

# The Vitruvian theory—does it apply to you?



Leonardo da Vinci (1452–1519) was a scientist and an artist, one of the greatest painters of the Italian Renaissance. He left only a handful of completed paintings, one of which is the *Mona Lisa*. He was so secretive that he wrote backwards to disguise his ideas.

In 1492 he drew the picture of a man standing inside a circle and a square. This is known as the 'Vitruvian Man.' It was a study of the proportions of the human body as described by Vitruvius, a Roman architect from the first century B.C. Leonardo believed that arm span was equal to height in a perfectly proportioned body.

Why do you think he was interested in working out body proportions?

Do you think the Vitruvian theory illustrated by Leonardo is valid today?

## Problem



Is the Vitruvian theory that height is equal to arm span true for Canadian students today?

## Plan



Before you begin your investigation, what answer do you predict? Why? \_\_\_\_\_

Now test your prediction using your class data from Census at School.

## Data



Fill in the data table below, using the Census at School results for all the students in your class. (If you need more rows, create your own larger table.)

Student	Age	Gender	Arm span	Height	Ratio:	
					arm span / height	
	years	M or F	cm		fraction	decimal
A						
B						
C						
D						
E						
F						
G						
H						
I						
J						
K						
L						
M						
N						
O						
P						
Q						
R						
S						
T						
U						
V						
W						

Analysis



1. What do you notice from the table of data? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2. Which students most closely fit Leonardo's theory? \_\_\_\_\_

3. What helped you decide that a student fits this theory? \_\_\_\_\_  
\_\_\_\_\_

4. Check your prediction by plotting four graphs on pages 4 to 7.

Graph 1: Create your own graph from the data table above and give it a title.

Graph 2: Graph one measurement against the other in a scatterplot. Use only data for the girls.

Graph 3: Graph one measurement against the other in a scatterplot. Use only data for the boys.

Graph 4: Graph one measurement against the other in a scatterplot. Use data for all students.

Answer the questions written below each graph after you have plotted the data.

5. Compare the distribution shape, middle range and spread for boys and girls.

Are boys different from girls? \_\_\_\_\_

What evidence do you have to support your claim? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

6. Not everybody has an arm span / height ratio equal to 1. Why do you think this is?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

7. Do you think the results would be the same for babies or seniors?

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

Seniors Yes/No Why? \_\_\_\_\_

**Conclusion**

You are now ready to answer the question we asked at the beginning.

Remember to give reasons based on what you found out in your investigation. Include things you wish you had more information about 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 scatterplots: outlier, slope of the graph, trend

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

**Is the Vitruvian theory that height is equal to arm span true for Canadian students today?**

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

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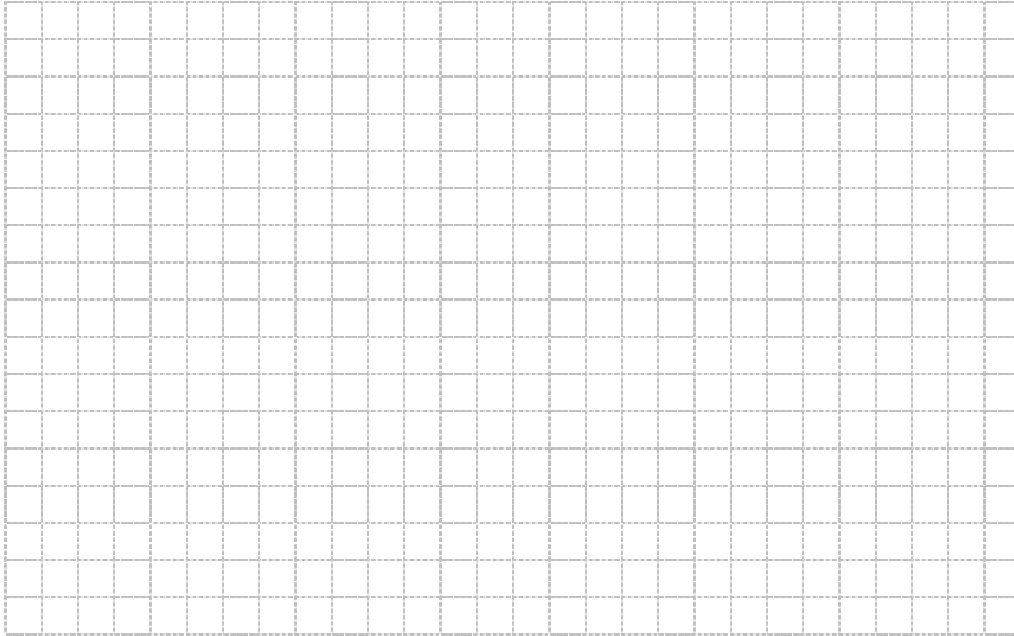
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Graphs:

Graph 1 – Title:



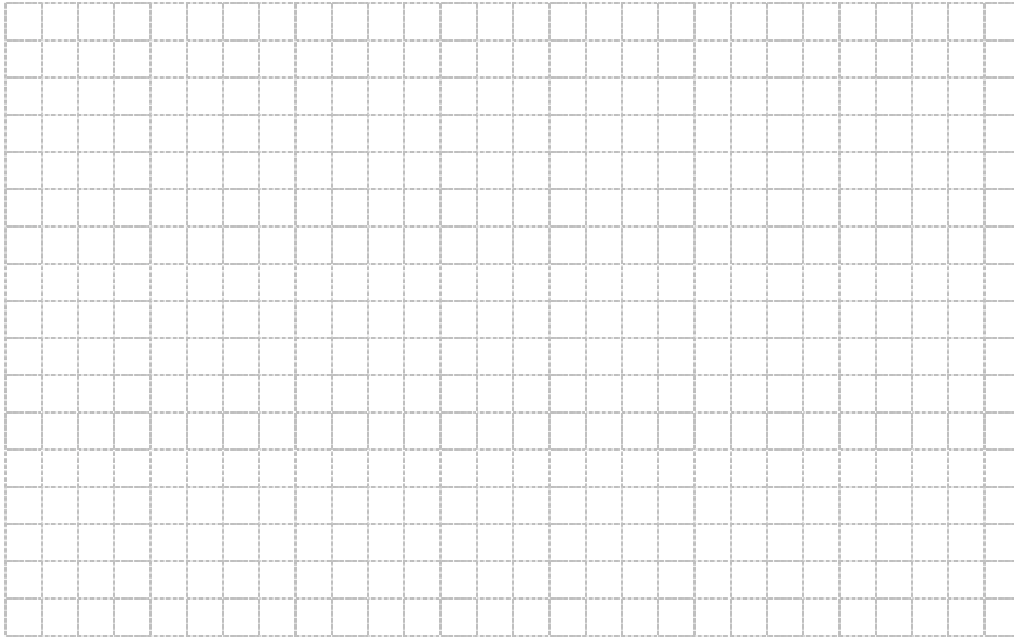
What is the shape of the plotted data? \_\_\_\_\_

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

Is there anything interesting you notice about the graph (middle range, outliers, clusters)?

\_\_\_\_\_  
\_\_\_\_\_

Graph 2 - Height versus arm span, girls



Draw a line of best fit.

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

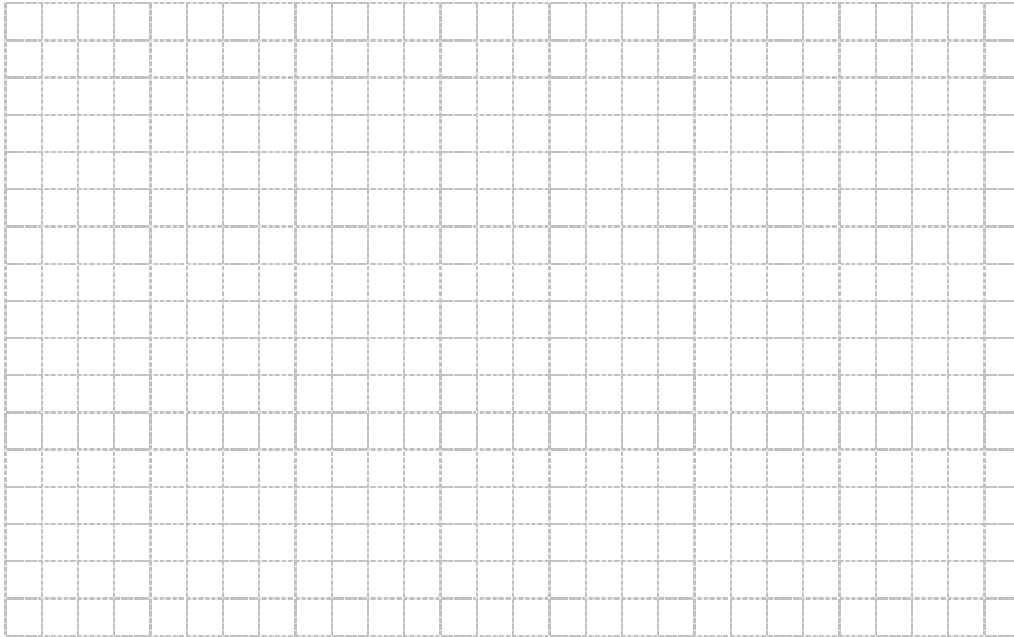
What is the spread of the plotted data? \_\_\_\_\_

Is there anything interesting you notice about the graph (middle range, outliers, clusters)?

\_\_\_\_\_

\_\_\_\_\_

Graph 3 - Height versus arm span, boys



Draw a line of best fit.

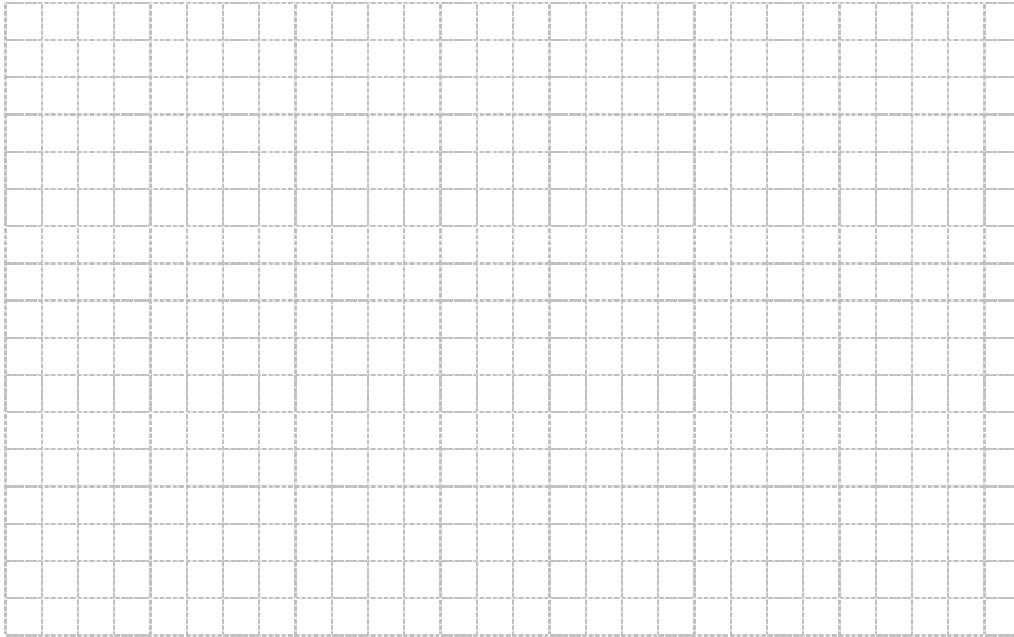
What is the shape of the plotted data? \_\_\_\_\_

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

Is there anything interesting you notice about the graph (middle range, outliers, clusters)?

\_\_\_\_\_  
\_\_\_\_\_

Graph 4 - Height versus arm span, all students



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 (middle range, outliers, clusters)?

\_\_\_\_\_  
\_\_\_\_\_