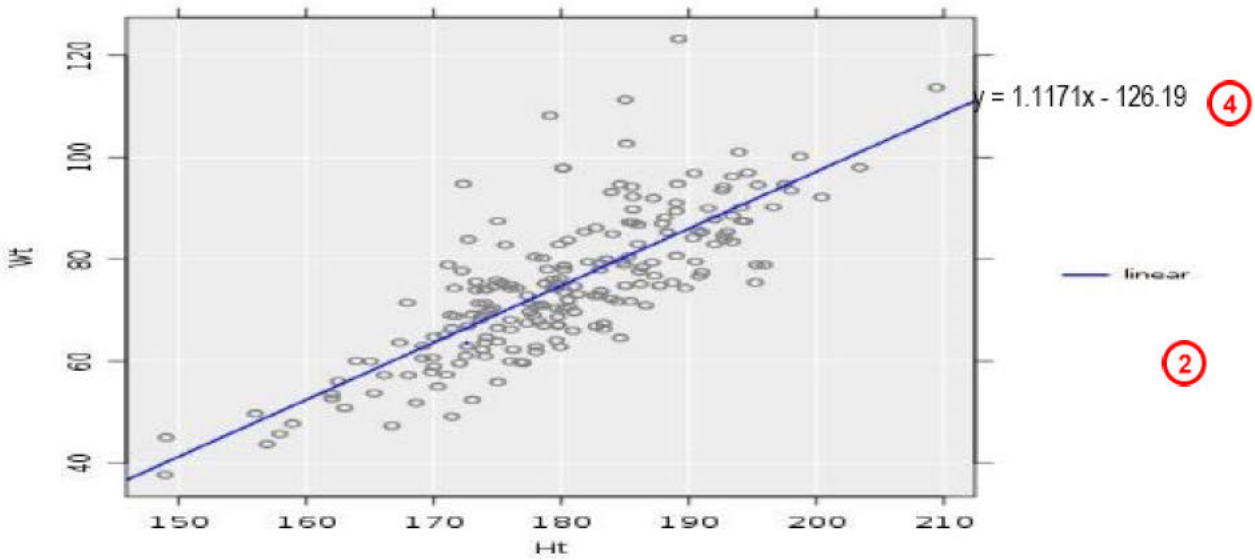
Student 4: High Achieved

NZQA Intended for teacher use only

Is there a relationship between the height in cm and the weight in kg for athletes in the data supplied from the Australian Institute of Sport? I think it is likely. There is an app from the BBC where you can put in your height and weight and see which Olympian is your body twin http://www.bbc.co.uk/news/uk-19050139 - this is based on the relationship between the height and weight of athletes. (1)

I have made height the explanatory variable and weight the response variable. I think this may be useful to the institute when they are identifying future athletes for training.

Ht versus Wt



(4) (2)

The scatter graph has a strong positive relationship between the height and weight of sports athletes at the Australian Institute of Sport. The data in the graph tells us that as an athlete gets taller (cm) their weight (kg) will generally increase as well. The relationship is strong as the data points are close to the fitted trend line and 'r' is 0.78090629 which also confirms this. (5)

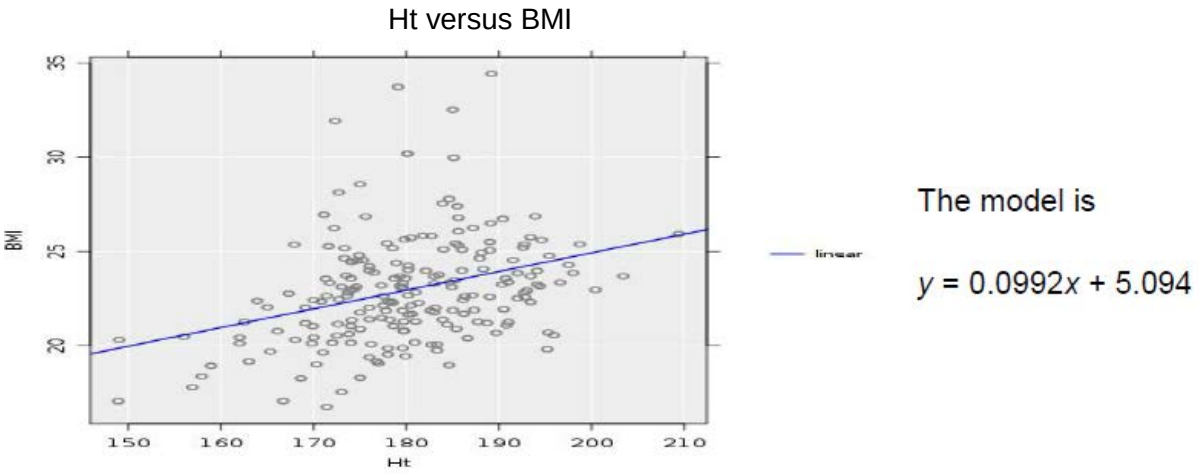
The linear model fits this data quite well as it is positive and shows generally as height increases so does weight this confirms my statement from above, this is because the taller the athlete is the more muscle/fat they will have making them weigh more. There are some values more scattered away from this linear model - such as the one that weighs around 120kg and is around 190cm tall, this is probably due to different sports requiring different physiques, in this instance it is a male 'field' athlete. This graph also shows me that in the data supplied there are only a few athletes taller than 200cm and these are all basketball players and the linear model stops at around 200cm. (3)

To make my prediction I used a male TSPRNT individual with a height of 190 cm to predict his weight in kg. I used the equation that I got from my linear model to work this out.

Prediction = 1.1171*190 – 126.19 = 86.059 = 86.1kg (6)

I did another prediction with data outside of my graph I used a height of 210 cm to predict the weight. I also used the equation from my linear model to work out the prediction.
Prediction = 1.1171*210 – 126.19 = 108.401 = 108.4kg
This confirms my thinking that with a shorter person their weight was less than a person much taller.

I decided to also investigate if there is a relationship between Height (cm) and BMI (weight/height^2).
The scatter graph shows a moderate positive relationship between the height and BMI (body mass index) in athletes at the Australian Institute of Sport. The graph shows that as the height of an athlete increases their BMI will increase. As BMI is worked out from (weight/height^2) we might expect this.



The graph shows that the linear model fitted for this data seems ok, the data appears to be mostly clumped together – there are still some BMI values for heights between 175cm and 189cm where the data is scattered further away from the regression line.

Discussion
Looking at my scatter graphs for the two relationships the relationship between height and weight is a much stronger relationship than that between height and BMI – the data points are much more closely scattered around the regression line for height/weight. This is supported by the correlation for height/weight being 0.78 and the correlation for height/BMI being 0.34. This tells us that the relationship between height and weight of an athlete is much stronger the relationship height and BMI of an athlete.
The height/weight model may be better fitting to the linear graph due to it comparing the height and weight and as someone gets taller they generally have more muscles with larger bones, whereas for the height/BMI the BMI is calculated already from weight/height^2 therefore it is already including the height in the graph.

Wikipedia tells us that BMI is inaccurate for athletes and people who are fit because they have higher amounts of muscle which puts them in the "overweight" category even though their body fat percentages are in the 10-15% category.

Being an institute of sport they will be focusing on particular sports and building muscles so it may also be dependent on the sport, for example in sprints you don't need the whole body at equal strength as you may need in water polo, due to sprints mainly involving timing and the power in your legs; whereas water polo you need to be able to stay afloat through your legs and be able to throw/catch the ball.

I think that the height/weight model would be useful for the sports institute to identify potential future athletes.

7