

Learning Objective 1: Constructing Cumulative Frequency Polygons

Learning Objective 2: Developing key skills required for analysing data

Weight (kg)	Frequency
$30 \leq w < 40$	3
$40 \leq w < 50$	4
$50 \leq w < 60$	12
$60 \leq w < 70$	23
$70 \leq w < 80$	17
$80 \leq w < 90$	1

Time (s)	Frequency
$0 \leq t < 20$	7
$20 \leq t < 40$	10
$40 \leq t < 60$	13
$60 \leq t < 80$	6

Height (m)	Frequency
$1 \leq x < 1.2$	1
$1.2 \leq x < 1.4$	2
$1.4 \leq x < 1.6$	17
$1.6 \leq x < 1.8$	15
$1.8 \leq x < 2.0$	5

length (cm)	Frequency
$0 \leq l < 1$	5
$1 \leq l < 1.2$	7
$1.2 \leq l < 1.5$	12
$1.5 \leq l < 1.6$	13
$1.6 \leq l < 2.0$	8

Time (minutes)	Frequency
$0 \leq t < 1$	3
$1 \leq t < 5$	15
$5 \leq t < 7$	18
$7 \leq t < 10$	2

Age (years)	Frequency
0 – 9	45
10 – 19	51
20 – 29	33
30 – 39	28
40 +	7

For each of the following tables in turn

- Construct a cumulative frequency polygon
- Work out the median, lower-quartile (LQ), upper-quartile (UQ) and inter-quartile range (IQR)
- Construct a box and whisker plot directly below the respective cumulative frequency graph

Learning Objective 1: To use box and whisker plots to compare two sets of data

Learning Objective 2: To be able to back up arguments using Median and IQR

Part 1: Evaluating a hypothesis

Billy: Time (s)	Frequency	Sally: Time (s)	Frequency
$0 \leq t < 20$	2	$0 \leq t < 20$	1
$20 \leq t < 40$	7	$20 \leq t < 40$	2
$40 \leq t < 60$	13	$40 \leq t < 60$	15
$60 \leq t < 80$	8	$60 \leq t < 80$	14
$80 \leq t < 100$	4	$80 \leq t < 100$	1

Billy has a hypothesis: He believes that he is quicker than Sally at doing a particular puzzle.

- a) By constructing two cumulative frequency polygons and their respective box and whisker plot provide two clear pieces of comparative evidence to analyse this claim

Part 2: You have to pick two of the following athletes to take on a county sport fixture. By constructing the cumulative frequency plots and their respective box and whisker plot, produce a clear report detailing who you would take and why

Jack: Time (s)	Frequency	John: Time (s)	Frequency
$10 \leq t < 12$	3	$10 \leq t < 12$	4
$12 \leq t < 14$	5	$12 \leq t < 14$	5
$14 \leq t < 16$	12	$14 \leq t < 16$	8
$16 \leq t < 18$	7	$16 \leq t < 18$	9
$18 \leq t < 20$	2	$18 \leq t < 20$	3

Sam: Time (s)	Frequency	Dave: Time (s)	Frequency
$10 \leq t < 12$	1	$10 \leq t < 12$	5
$12 \leq t < 14$	2	$12 \leq t < 14$	12
$14 \leq t < 16$	3	$14 \leq t < 16$	7
$16 \leq t < 18$	9	$16 \leq t < 18$	4
$18 \leq t < 20$	0	$18 \leq t < 20$	4

Extension: Learning Objective: Constructing cumulative frequency polygons from a limited set of information

Part 1:

Jack and Jill run up the hill one 40 times and record how long it takes them in seconds.

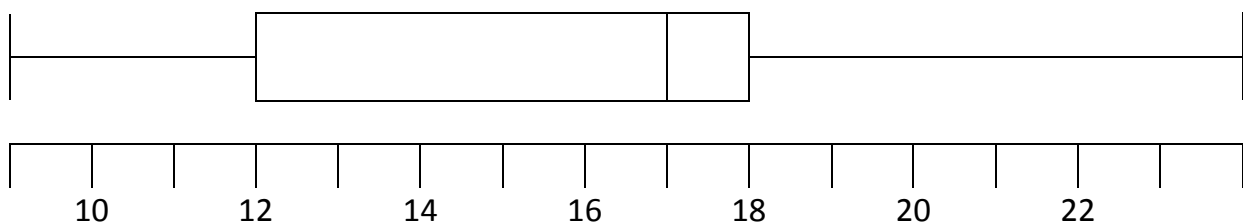
- 1) Use the following information to construct a cumulative frequency graph for each of them on the same set of axes

Jack has a **quickest time** of 13 seconds. He has a **Median** time of 20 seconds. His **LQ** is 15 seconds. His **UQ** is 27 seconds and his **maximum** time is 45 seconds

Jill **never runs slower** than 44 seconds and her **range** of times 32 seconds. Her **LQ** is 14 seconds. Her **Median** is 21 seconds and **her IQR** is 15 seconds.

- 2) Now find an approximate answer to the following questions
  - a) How often did Jack run quicker than 17 seconds
  - b) How often did Jack run slower than Jill's median
  - c) What percentage of the time did Jill run below 40 seconds
  - d) What is the probability that Jill will run slower than 24 seconds

Part 3: Construct the corresponding cumulative frequency polygon for the following box and whisker plot which shows 50 times for Sally, a runner.



Pauline has a median of 16 seconds and an IQR of 10 seconds over the same 50 races.

Pauline believes she is better than Sally.

Argue carefully whether or not you agree with her.