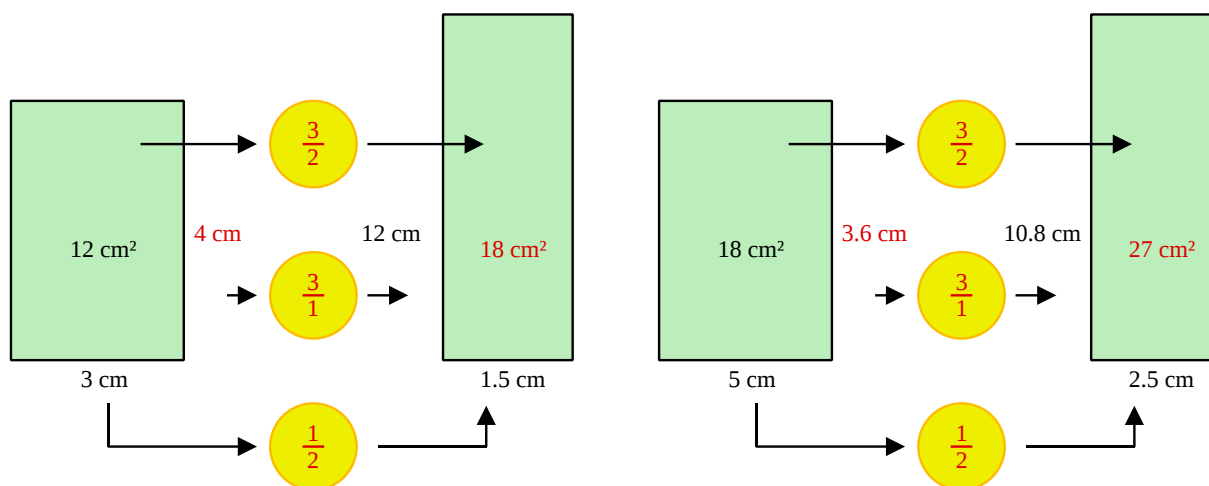


11.4 Answers

A-level Statistics : Year 1 Partitioning Data

11.4.1 Solution to 11.2 Example

Complete the diagram with Area Scale Factor, separate Length Scale Factors for the x and y axis and then work through the various numbers for the lengths and areas.

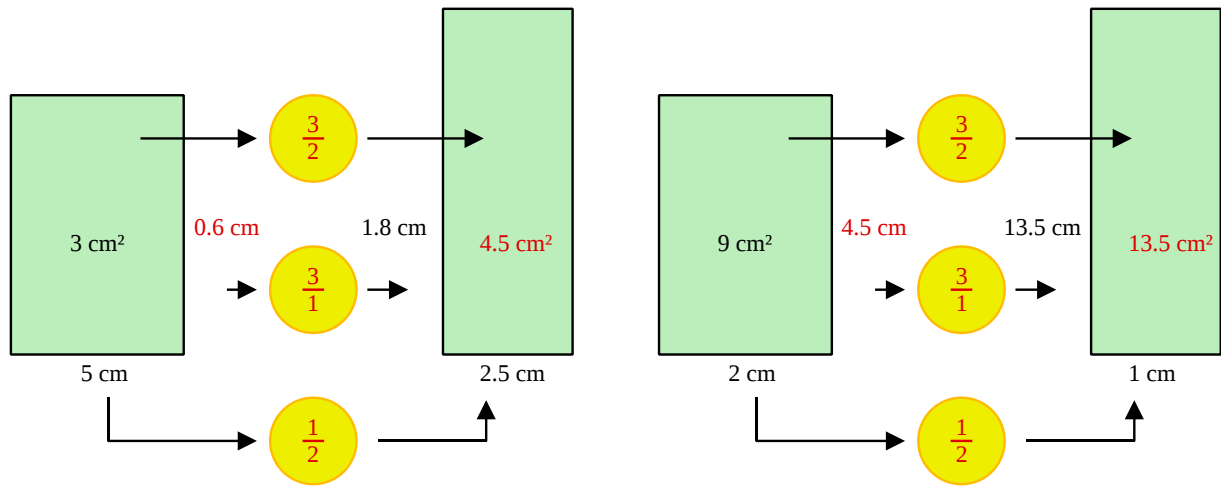


Thus, the $0 \leq h < 5$ group is represented by a bar of width 2.5 cm and height 10.8 cm

11.4.2 Solutions to 11.3 Exercise

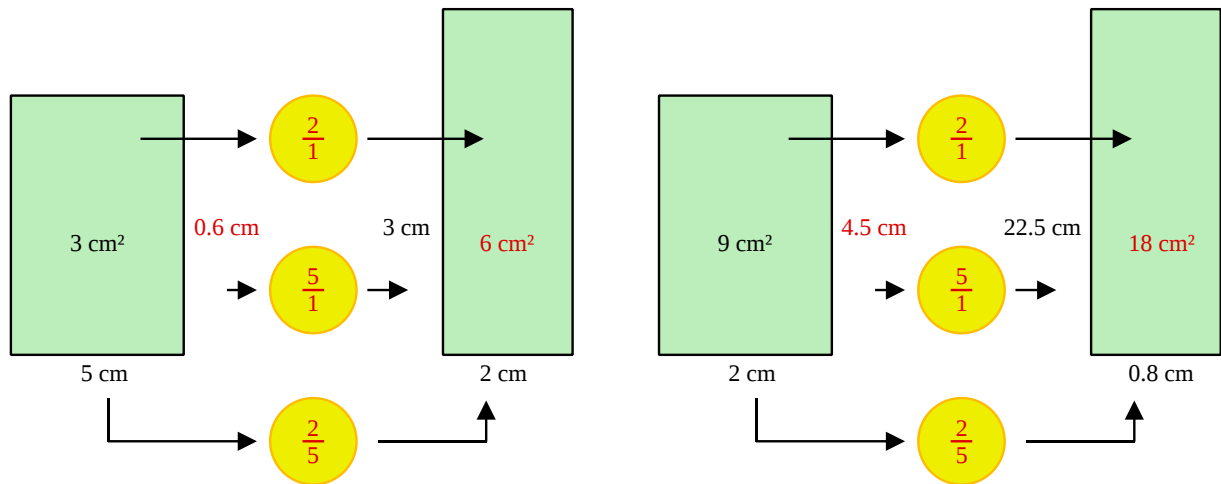
Answer 1

(i)



Marta's $18 \leq g < 20$ class is represented by a bar of width 1 cm and height 13.5 cm

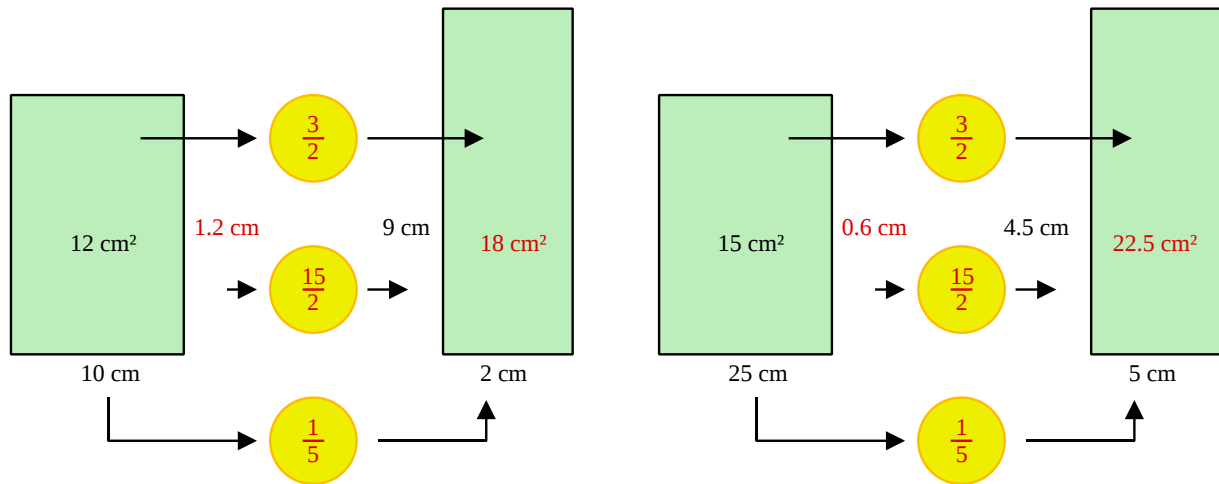
(ii)



Cathy's $18 \leq g < 20$ class is represented by a bar of width 0.8 cm and height 22.5 cm

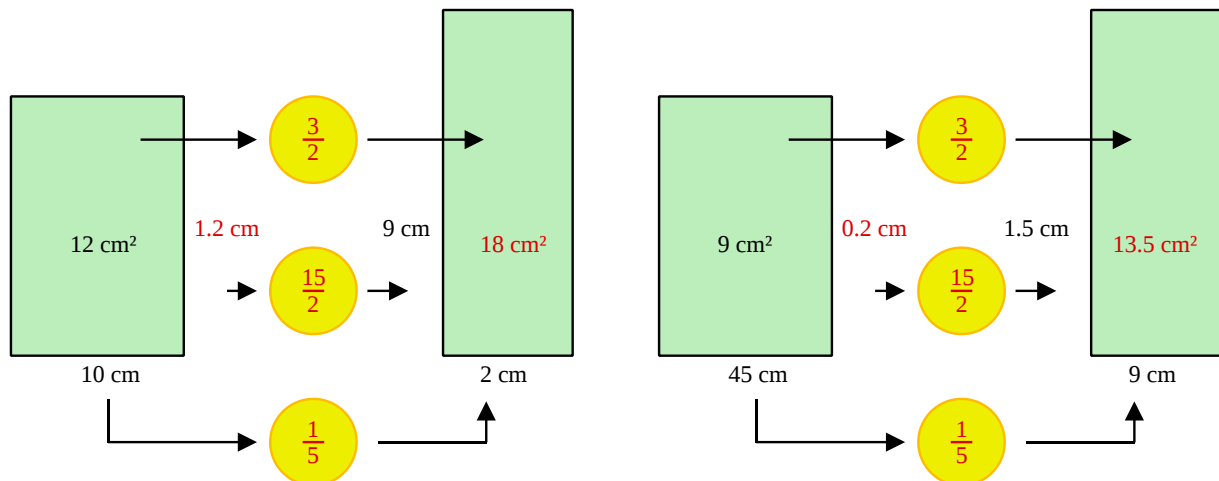
Answer 2

(i)



The $55 \leq L < 80$ group will have a width of 5 cm and height 4.5 cm

(ii)

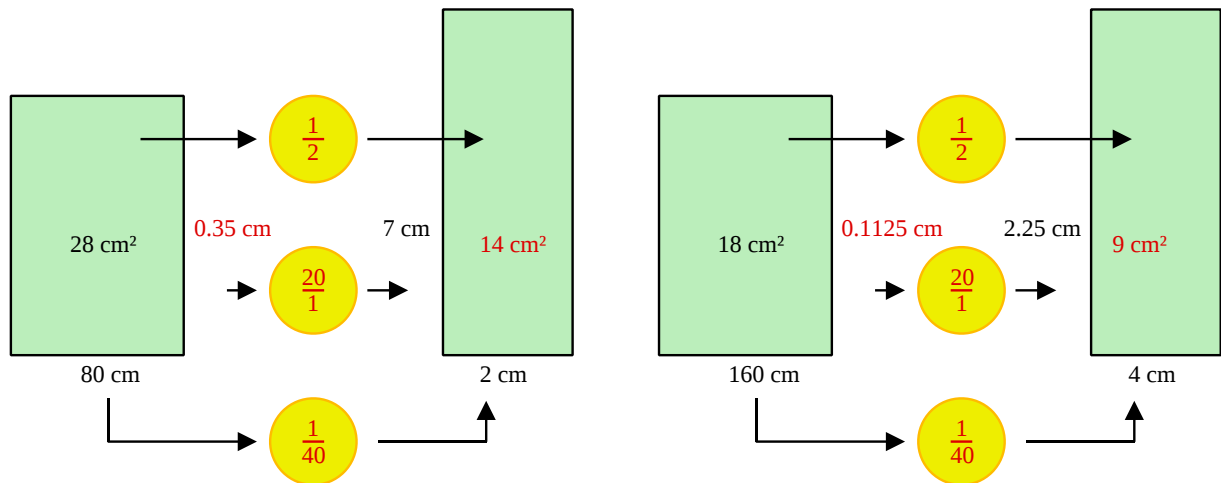


The $0 \leq L < 45$ group will have a width of 9 cm and height 1.5 cm

Answer 3

(i) A weekly income of £1038.46 will be in the $800 \leq y < 1200$ class interval.

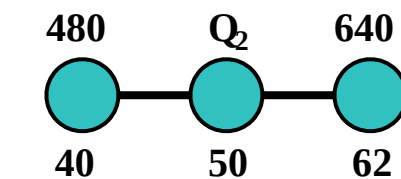
(ii)



The $640 \leq y < 800$ group will have a width of 4 cm and height 2.25 cm

(iii)

For Q_2 : $\frac{100 \times 2}{4} = 50$ which is in the class $480 \leq y < 640$



$$\frac{Q_2 - 480}{640 - 480} = \frac{50 - 40}{62 - 40}$$

$$Q_2 = 181.5727848$$

$$\text{median} = \text{£}552.73 \text{ per week}$$

$$\therefore \text{About } \text{£}28821 \text{ per annum}$$

(iv) You can either agree or disagree with Toby and get full marks provided you justify your viewpoint !

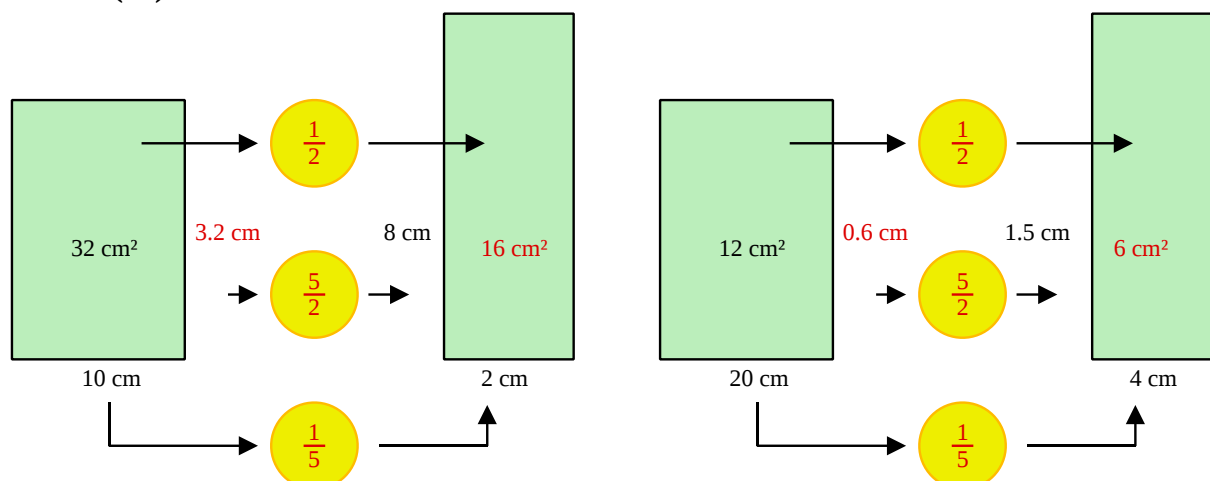
A key point is to identify that a histogram should only be drawn for continuous data and as money is a discrete quantity, Toby has a valid point. Thus you could agree with Toby and get full marks.

However, the granulation of the data is so fine, relative to the quantities of money being discussed, that you could continue by arguing that, whilst Toby is technically correct, the data can be modelled accurately as being continuous. So, from a pragmatic point of view, the histogram is indeed a useful representation of the data.

Thus you could disagree with Toby, and get full marks.

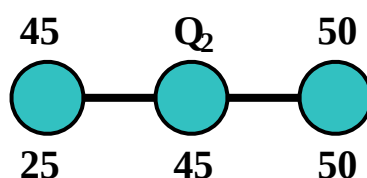
Answer 4

(a)



The $20 \leq y < 40$ group will have a width of 4 cm and height 1.5 cm

(b) For Q_2 : $\frac{90 \times 2}{4} = 45$ which is in the class $45 \leq y < 6 = 50$



$$\frac{Q_2 - 45}{50 - 45} = \frac{45 - 25}{50 - 25}$$

$$Q_2 = 49$$

median = £49 per square foot

(c)

$$\begin{aligned} \text{mean} &= \frac{12 \times 30 + 13 \times 42.5 + 25 \times 47.5 + 32 \times 55 + 8 \times 70}{90} \\ &= \frac{4420}{90} \\ &= \frac{442}{9} \quad (\text{About } 49.11\ldots) \end{aligned}$$

(d)

$$\begin{aligned} \text{standard deviation} &= \sqrt{\frac{226\,687.5}{90} - \left(\frac{442}{90}\right)^2} \\ &= 10.3368 \end{aligned}$$

(e) As *mean* $\approx$ *median* the distribution is symmetric (negligible skew)

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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