Cumulative Frequency

Starter

1. **(Review of last lesson)** Calculate the IQR for 8 9 9 9 10 10 12 15 16 17 19.

Notes

When data is presented as table of grouped values (e.g. $10 \leq h < 20$) a ***cumulative frequency graph*** can be drawn to ***estimate*** the median and quartiles

Success Criteria — drawing a cumulative frequency curve

1. Add an extra column to the table and find the cumulative frequency (i.e. ***running total***)
2. Draw the axes — ***cumulative frequency*** is always on the ***vertical axis***. Label your axes, make sure there is a suitable title on the axes.
3. The line must start from the horizontal axis. The ***left-hand value*** of the ***first interval*** is the ***first number*** on the ***horizontal*** axis
4. Plot the points at the ***end of each interval***
5. Draw ***one smooth curve*** through ***all the points***
6. Give your graph a ***title*** "Cumulative frequency graph to show…".

N.B. The ***vertical axis*** always starts at ***zero***
The ***horizontal axis*** can start the at the ***left-hand value*** of the ***first interval in the table***

E.g. 1 The table below shows the heights of a set of plants, measured to the nearest cm.

Height	Frequency	Cumulative frequency	Plot
$15 < h \leq 18$	3		
$18 < h \leq 21$	12		
$21 < h \leq 24$	35		
$24 < h \leq 27$	26		
$27 < h \leq 30$	4		

(a) Copy and complete the table above.

(b) Draw a cumulative frequency curve for the data.

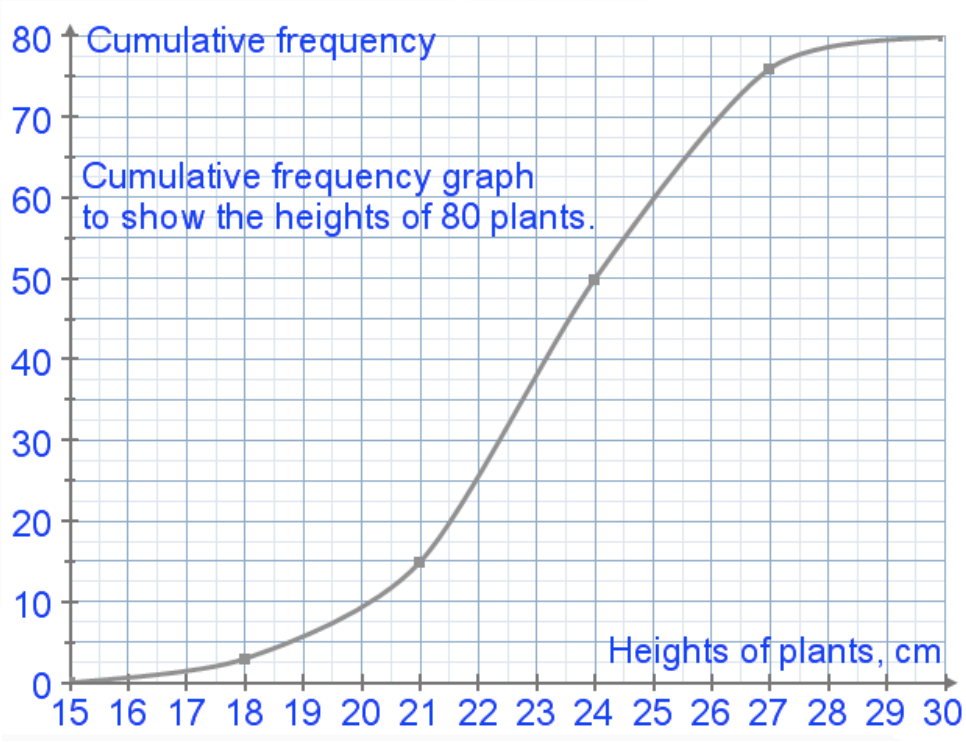
Working: (a)

Height	Frequency	Cumulative frequency	Plot
15 < h ≤ 18	3	3	(18, 3)
18 < h ≤ 21	12	3 + 12 = 15	(21, 15)
21 < h ≤ 24	35	15 + 35 = 50	(24, 50)
24 < h ≤ 27	26	50 + 26 = 76	(27, 76)
27 < h ≤ 30	4	76 + 4 = 80	(30, 80)

The first point plotted is (15, 0) — there were no plants whose height was less than 15 cm.

The point (18, 3) means there were 3 plants whose height was ≤ 18 cm
The point (21, 15) means there were 15 plants whose height was ≤ 21 cm
etc.

(b) Horizontal scale: height
Vertical scale: always cumulative frequency
Remember to label the axes and give the graph a title.



N.B. At the start of the horizontal axis, you could have a squiggle for a square and then start at 15.

E.g. 2 The table shows Y11 marks in a Maths test.

(a) Find the cumulative frequency values and write down the coordinates that should be plotted

(b) Draw a cumulative frequency curve for the marks.

Mark	Frequency
$0 < m \leq 10$	1
$10 < m \leq 20$	1
$20 < m \leq 30$	4
$30 < m \leq 40$	5
$40 < m \leq 50$	19
$50 < m \leq 60$	33
$60 < m \leq 70$	43
$70 < m \leq 80$	10
$80 < m \leq 90$	3
$90 < m \leq 100$	1

Video: Drawing cumulative frequency graphs

Solutions to Starter and E.g.s

Exercise

9-1 class textbook:	p480 E14.2 Qu 2a, 3ab, 4a, 5ab **N.B.** Qu 4 "100-" means $100 \leq \text{price} < 120$
A*-G class textbook:	p436 M14.7 Qu 2a, 3ab, 4ab, 5a **N.B.** Qu 5 "100-" means $100 \leq \text{price} < 120$
9-1 homework book:	p165 E14.2 Qu 1ab, 3ab
A*-G homework book:	p122 M14.7 Q 1ab, 3ab

Summary

Cumulative frequency graphs are to ***estimate*** the median and quartiles when data is grouped.

Drawing a cumulative frequency curve:

1. Add an extra column to the table and find the cumulative frequency (i.e. ***running total***)
2. Draw the axes — ***cumulative frequency*** is always on the ***vertical axis***. Label your axes, make sure there is a suitable title on the axes.
3. The line must start from the horizontal axis. The ***left-hand value*** of the ***first interval*** is the ***first number*** on the ***horizontal*** axis
4. Plot the points at the ***end of each interval***
5. Draw ***one smooth curve*** through ***all the points***
6. Give your graph a ***title*** "Cumulative frequency graph to show…".

N.B. The ***vertical axis*** always starts at ***zero***
The ***horizontal axis*** can start the at the ***left-hand value*** of the ***first interval in the table***

Homework book answers (only available during a lockdown)