



Are Height and Foot Length Related?

The frequency table below (table 1) was created from a random sample of 1000 pupils height and foot length measurements taken from the *CensusAtSchool* 2012/13. Pupils were asked to measure their height and foot length to the nearest millimetre.

Numbers in brackets mean up to but not including that number (e.g. 10–(12) means from 10 to 11.9, since the measurements were taken to the nearest millimetre).

Height (cm)	Foot Length (cm)													
	10-(12)	12-(14)	14-(16)	16-(18)	18-(20)	20-(22)	22-(24)	24-(26)	26-(28)	28-(30)	30-(32)	32-(34)	34-(36)	Total
90-(100)	0	7	1	0	0	0	0	1	0	0	0	0	1	10
100-(110)	0	2	0	0	1	0	1	2	0	0	0	0	1	7
110-(120)	0	0	0	0	1	2	0	0	0	0	0	0	0	3
120-(130)	0	1	1	1	1	1	3	4	0	0	1	0	0	13
130-(140)	0	1	0	2	5	10	7	2	0	0	0	0	0	27
140-(150)	0	1	2	1	11	43	49	28	5	2	1	0	0	143
150-(160)	0	4	3	3	5	50	123	84	36	7	7	2	3	327
160-(170)	1	7	3	5	5	27	80	101	50	12	9	6	3	309
170-(180)	0	1	0	0	1	6	8	42	27	18	13	4	1	121
180-(190)	0	1	0	1	0	1	3	4	9	4	5	0	1	29
190-(200)	0	0	0	0	0	0	0	1	2	1	1	0	0	5
200-(210)	0	0	0	1	0	0	0	0	1	0	0	0	4	6
Total	1	25	10	14	30	140	274	269	130	44	37	12	14	1000

Table 1 – Frequency table of height and foot length measurements for 1000 randomly sampled pupils (excluding non-responses)



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TASK A

Use the data in table 1 to investigate the heights and foot lengths of school children aged 10 to 18 years old.

1. Draw a histogram of the height data.
2. What do you notice about the distribution of the data?
Do some of these values look incorrect?
Why do you think this may be?
3. What is the modal group for the height data?
4. Repeat questions 1 to 3 using the foot length data.
5. What is the modal group for the combined height and foot length data?
Why do you think this is?

TASK B

If we were to randomly select a pupil from this sample, the probability that they would have a height from group 90-(100)cm is 1%. This is because there are 10 people in this group out of 1000 (the total of the sample).

$$\frac{10}{1000} = \frac{1}{100} = 1\%$$

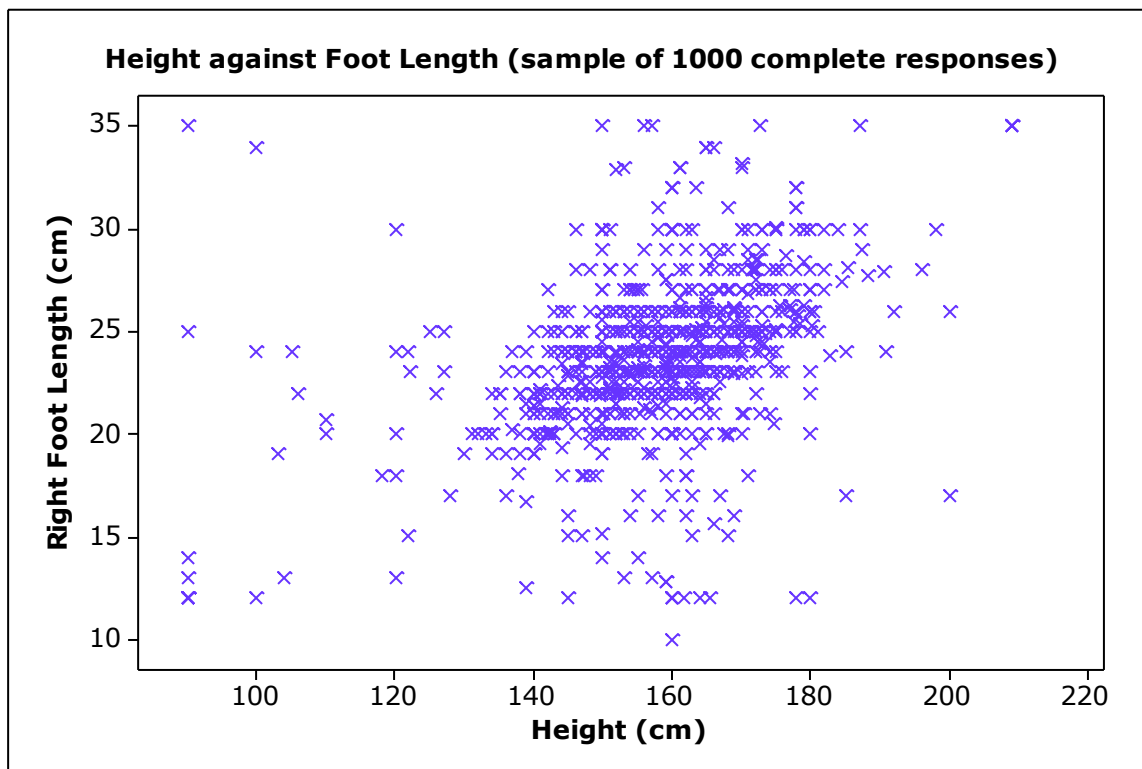
1. What is the probability of randomly selecting a pupil with foot length from group 18-(20)cm?
2. What is the probability of selecting a pupil with foot length between 18-(20) cm and a height of between 150-(160)cm?
3. Which foot length is a pupil selected at random least likely to have?
4. Which combined height and foot length group is a pupil selected at random most likely to come from? What is the probability of this?



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TASK C

The graph below shows the data in a scatterplot to show the correlation between height and foot length.



Graph 1 – A scatterplot of height against foot length from a sample of 1000 completed responses from *CensusAtSchool* 2012/13.

1. What type of correlation does this scatterplot show? Is the correlation strong/weak?
2. Using what you have found in question 1, can you explain the relationship between height and foot length (e.g. as height increases ... foot length ...). Explain why this might be?
3. Do you notice any unusual observations? Circle two unusual observations and explain why you think they are incorrect? What do you think might have been done incorrectly in recording this observation?
4. Would it be appropriate to use this data to predict on all UK children between the ages of 10 to 18? State your reasons?
5. Would it be appropriate to use this data to make predictions about the whole UK population? State your reasons?