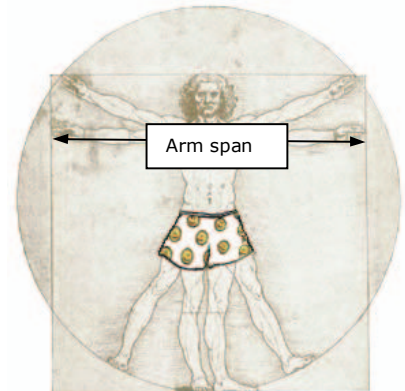


## Are you a masterpiece?

Leonardo da Vinci (1452-1519) was a scientist and an artist. In 1492 he drew the picture on the right. Can you see how the man is standing in a circle and a square? Leonardo thought that the span of someone's arms is equal to their height. Why do you think he was interested in working out body proportions?

Do you think Leonardo's theories still work today?



### Problem

We need to work out if Leonardo's theory still works. To do this we need to investigate a question.



**Is Leonardo's theory that a person's height is equal to their arm span true for New Zealand students in 2005?**

### Plan

How would you answer the question now, before you gather the data? Remember to justify your answer \_\_\_\_\_



What do you predict the ratio for yourself to be?

Your predicted height \_\_\_\_\_ Your predicted Arm span \_\_\_\_\_

Your predicted height to arm span ratio is: \_\_\_\_\_

### Data

Use students from your class or from CensusAtSchool.



Name	Age	Gender	Arm span (cm)	Height (cm)	Body Ratio Arm span/Height
You					
Student 1					
Student 2					
Student 3					
Student 4					
Student 5					
Student 6					
Student 7					
Student 8					
Student 9					
Student 10					
Student 11					
Student 12					
Student 13					
Student 14					
Student 15					
Student 16					
Student 17					
Student 18					
Student 19					

### Analysis

Have a look at the table of data. What do you notice? \_\_\_\_\_

What does a row stand for? \_\_\_\_\_

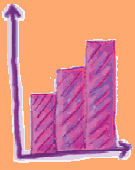
Who is the most like a masterpiece? \_\_\_\_\_

What helped you decide who is most like a masterpiece? \_\_\_\_\_

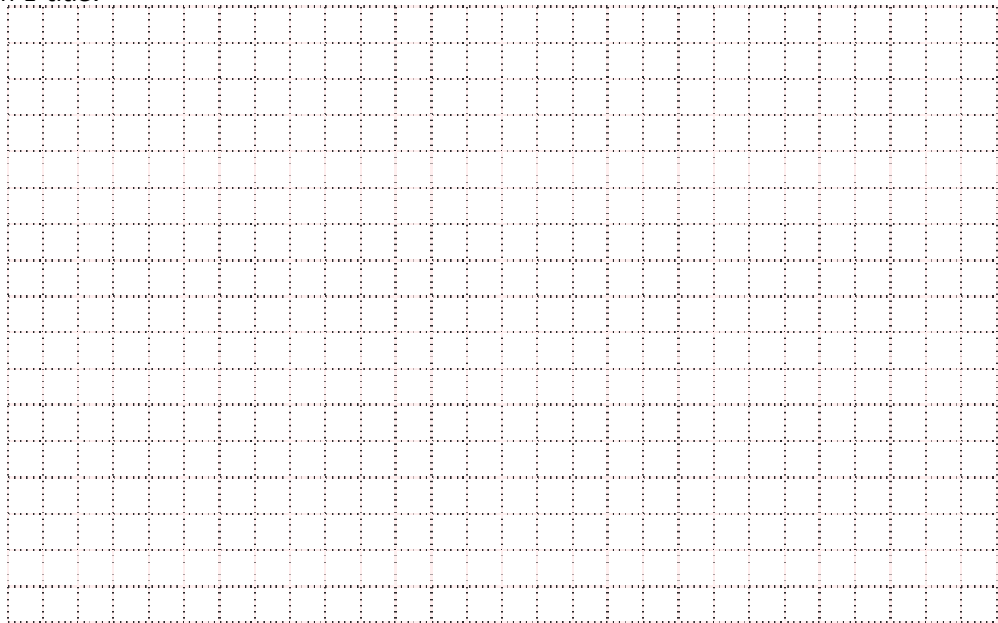


Check your predictions by graphing the measurements. You might have to draw a few graphs to show all the information. Answer the questions about each graph after you have plotted the data

## Analysis



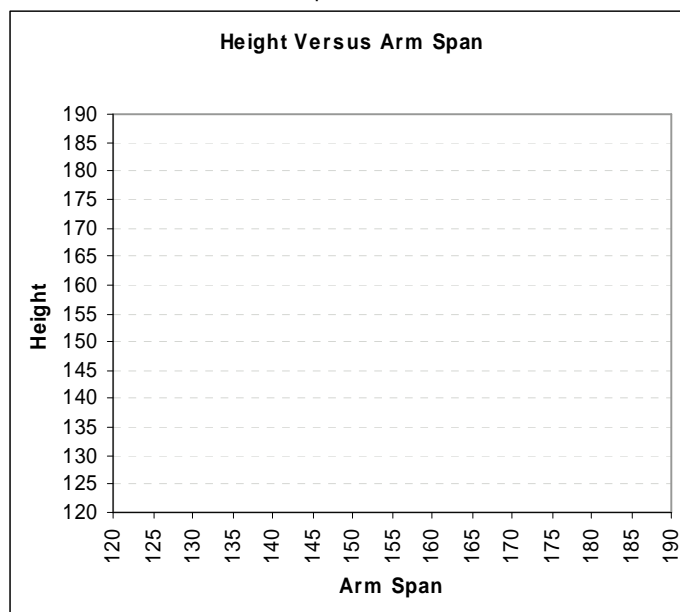
Graph 1 title:



What is the shape of the plotted data? \_\_\_\_\_  
What is the spread of the plotted data? \_\_\_\_\_  
Is there anything interesting you notice about the graph (middle range, outliers, clusters)? \_\_\_\_\_

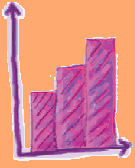
In this box try graphing one measurement against another measurement. Use only the **female** data. This is called a scatterplot.

Graph 2



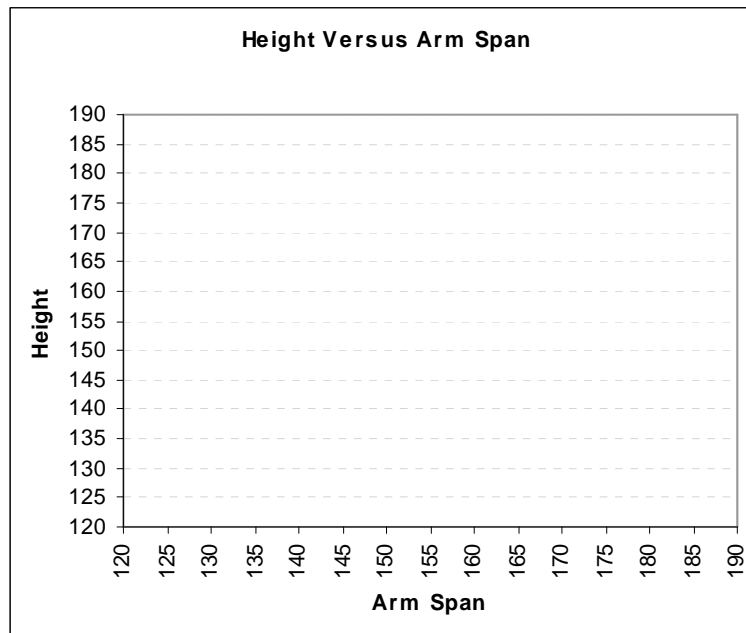
Draw a line of best fit  
What is the shape of the plotted data? \_\_\_\_\_  
What is the spread of the plotted data? \_\_\_\_\_  
Is there anything interesting you notice about the graph (outliers, clusters)? \_\_\_\_\_

## Analysis



In this box try graphing one measurement against another measurement. Use only the **male** data. This is another scatterplot.

Graph 3



Draw a line of best fit

What is the shape of the plotted data? \_\_\_\_\_

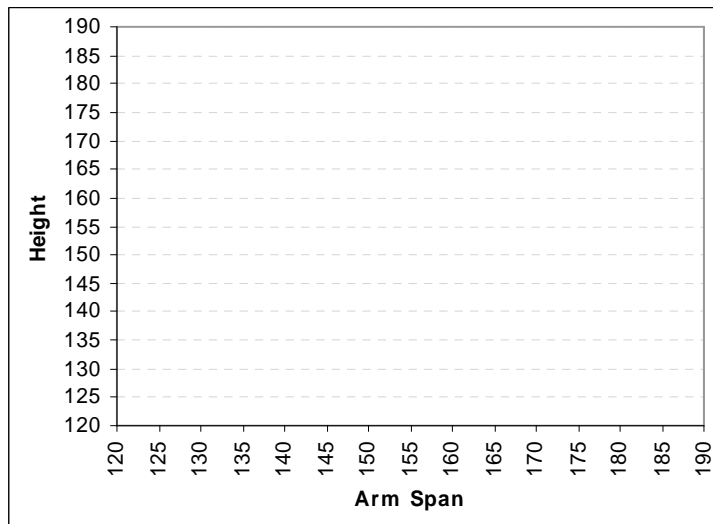
What is the spread of the plotted data? \_\_\_\_\_

Is there anything interesting you notice about the graph (outliers, clusters)? \_\_\_\_\_

\_\_\_\_\_

In this box try graphing one measurement against another measurement for **all students**.

Graph 4 title:



Draw in a line of best fit

What is the shape of the plotted data? \_\_\_\_\_

What is the spread of the plotted data? \_\_\_\_\_

Is there anything interesting you notice about the graph (outliers, clusters)? \_\_\_\_\_

\_\_\_\_\_

## Analysis



Compare the distribution shape, middle range and spread for males and females. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Are males different from females? \_\_\_\_\_  
What evidence do you have to support your claim \_\_\_\_\_  
Where are you on the graph? (high light yourself on the graph using a different colour)

Not everybody has an Arm span/ Height ratio equal to 1.  
Why do you think this is? \_\_\_\_\_  
\_\_\_\_\_

Do you think the results would be the same for other groups of people?

Babies Yes/No Why? \_\_\_\_\_  
All Blacks Yes/No Why? \_\_\_\_\_

## Conclusion



You are now ready to answer the question we asked at the beginning of the worksheet. Remember to give reasons based on what you found out in your investigation. Include things you wish you had more information about on or were wondering about when you drew your graphs.

You might like to use some statistical language in your conclusion. Here are some phrases that might be useful.

For histograms: normal/skewed distribution, middle range

For scatter plots: outlier, slope of the graph, trend

For all analysis: This sample suggests, probably, most, spread, shape, relative proportions, ratios, middle range.

**Is Leonardo's theory that a person's height is equal to their arm span true for New Zealand students in 2005?**

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Complete the following sentences

I noticed that \_\_\_\_\_

I wonder \_\_\_\_\_

Who would be interested in your conclusion? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_