density axis.

Now, we complete the histogram:

Frequency density

Number of hours