

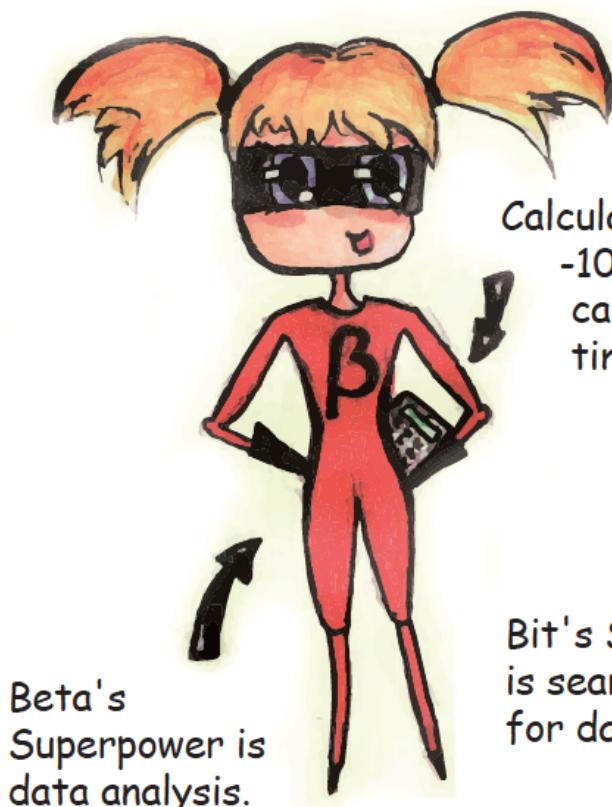
# Adventures of Beta and Bit

## How to weigh a dog using a ruler?

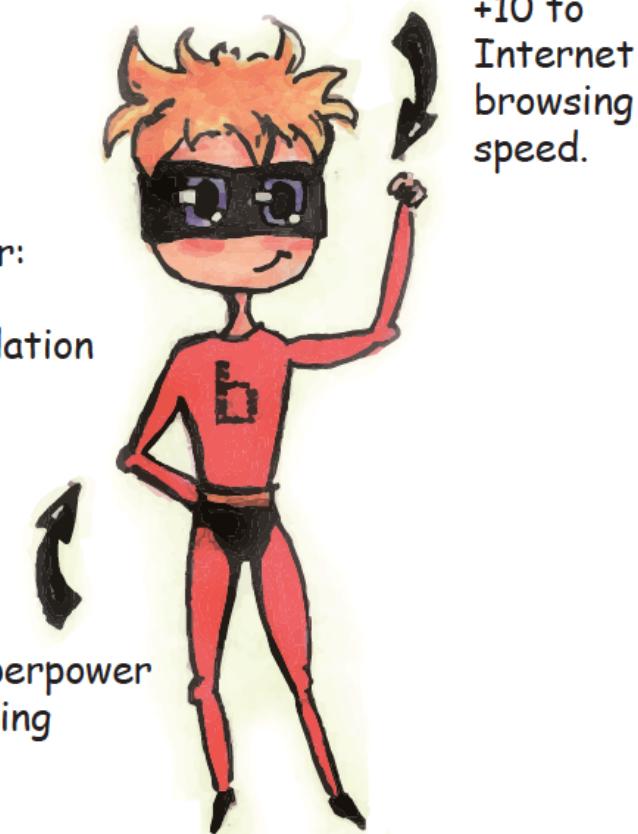


Beta, who has a passion for mathematics, chess and good books, changes into SuperBeta under the influence of puzzles.

Text: Przemysław Biecek, Illustrations: Klaudia Korniluk, Translation: Witold Chodor, Adam Melling-Smith



Beta's Superpower is data analysis.

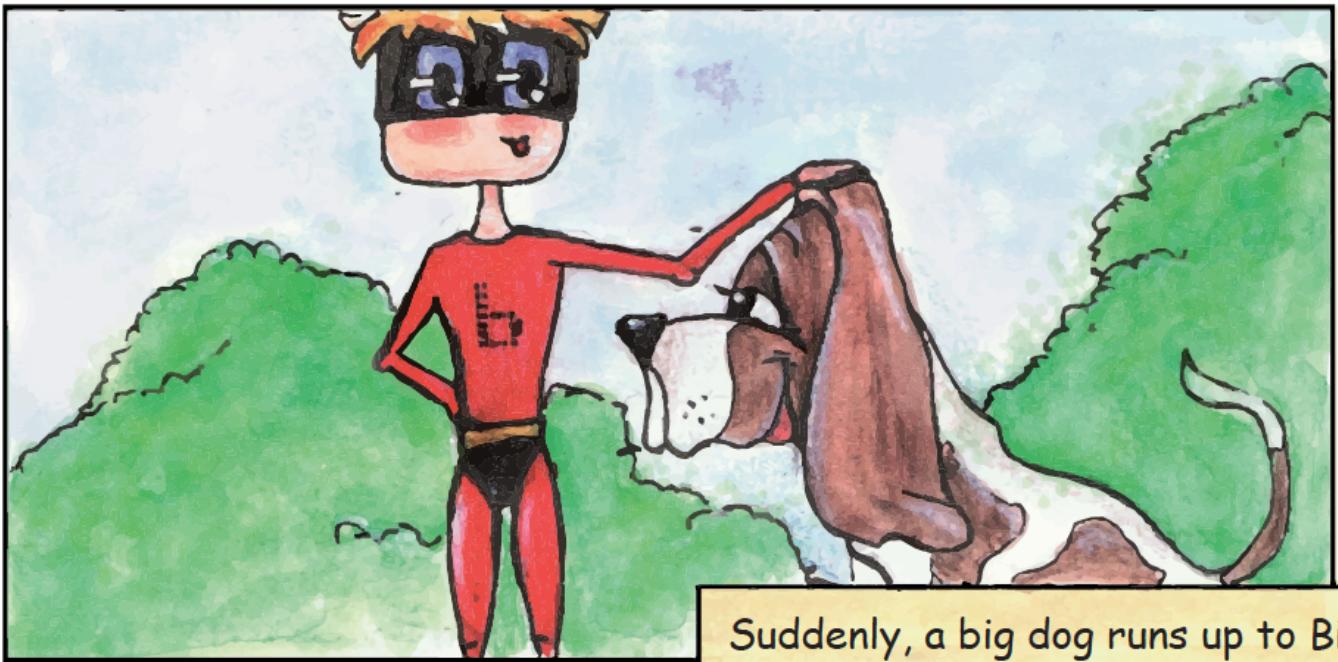


Superglasses:  
+10 to Internet browsing speed.

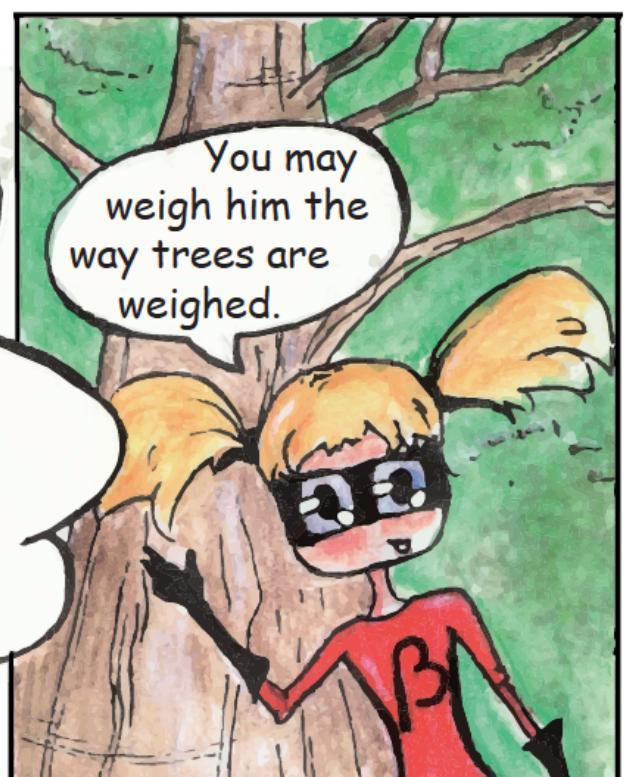
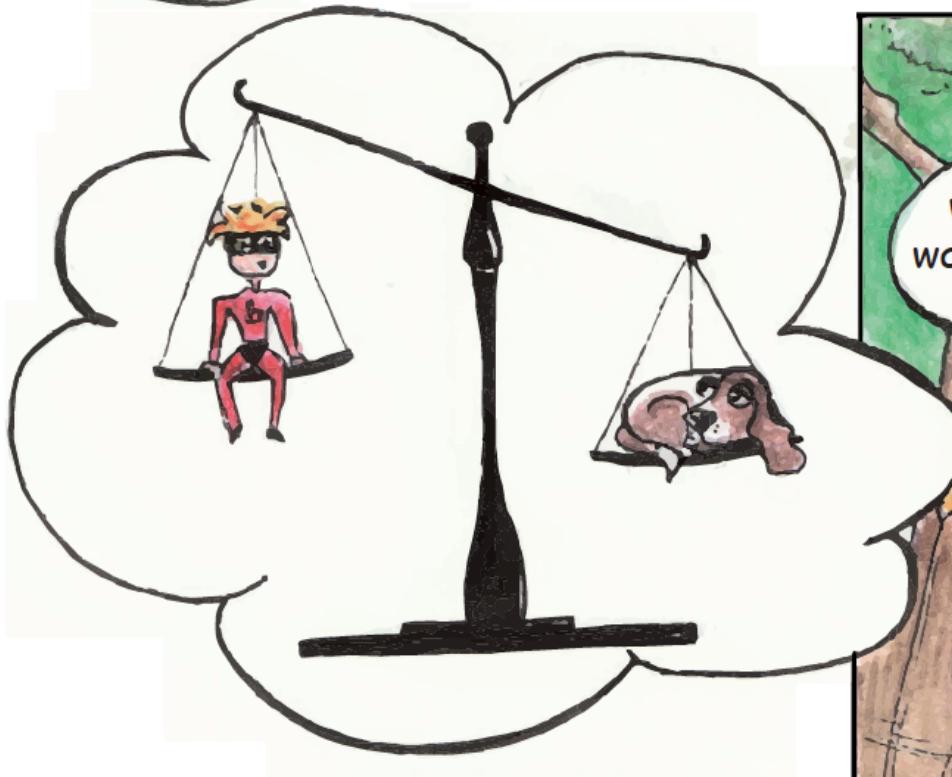
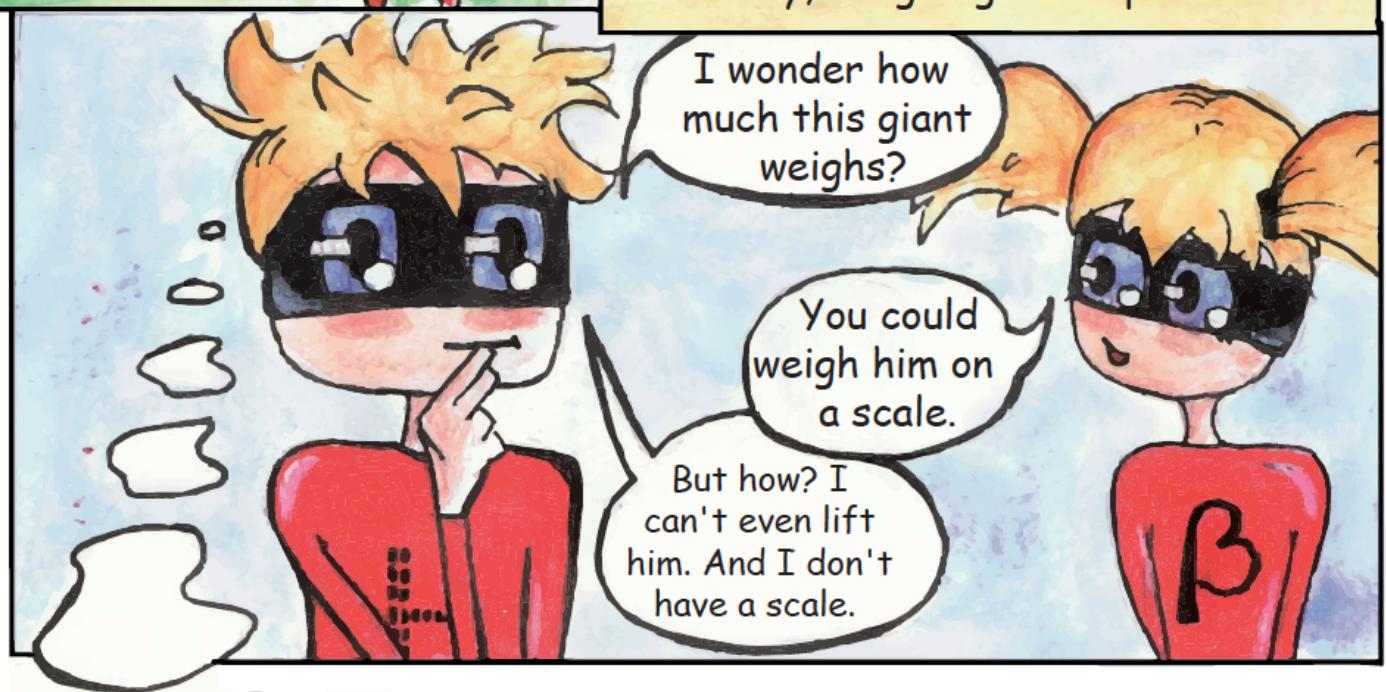
Early spring: Beta and Bit are wandering through the park.

Bit, who is a computer-programming and robotics maniac, changes into SuperBit under the influence of puzzles.





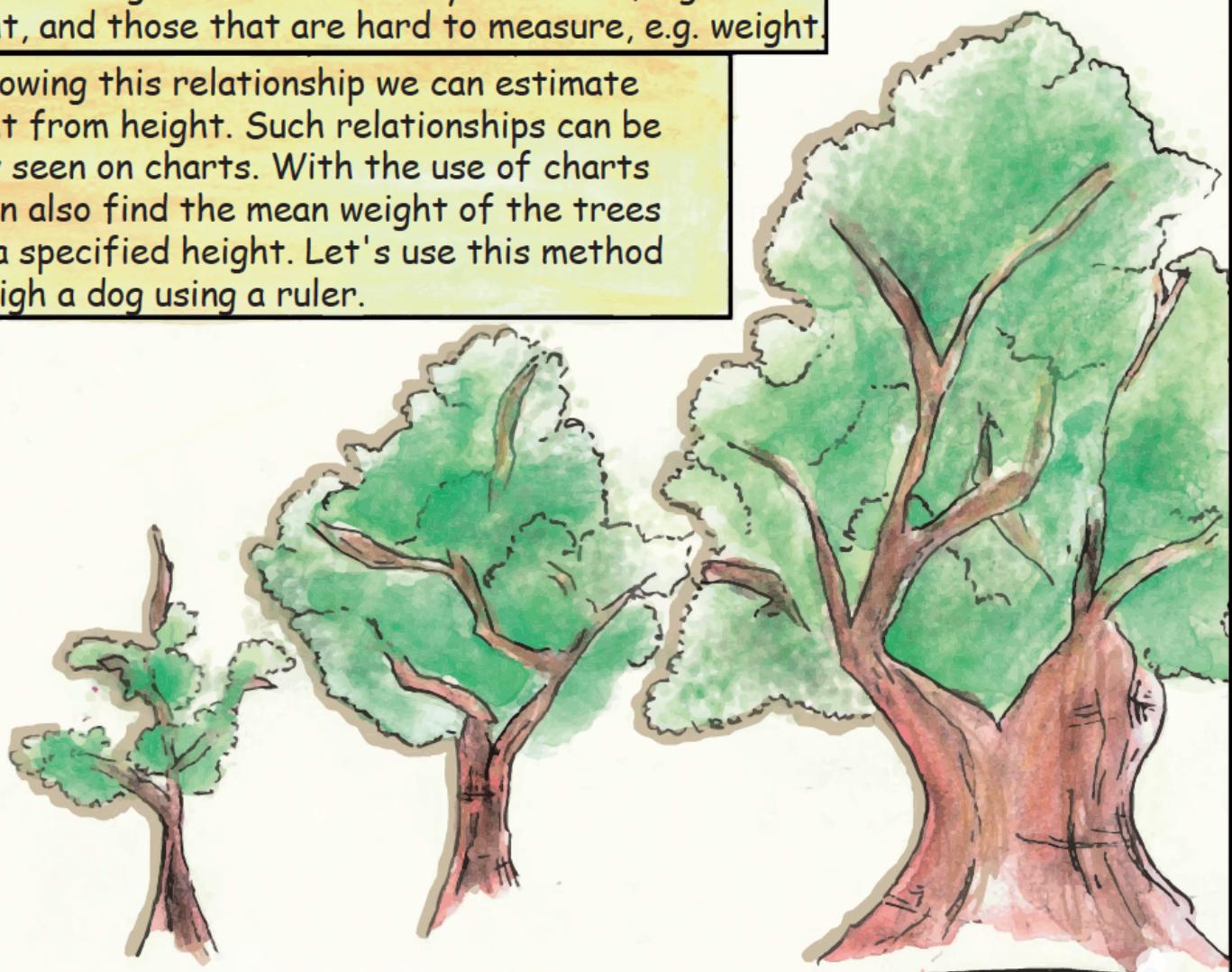
Suddenly, a big dog runs up to Bit.



How to weigh huge trees? Nobody digs them up and places them on a scale after all. So how?

The scientists are searching for a relationship between things that can be easily measured, e.g. height, and those that are hard to measure, e.g. weight.

By knowing this relationship we can estimate weight from height. Such relationships can be easily seen on charts. With the use of charts we can also find the mean weight of the trees with a specified height. Let's use this method to weigh a dog using a ruler.

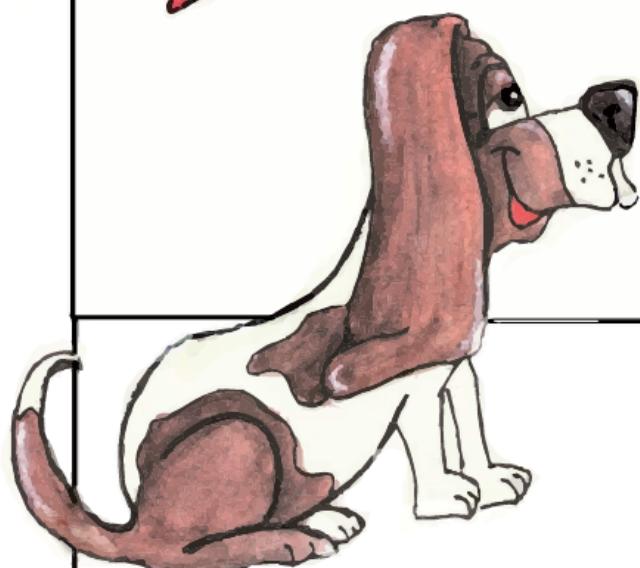


Let's find some data about the size and weight of some different dog breeds. Then we will find the relationship between these two features and estimate the dog's weight! Will you help us to do it?

Take a ruler and a pencil. We will weigh a dog using a ruler in only three steps!

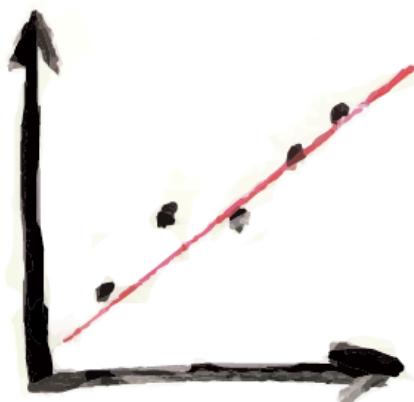
1

Bit has found a table with different dog breeds' data on the Internet. Now, you should mark on the chart on the right the weight and height of the breeds, as mentioned in the table.



	Height [cm]	Weight [kg]
Chihuahua	20	2,7
Yorkshire	22	3
Terrier	40	13
Bearded Collie	55	28
Chow Chow	55	31
Akita	70	50
Newfoundland	71	70
Mastiff	80	90

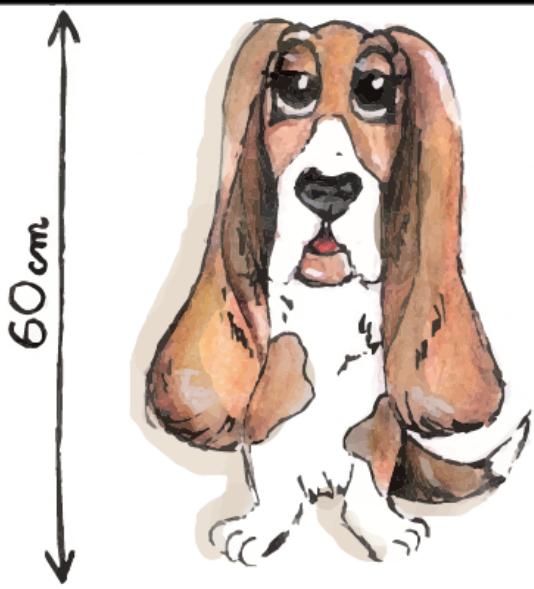
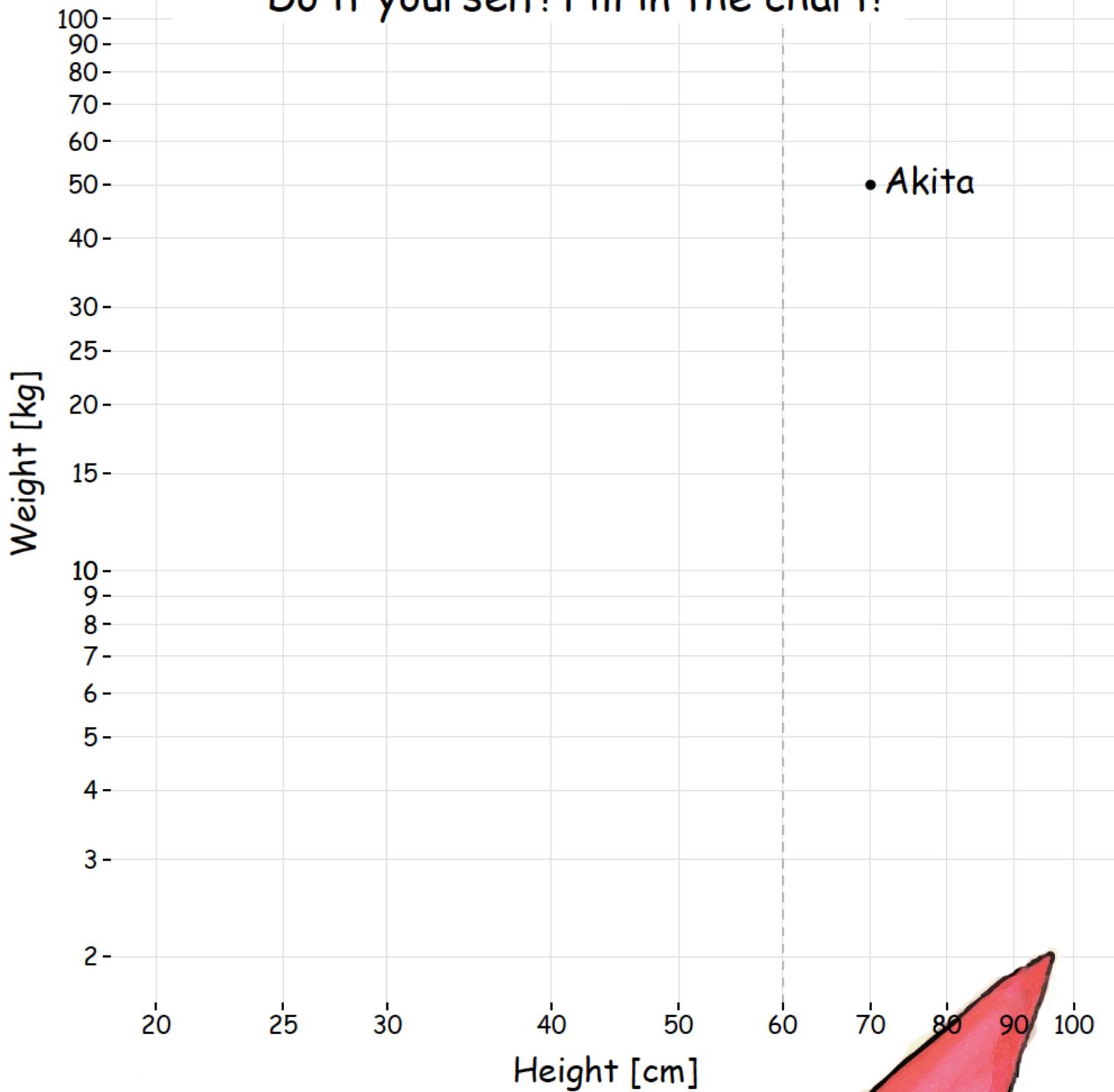
2



Take a ruler and try to draw a line that passes all the points as close as possible. It doesn't have to go through all possible points but try to make it as close as possible.\*

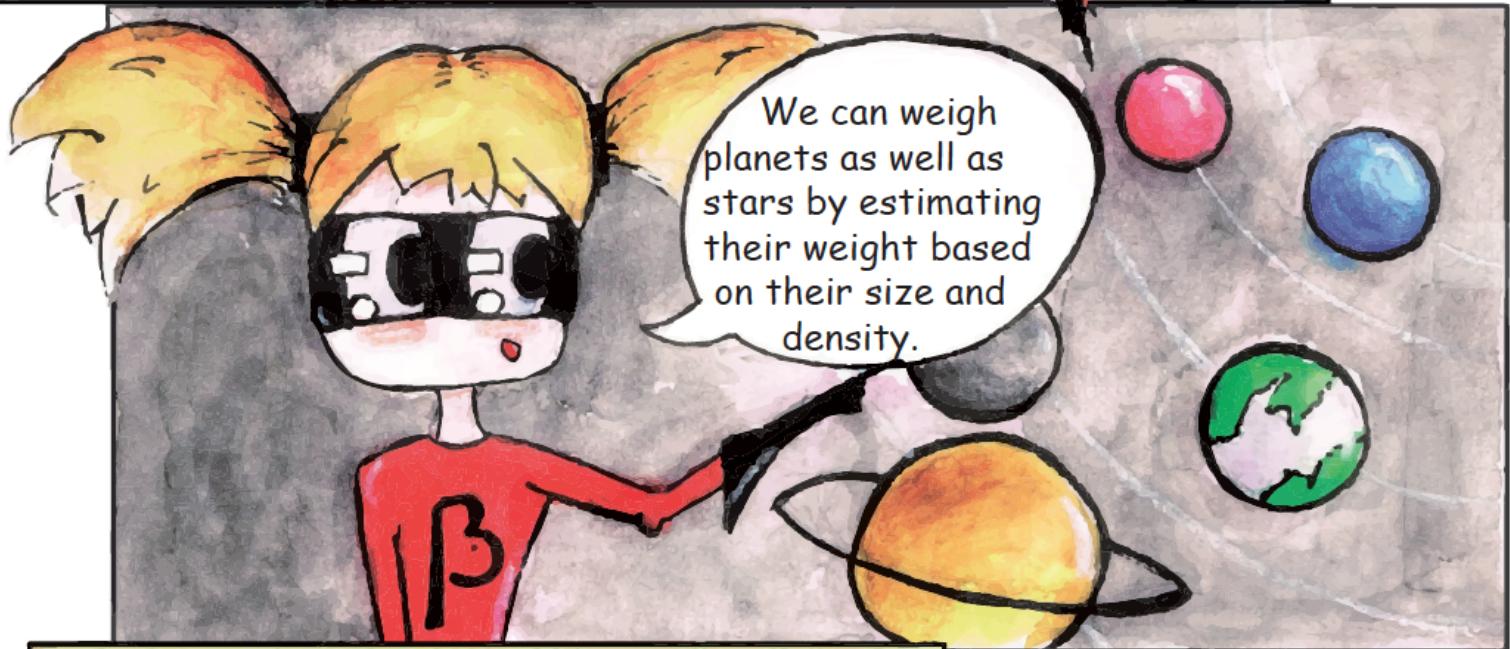
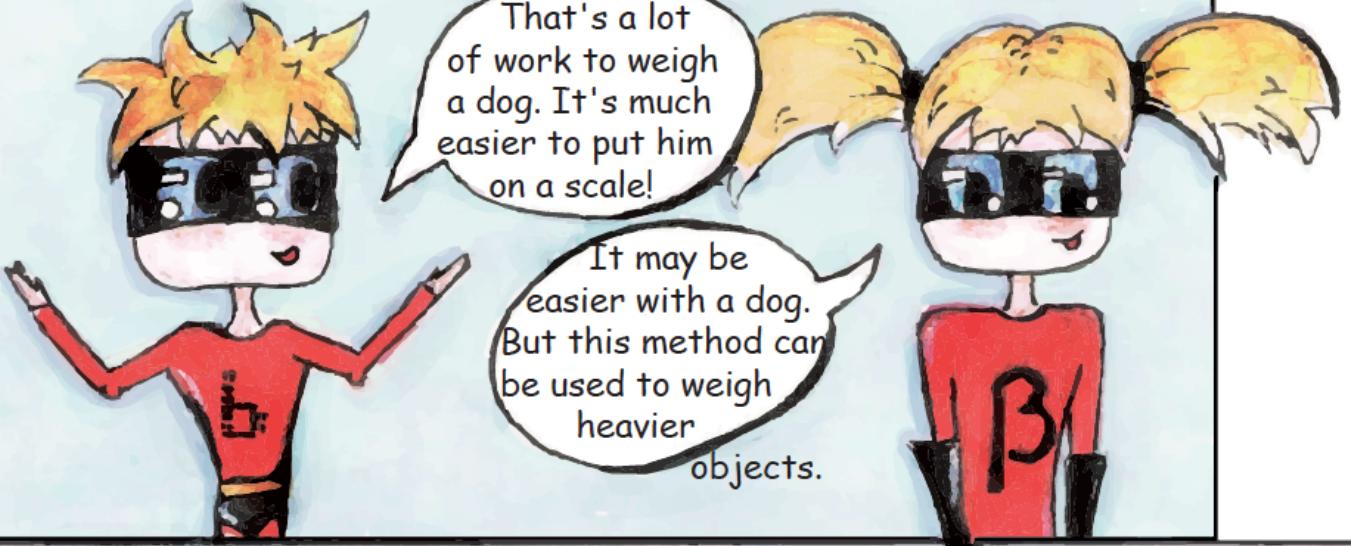
\* Academic mathematics is needed to find the line that fits the best, but this method will give us an approximate solution.

# Do it yourself! Fill in the chart!

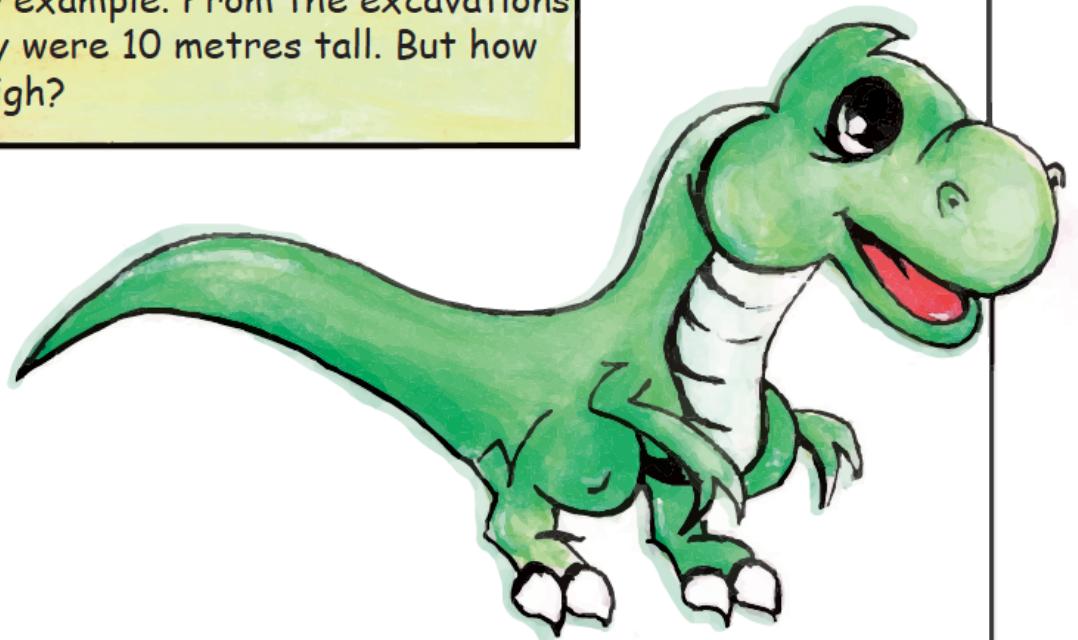


3

How heavy  
is a 60-centimetre  
tall dog? (1) Mark this size  
on the horizontal line. (2) Draw  
a vertical line through it.  
(3) Try to read what weight  
the height of the dog corresponds  
to. What is your result?



We can weigh dinosaurs too, in spite of the fact that they died out a long time ago and today we have only their skeletons or imprints on a rock. Take a T-Rex, for example. From the excavations we know that they were 10 metres tall. But how much did they weigh?



1 000 t-

# Do it yourself! Find T-Rex's weight.

Weight

100 t-

10 t-

1 t-

100 kg-

10 kg-

1 kg-

100 g-

10 g-

1 g-

1 cm  
cm2 cm  
5 cm  
10 cm  
20 cm50 cm  
1 m  
2 m5 m  
10 m  
20 m  
50 m  
100 m

Height

Blue  
Whale

African Elephant

Giraffe

Polar Bear

Man  
Capybara

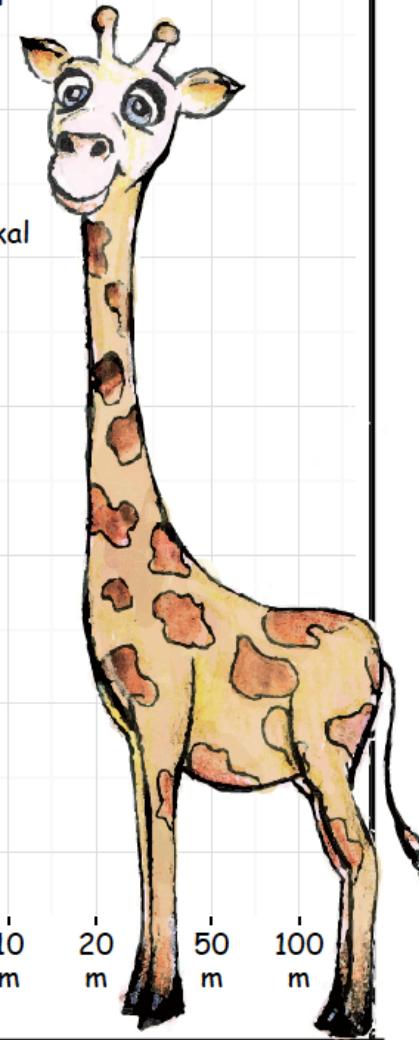
Wombat

Side-Striped Jackal

Red Squirrel

Wood Mouse

Kitti's Hog-Nosed Bat



The height and weight of different animals., from a small bat to a giant whale., has been marked on the chart above. Given this data, try to estimate how much the 10-metre dinosaur weighed.

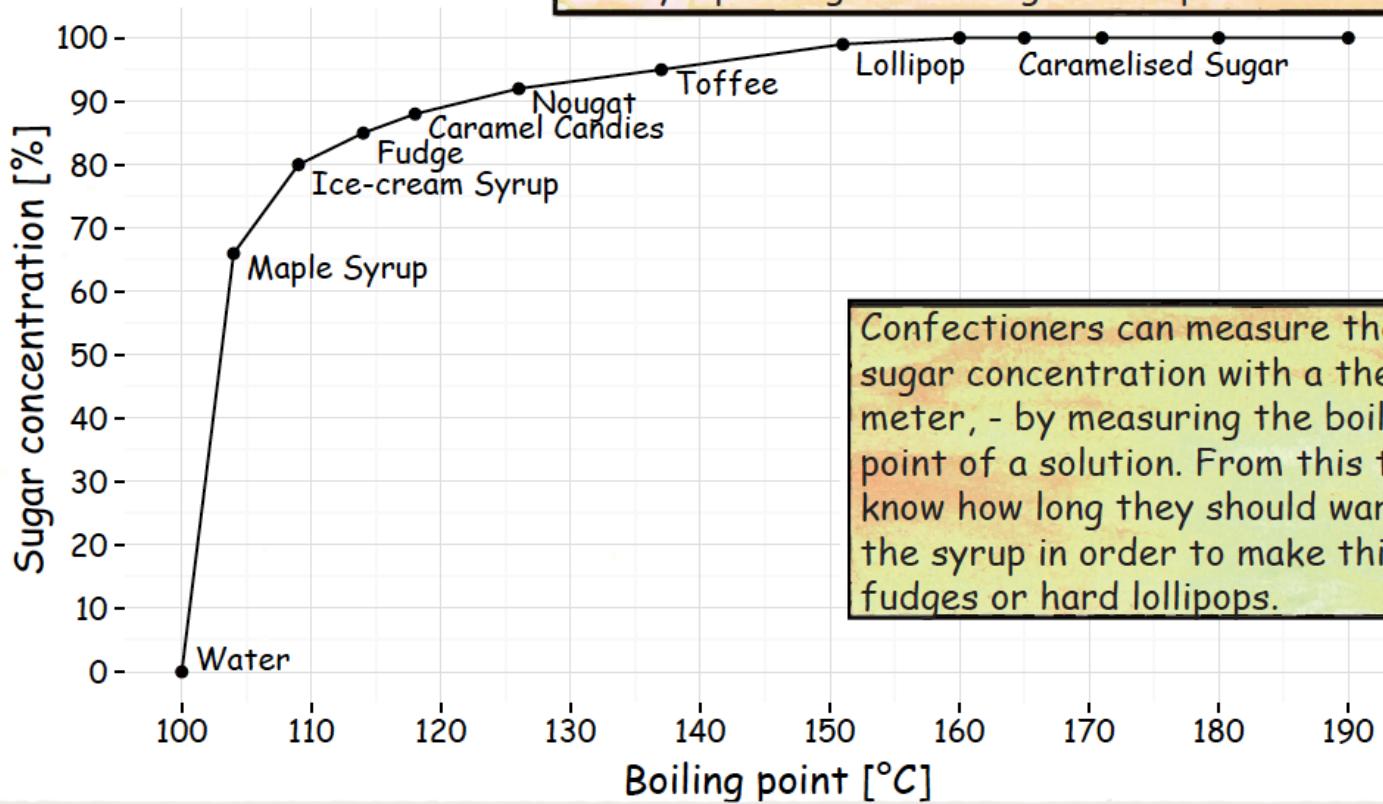
- (1) Draw a line passing close to the marked points, as you did for the dogs.
- (2) Based on the relationship between height and weight, estimate T-Rex's weight. \* Find out what weight corresponds to 10 metres of height.

\* Up until now, scientists have not all agreed about how much these giants weighed. Different models vary from 4.5 to 10 tons. And what was your result?

You're not saying that we can weigh everything with a ruler and there's always such a simple relationship between data.

Not everything but a lot of things. Even if it doesn't work with a straight line, then the method is only a little more complicated.

The sweetest substance is shown by the sugar curve. It is used by confectioners who warm up the syrup to higher and higher temperatures.



Confectioners can measure the sugar concentration with a thermometer, - by measuring the boiling point of a solution. From this they know how long they should warm up the syrup in order to make thick fudges or hard lollipops.



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Want to get more incredible adventures of Beta and Bit? You can find more of them at the website <http://www.BetaBit.wiki>