Student 4: High Achieved

NZQA Intended for teacher use only

What is the relationship between people's cubit length and their heights?

(Cubit length is from the elbow to the tip of the middle finger.)

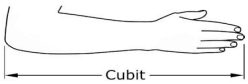
Question:

I wonder if there is a relationship between cubit length (in centimetres) and the height (in centimetres) of year 10 students. I predict that taller students will have a longer cubit length. (1)

Plan:

For this experiment my partner and I choose 25 of our year 10 classmates in our math class and measure each student's cubit length (in centimetres) and Height (In centimetres).

Cubit length is the length of a person's forearm, from their elbow to the tip of their middle finger. We will be measuring each student's cubit length to the nearest centimetre using a ruler. We will do this by getting the student to place their right arm on a table, with their elbow against the wall. We decided to measure each student's right arm so that we could get an accurate measurement, because if we were to measure one student's left arm's cubit length and another students right arm's cubit length then that would make our measurements slightly less accurate. But before we begin measuring, the student will need to remove any gloves that they might be wearing and roll up any long sleeves that they might have on so we can get an accurate measurement. We will also ask the students to keep their arm and fingers as straight as possible, which will allow us to take the best reading possible. Once we are sure that the student is set up properly and in the correct position with their right arm laying on the table and their elbow pressed firm against the wall. My partner will take the ruler and measure from the wall to the very tip of the student's middle finger. She will then read the measurement and call it out for me to immediately record into a google sheet next to the student's name. After we have completed the reading the student may leave and we will begin measuring the next student using the same process. (2) (3)



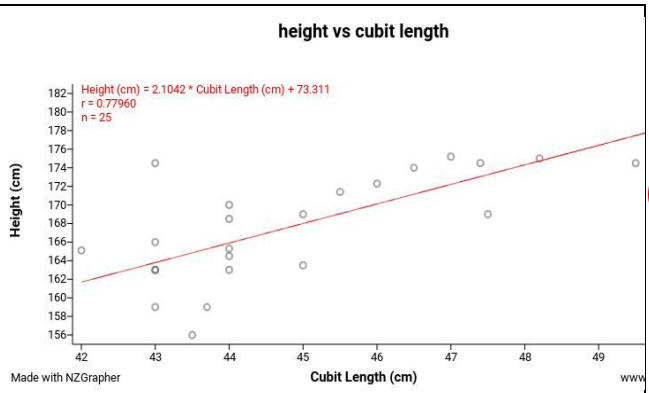
We will measure each student's height to the nearest centimetre, using a special type of equipment called a stadiometer, and a ruler which is used to put on the student's head to get their correct height. Before measuring, the student will need to remove any footwear because different types of footwear have different types of sole thickness and could cause us to have inaccurate measurements. Next the student will need to stand up as straight as possible with their back to the stadiometer. We will politely ask the student to stand with their feet together and move back until both their heels are touching the bottom of the stadiometer. The students will need to keep their feet firmly on the ground, meaning no tip toeing or anything like that, because doing that could cause our measurements to be inaccurate. When we are positive that the student is in the correct position with their heels pressed up against the bottom of the stadiometer and their back to the stadiometer as straight as possible, we will ask them to stand very still. Then I will take a hard ruler and place it on the top of the student's head, I will need to make sure that it is a hard ruler so that it doesn't bend and affect our results. I will (2) (3)

read the measurement that is parallel to the ruler and call out the student's height for my partner who will then record the student's measurement next to their name in a google sheet.
Once we have finished measuring, the student may leave, and we will go on to measuring our next student using the same process.

For both tests we will keep a list of the names of each student so that we don't measure the same student twice or so that if we needed to, we could re-measure someone.

No.	Height (cm)	Cubit Length (cm)
1	163	43
2	166	43
3	165.1	42
4	163.5	45
5	169	47.5
6	174	46.5
7	175	48.2
8	174.5	47.7
9	163	44
10	163	43
11	164.5	44
12	171.4	45.5
13	172.3	46
14	174.5	49.5
15	169	45
16	175.2	47
17	174.5	43
18	156	43.5
19	165.3	44
20	159	43
21	168.5	44
22	178.5	50
23	159	43.7
24	170	44
25	180.5	50

4



5

Features of the graph.

I notice that there is a positive linear relationship between the height (in centimetres) and cubit length (in centimetres) of year 10 students in my math class. It is positive relationship because the line of best fit has a positive gradient and is sloping up towards the right. This means that taller students tend to have a long cubit length.

6

I also notice that the strength of the relationship between the height and cubit length is moderate.

When we measured the height and cubit length of the students in our class there was one student who was away. But we knew that his cubit length was 50 cm, so we used the formula on the graph (Height= 2.1042 x cubit length+73.311) to estimate the length of his right foot. We found the students height by calculating 2.1042 x 50 +73.311 which gave us 178.521.

I would be more confident in the relationship found in this investigation if I had a larger sample size. The sample size was just 25, so it wasn't as reliable as it could have been. If I were to repeat my experiment again, I would expect to get a similar relationship, but the trend line would be slightly different.