

Name: \_\_\_\_\_ Block: \_\_\_\_\_ Date: \_\_\_\_\_

## Lesson 5.7 - Cumulative Frequency

Cumulative - increasing in quantity by successive additions

In other words, *find the total for each step.*

### How to Make a Cumulative Frequency Table

**Add an extra column and keep track of the running total.**

#### EXAMPLE #1

Add cumulative frequencies to the table of IB project marks that Ahmed compiled in Worked example 5.3 and make some observations about the data.

Marks	Frequency	Cumulative Frequency
0 - 2	0	+ 0
3 - 5	0	+ 0
6 - 8	7	+ 7
9 - 11	11	18
12 - 14	14	32
15 - 17	10	42
18 - 20	8	50
Total Frequency	50	

### **Cumulative Frequency Curves**

You can use the curve:

- to answer questions about the data up to a certain value and use it to make estimates about the data such as:
  - What frequency a certain data value might occur at?
  - What the frequency is likely to be of a particular value?

This can be useful if you want to use existing data to make predictions about data in the future.

- to estimate the 'average' data value, which is the value at which 50% of the total frequency lies and the one you expect to occur most often (the median).
- to tell you at what data point 25% of the frequency lies (the lower quartile), and where 75% of it lies (the upper quartile).

### **How to Draw a Cumulative Frequency Curve**

1. Mark the values of the **upper** class boundaries along the horizontal axis.
2. Plot the cumulative frequency values along the vertical axis.
3. Label the axes clearly.
4. Give the graph a title.

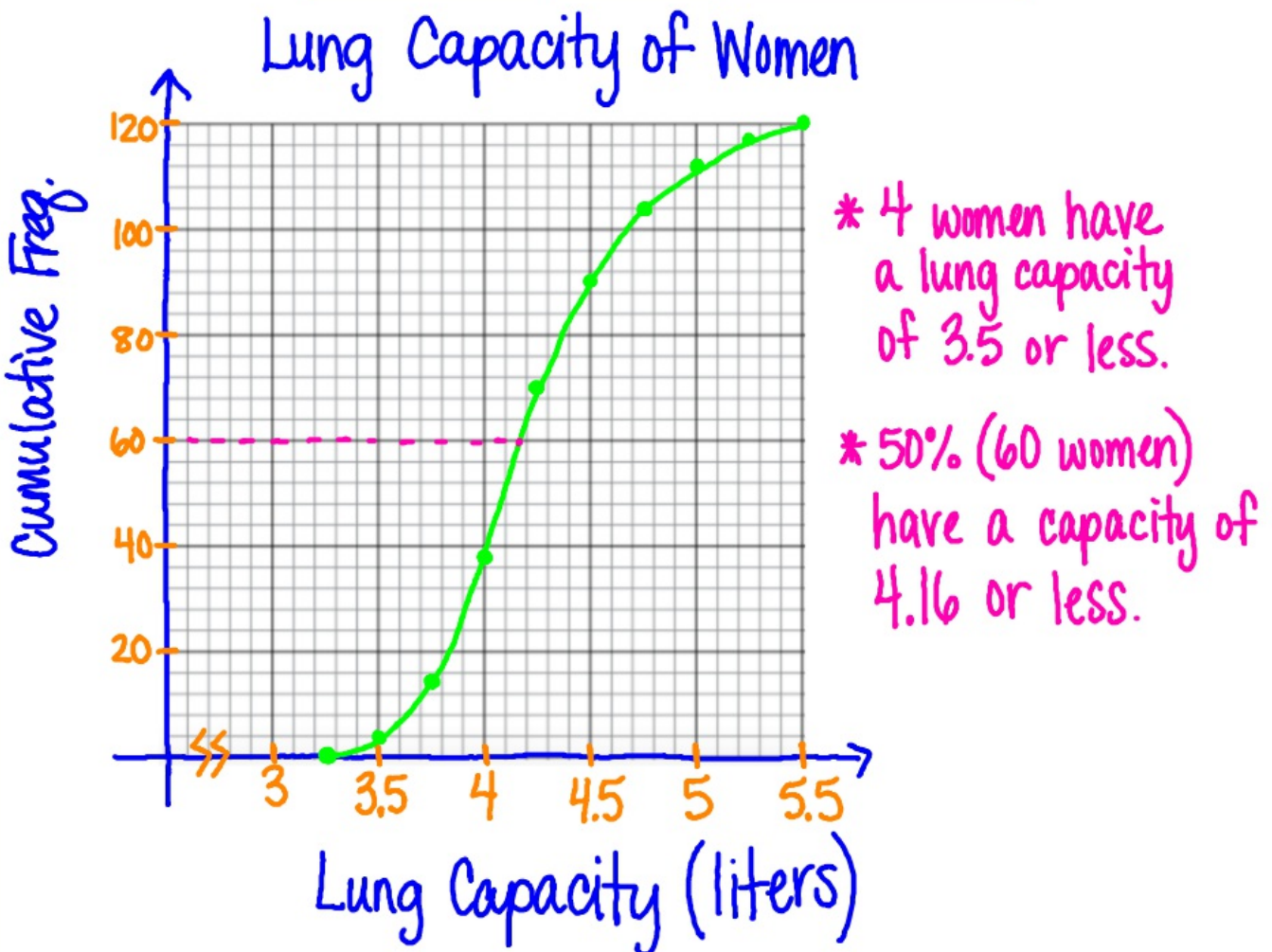
### **When using the graph to estimate the median or the values of the quartiles:**

1. Draw a dashed line straight across from the vertical axis until you meet the cumulative curve

### EXAMPLE #2

The total lung capacity (TLC) of 120 female members of a sports club was recorded. The data was grouped into classes of width 0.25 litres and the cumulative frequency was calculated. Draw a cumulative frequency curve of the data and make observations about the data.

Capacity (litres)	Frequency	Cumulative frequency
3.00–3.25	0	0
3.25–3.50	4	4
3.50–3.75	11	15
3.75–4.00	23	38
4.00–4.25	32	70
4.25–4.50	21	91
4.50–4.75	13	104
4.75–5.00	8	112
5.00–5.25	5	117
5.25–5.50	3	120

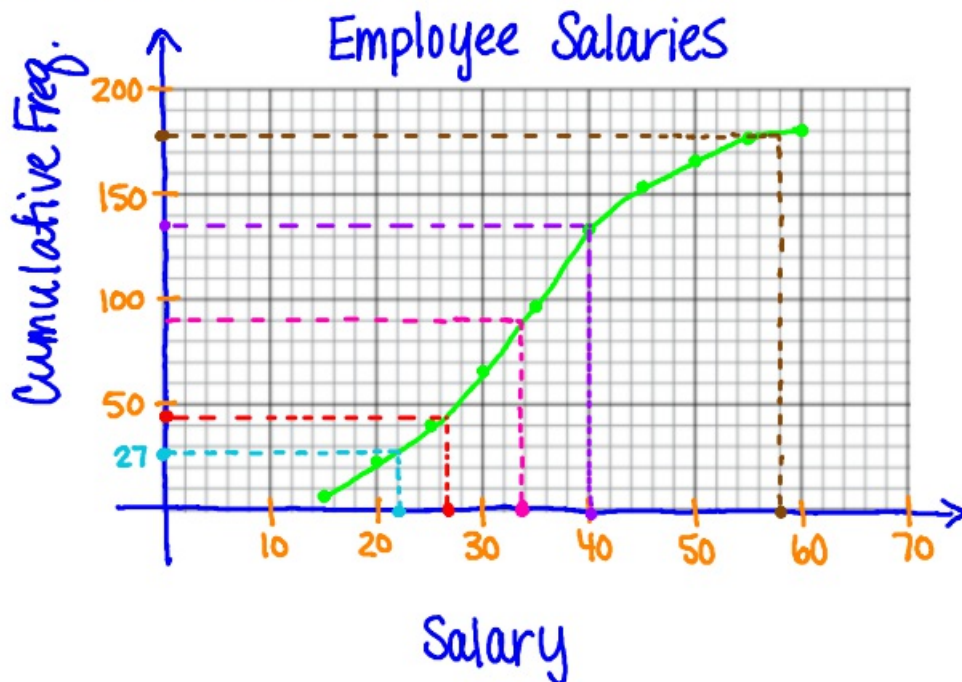


**EXAMPLE #3**

A company has 180 employees, and the company record summarises their salaries as follows:

Salary $s$ (\$ ,000)	Frequency	Cumulative frequency
$10 \leq s < 15$	8	8
$15 \leq s < 20$	13	21
$20 \leq s < 25$	19	40
$25 \leq s < 30$	26	66
$30 \leq s < 35$	32	98
$35 \leq s < 40$	35	133
$40 \leq s < 45$	20	153
$45 \leq s < 50$	13	166
$50 \leq s < 55$	10	176
$55 \leq s < 60$	4	180

a. Draw a cumulative frequency curve to represent the information.



b. Use the graph to find an estimate for the median salary.

$$\hookrightarrow 50\% = 90 \text{ employees} = \boxed{\$34,000}$$

c. Use the graph to calculate the percentage of the employees with:

i. a salary below \$22,000  $\frac{27}{180} = 15\%$

ii. a salary above \$58,000.  $\frac{179}{180} = 99\%$  Above =  $100 - 99 = \boxed{1\%}$

d. Use your graph to estimate the upper quartile and the lower quartile.

75%

25%

Upper  
 $.75(180) = 135 \text{ ppl}$

$$\approx \boxed{\$40,000}$$

Lower  
 $.25(180) = 45 \text{ ppl}$

$$\approx \boxed{\$26,500}$$