

Cumulative Frequency

Starter

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

Working: The number of values is 11 so $n = 11$
 $Q_1 = \frac{1}{4}(n + 1)\text{th value} = \frac{1}{4}(11 + 1)\text{th value} = 3\text{rd value}$
 So the lower quartile, $Q_1 = 9$
 $Q_3 = \frac{3}{4}(n + 1)\text{th value} = \frac{3}{4}(11 + 1)\text{th value} = 9\text{th value}$
 So the upper quartile, $Q_3 = 16$
 $\text{IQR} = Q_3 - Q_1 = 16 - 9 = 7$

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.

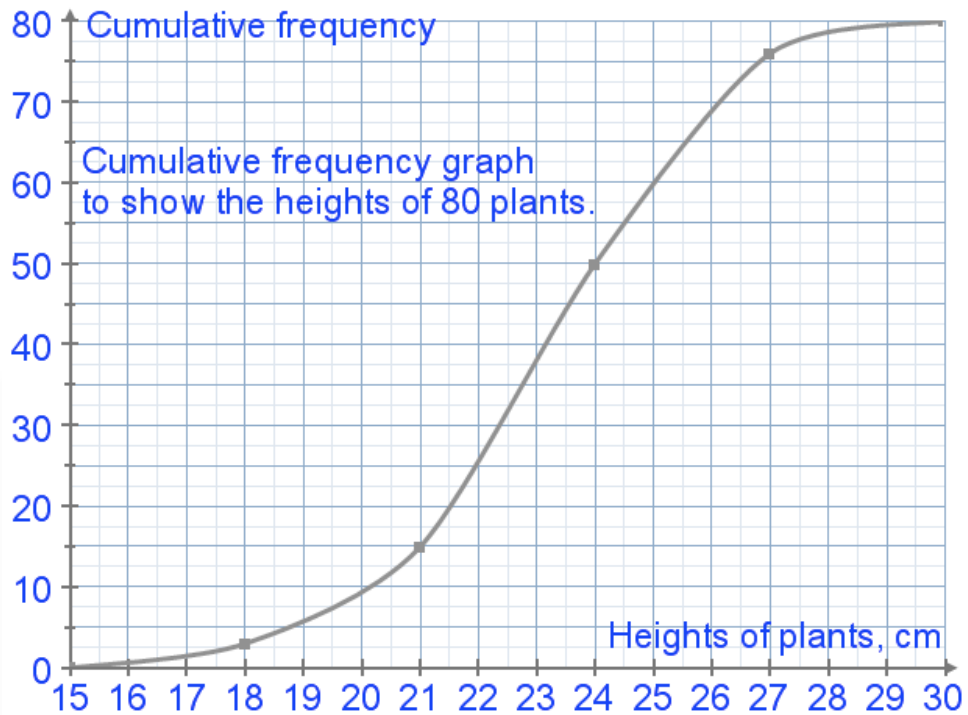
Working: (a)

Height	Frequency	Cumulative frequency	Plot
$15 < h \leq 18$	3	3	(18, 3)
$18 < h \leq 21$	12	$3 + 12 = 15$	(21, 15)
$21 < h \leq 24$	35	$15 + 35 = 50$	(24, 50)
$24 < h \leq 27$	26	$50 + 26 = 76$	(27, 76)
$27 < h \leq 30$	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.

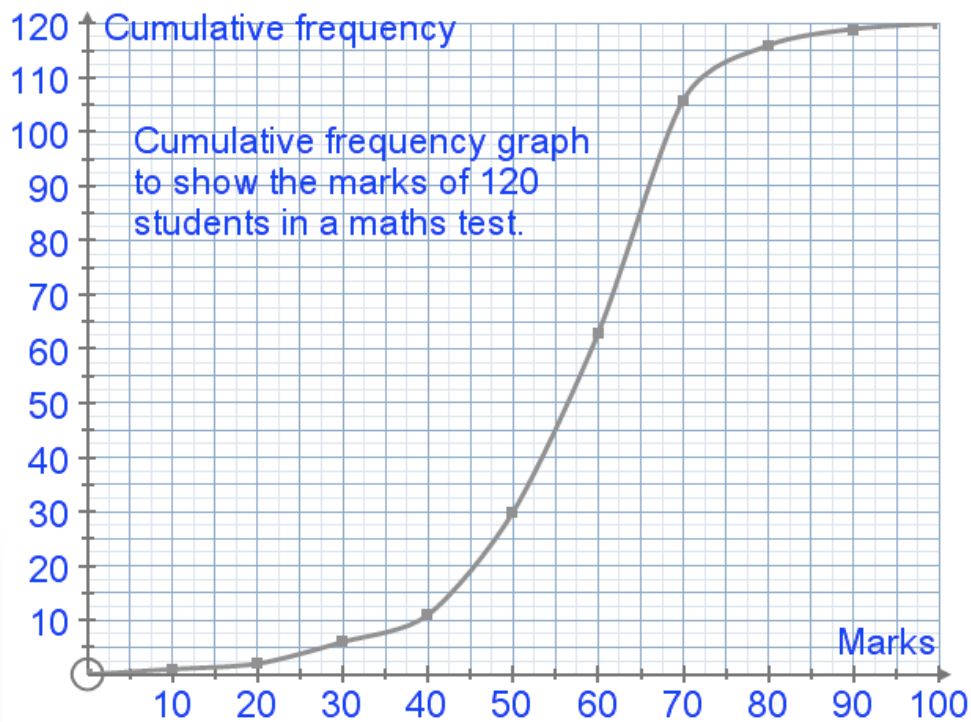
- (a) Find the cumulative frequency values and write down the coordinates that should be plotted
- (b) Draw a cumulative frequency curve for the marks.

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

Working: (a) Cumulative frequency: 1, 2, 6, 11, 30, 63, 106, 116, 119, 120
 Plot: (10, 1), (20, 2), (30, 6), (40, 11), (50, 30)
 (60, 63), (70, 106), (80, 116), (90, 119), (100, 120)

The first point plotted is (0, 0) — there were no students whose mark was less than 0 marks.

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



[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

[Homework book answers \(only available during a lockdown\)](#)