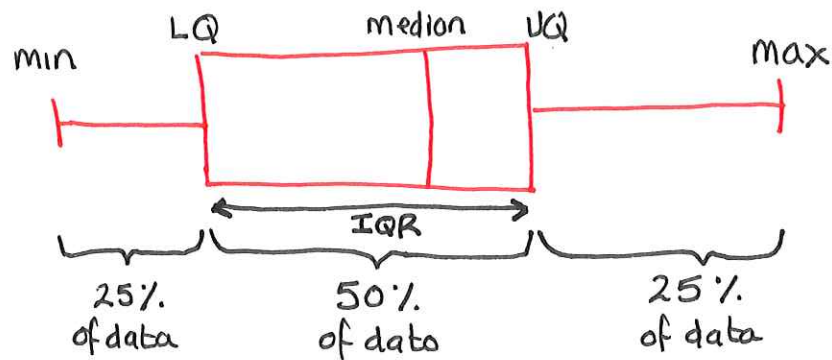


- BOX PLOTS



Find median, LQ and UQ

3, 4, 4, 6, 8, 9, 9, 10, 12

↓
median

3, 4, 4, 6

↓
LQ

9, 9, 10, 12

↓
UQ

or

3, 4, 4, 6, 8, 9, 9, 10, 12, 13

↓
median
8.5

3, 4, 4, 6, 8

↓
LQ

9, 9, 10, 12, 13

↓
UQ

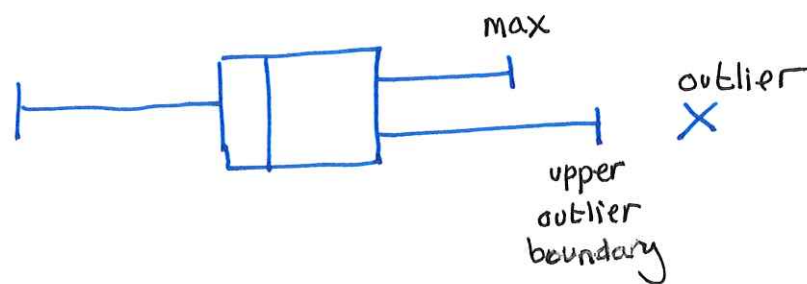
- OUTLIERS

Outliers is an extreme value

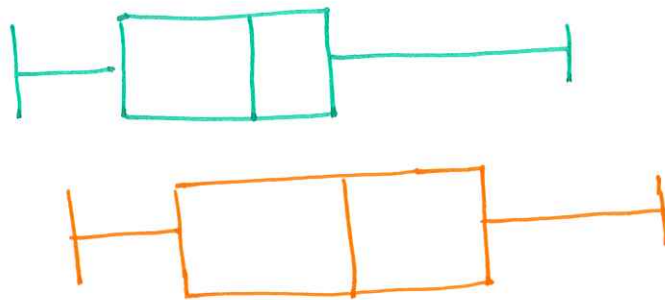
Possible ways of calculating limits of outliers :

- $1.5 \times \text{IQR}$ below LQ and above UQ
- 2 standard deviations above and below mean

Represent outliers on box plots :



- COMPARING BOX PLOTS



make 2 comparisons

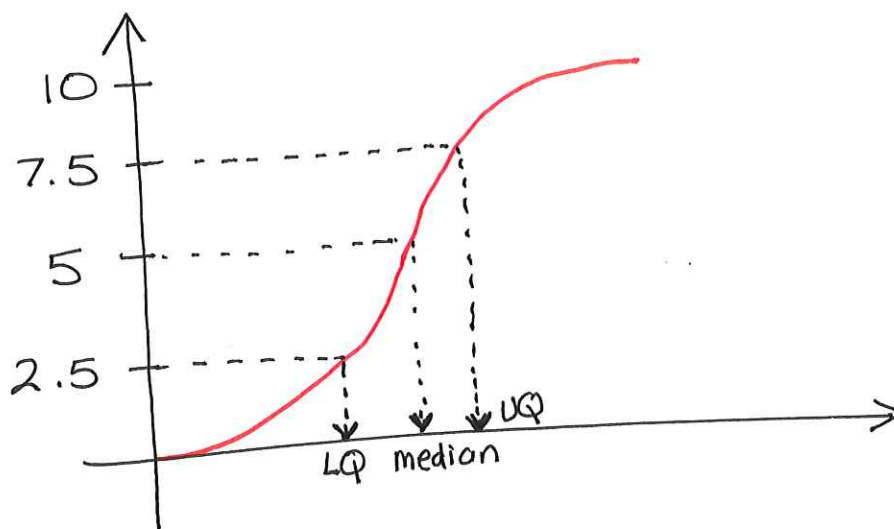
- one on spread i.e. IQR or RANGE
- one on measure of location i.e. MEDIAN

- CUMULATIVE FREQUENCY DIAGRAMS

TIME	FREQ	Cum FREQ
$9 < t \leq 10$	1	1
$10 < t \leq 11$	4	$1 + 4 = 5$
$11 < t \leq 12$	5	$1 + 4 + 5 = 10$

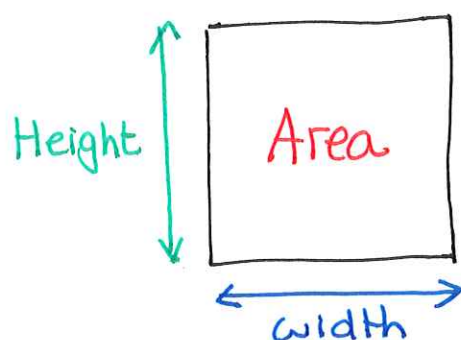
Plot points $\left(\begin{array}{c} \text{upper} \\ \text{value} \end{array}, CF \right)$

$(10, 1)$
 $(11, 5)$
 $(12, 10)$

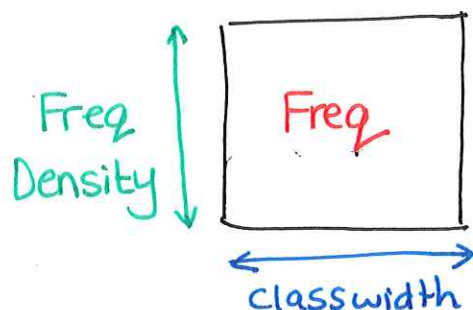


- HISTOGRAMS

- continuous data
- Bars can be uneven intervals
- Frequency = Area
- No gaps between bars



$$\text{Area} = \text{Height} \times \text{width}$$



$$\text{Freq} = \text{Freq Density} \times \text{classwidth}$$

weight	Freq	Freq Density
$10 < w \leq 15$ $\xleftrightarrow{5}$	15	$15 \div 5 = 3$
$15 < w \leq 30$ $\xleftrightarrow{15}$	30	$30 \div 15 = 2$
$30 < w \leq 40$ $\xleftrightarrow{10}$	40	$40 \div 10 = 4$

- HISTOGRAM SCALERS

$$\text{AREA} = \text{SCALER} \times \text{FREQUENCY}$$

$$\text{Area} = 8$$

$$\text{Frequency} = 20$$

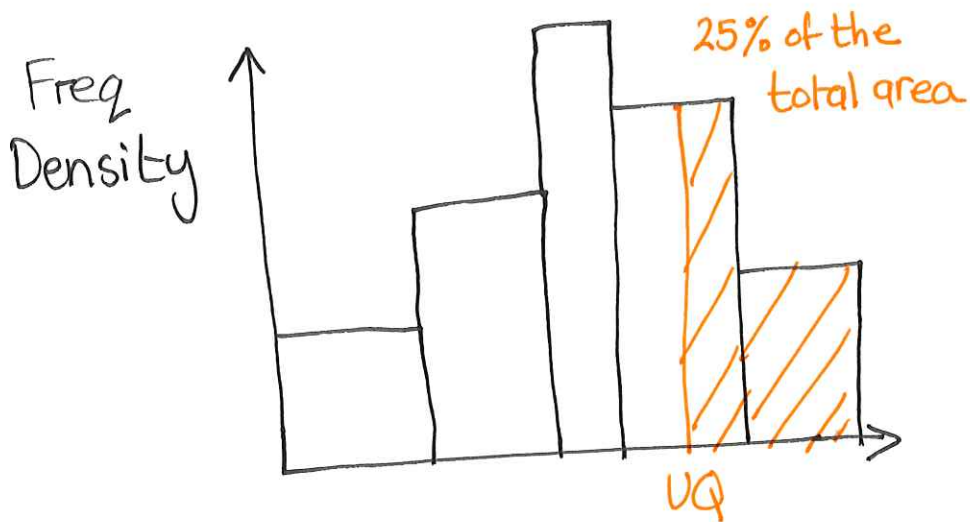
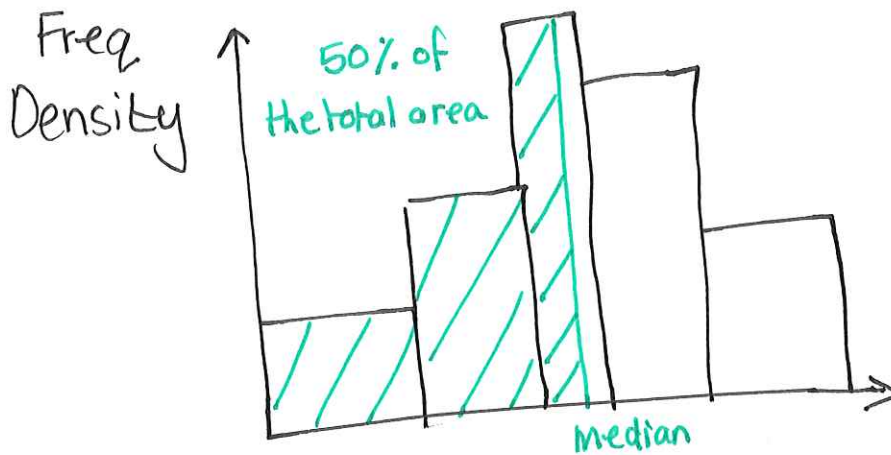
$$\text{Scalar} = \frac{20}{8} = 2.5$$

2.5	2.5	2.5	2.5
2.5	2.5	2.5	2.5

Weight	Area	Freq
$1 < w \leq 2$	4	12
$2 < w \leq 6$	6	18
$7 < w \leq 9$	3	9

Diagram showing Area values (4, 6, 3) being multiplied by a scalar of 3 to reach the corresponding Frequency values (12, 18, 9). Red arrows indicate the multiplication: 4 to 12 (labeled 'scalar x 3'), 6 to 18 (labeled 'x 3'), and 3 to 9 (labeled 'x 3').

- HISTOGRAMS LQ, UQ and Median



→ FREQUENCY POLYGONS

Join the mid points of each bar of a histogram.

