

**OTHER EXAMPLES**



**Juice making - Colombia**



**Carpentry - Peru**

**Fruit/spice dryer**

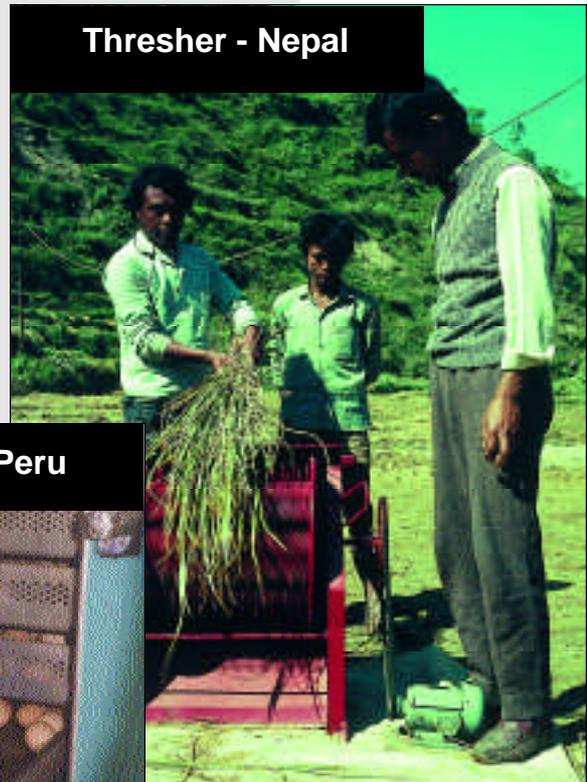
**Spice grinder**

**Sewing machine**

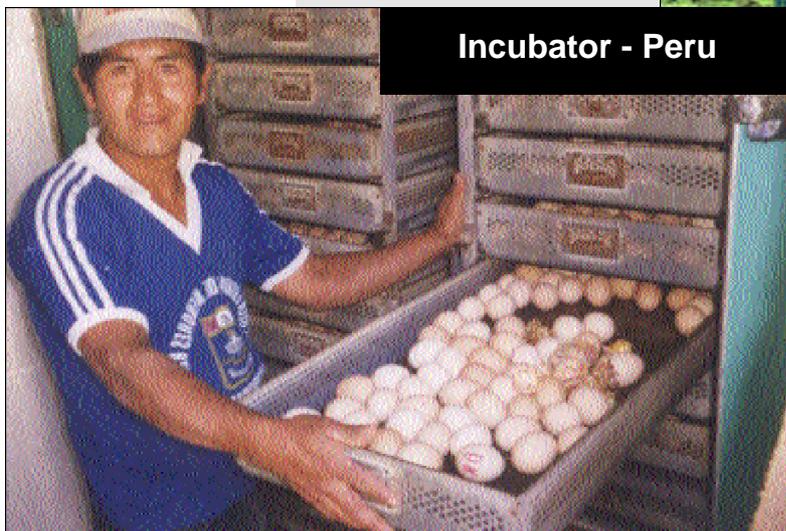
**Cooking stove**

**Water pump**

**Fan**



**Thresher - Nepal**

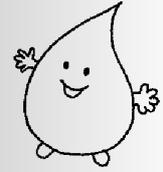


**Incubator - Peru**

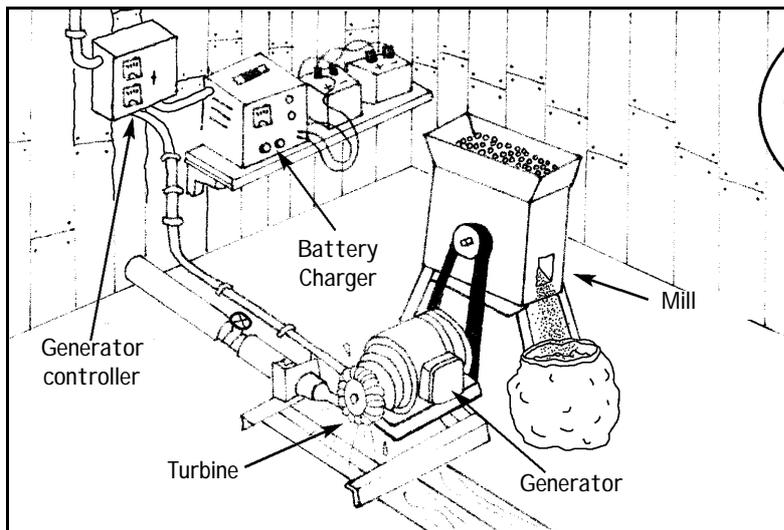
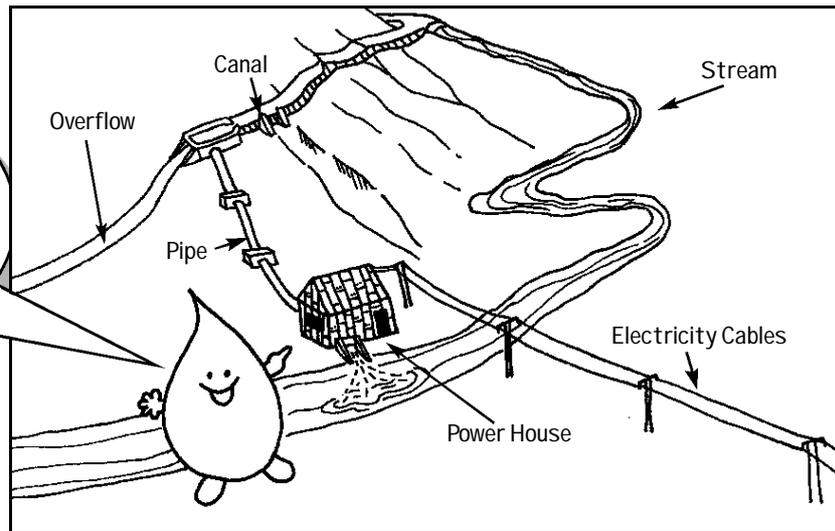
**Butter churner**

### SECTION 3

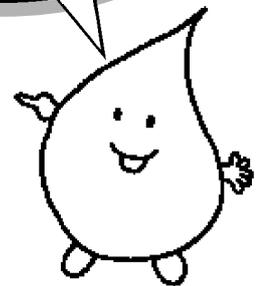
## WHAT DOES A WATER POWER SYSTEM LOOK LIKE?



Let's take a look at a waterpower scheme. This picture shows one way of building it. Here, water is taken from the stream along a canal and fed down a pipe to the power house. Let's go into the power house to see what the power is being used for.

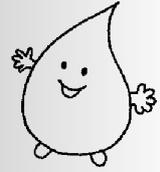


In this example, we can see that the waterpower is being used to mill grain into flour. It is also used to generate electricity which goes by wire to the village houses. People who live further away can have their batteries charged here, to be carried to their homes for lights and radio.



## SECTION 4

# IS YOUR STREAM STRONG ENOUGH FOR A WATER TURBINE



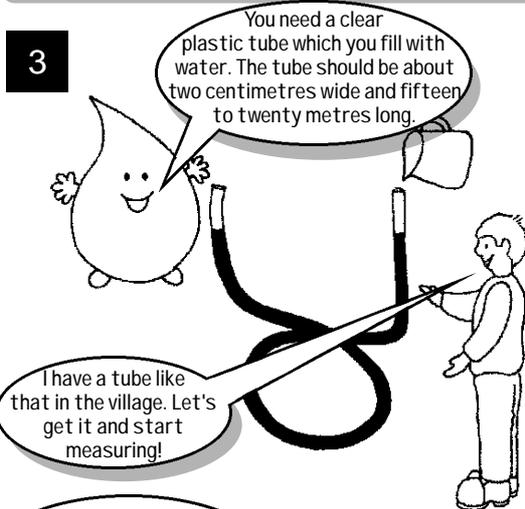
Can I put a water turbine somewhere near my village?

It must be close to the village, and the stream must be strong enough. This is a good place, because the stream is next to the village and drops steeply.



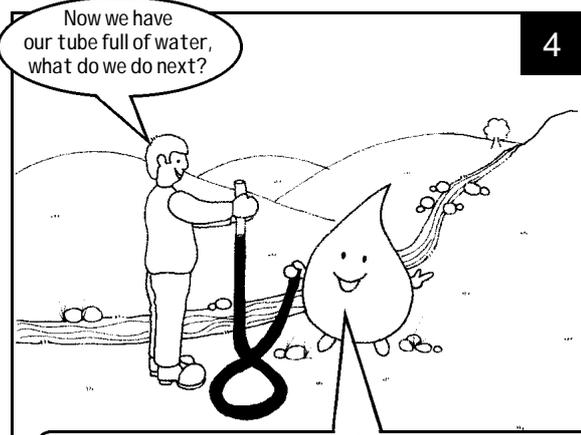
How do I find out if the stream is strong enough?

You must do two things: find out the drop, and find out the amount of water. The greater the drop and the more the amount of water, the stronger your stream. I will show you how to measure the drop now.



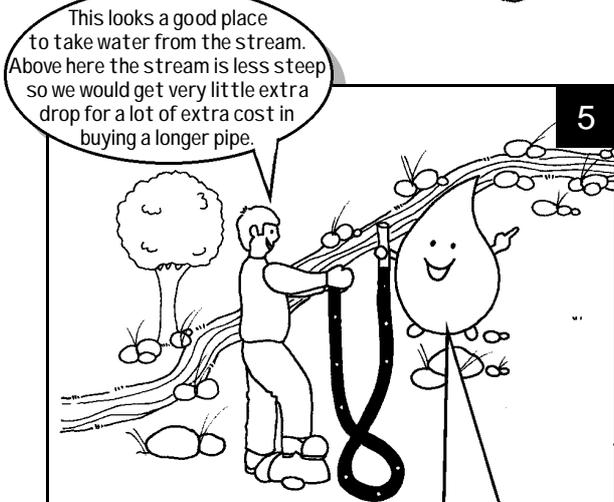
You need a clear plastic tube which you fill with water. The tube should be about two centimetres wide and fifteen to twenty metres long.

I have a tube like that in the village. Let's get it and start measuring!



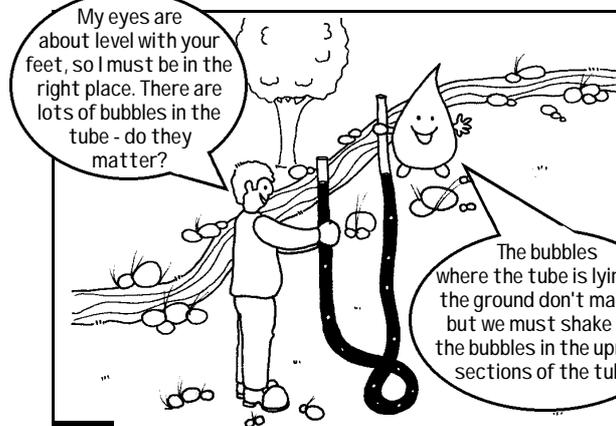
Now we have our tube full of water, what do we do next?

We will climb the hill to the place where you will put the water pipe to take water out of the stream to run your turbine. Hold your thumb over the end of the tube as we climb so you don't spill the water.



This looks a good place to take water from the stream. Above here the stream is less steep so we would get very little extra drop for a lot of extra cost in buying a longer pipe.

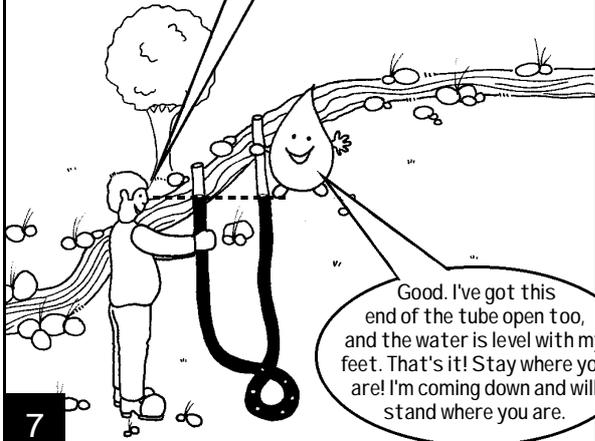
Good choice! I'll stand here with my feet at the place where we will take water out. You walk downhill until your eyes are level with my feet. Then hold the tube up and take your thumb off the end.



My eyes are about level with your feet, so I must be in the right place. There are lots of bubbles in the tube - do they matter?

The bubbles where the tube is lying on the ground don't matter but we must shake out the bubbles in the upright sections of the tube.

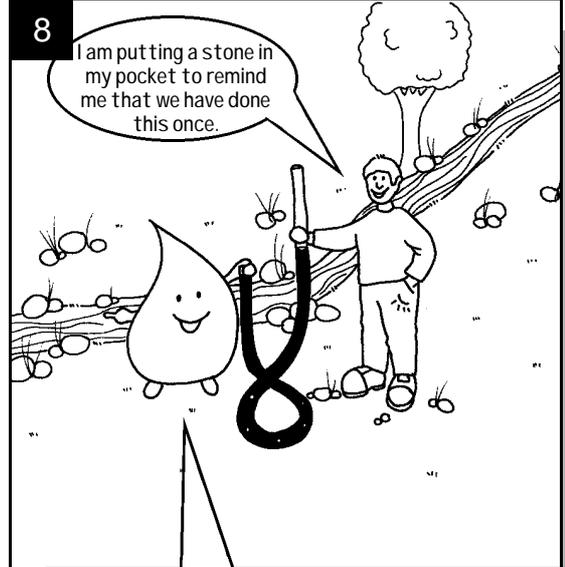
OK, I've shaken out as many bubbles as I can. The only bubbles left are in the coiled section on the ground. My end of the tube is not closed and the water is level with my eyes.



7

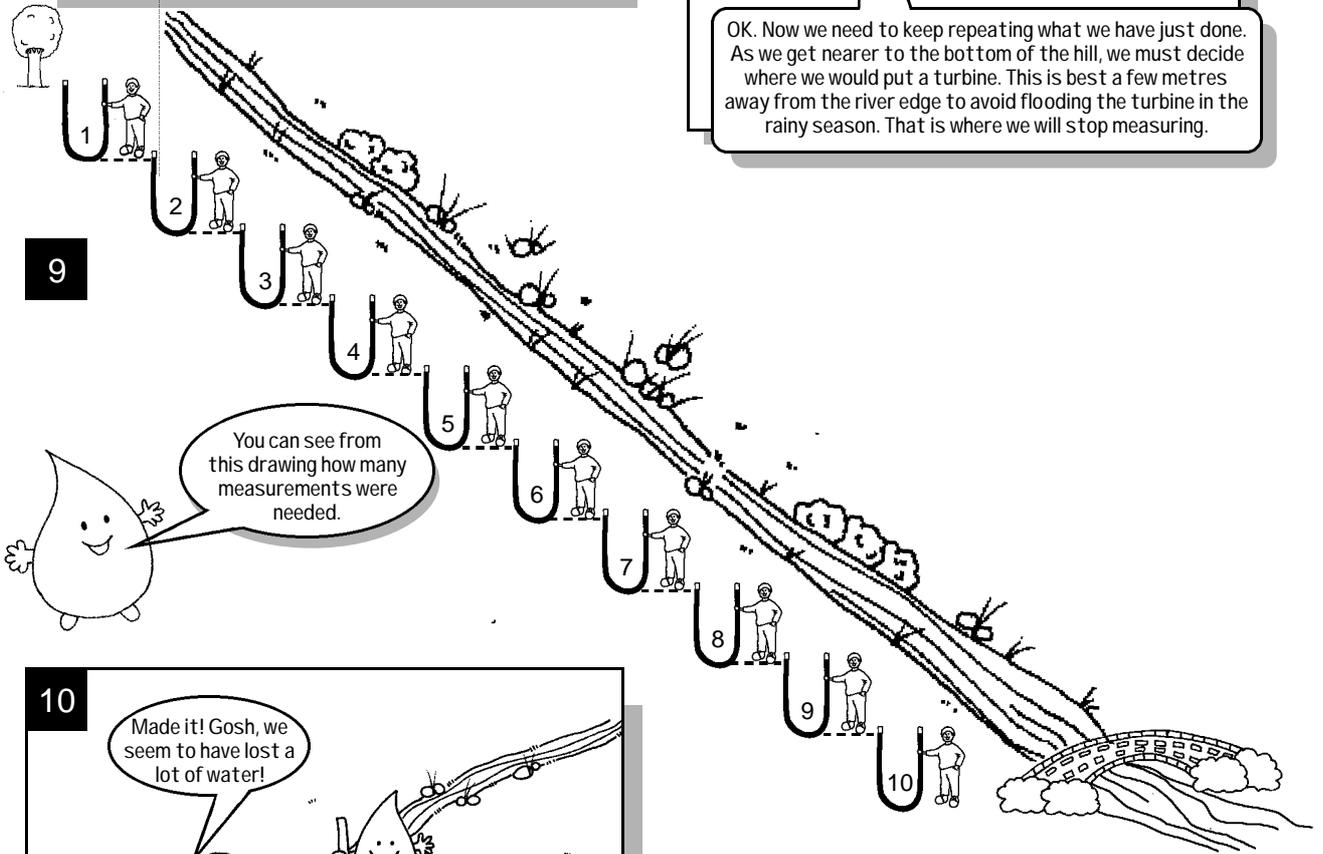
8

I am putting a stone in my pocket to remind me that we have done this once.



OK. Now we need to keep repeating what we have just done. As we get nearer to the bottom of the hill, we must decide where we would put a turbine. This is best a few metres away from the river edge to avoid flooding the turbine in the rainy season. That is where we will stop measuring.

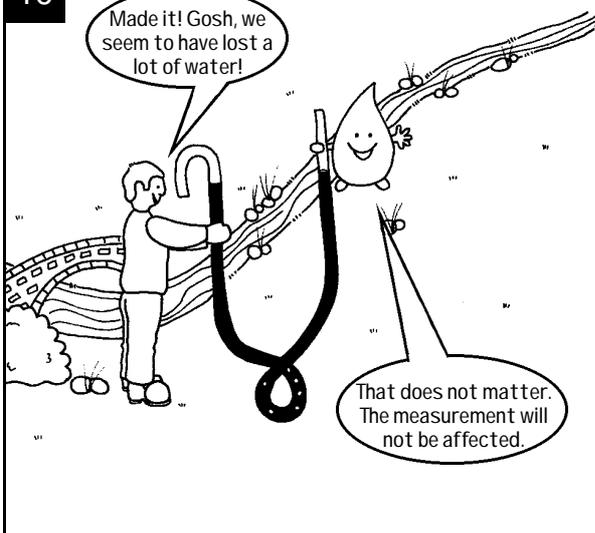
9



You can see from this drawing how many measurements were needed.

10

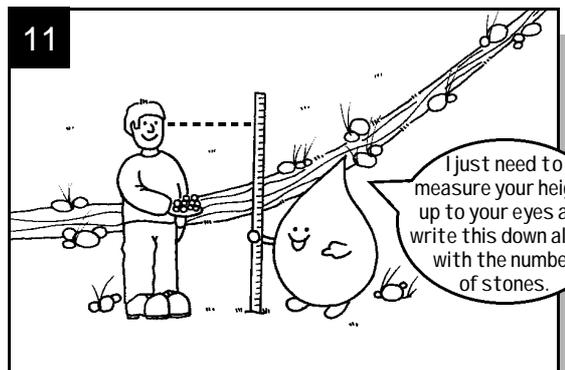
Made it! Gosh, we seem to have lost a lot of water!



That does not matter. The measurement will not be affected.

11

I just need to measure your height up to your eyes and write this down along with the number of stones.



12

Is that it? I'm hungry!

height 150cm  
number of heights 10

We should do our measurements at least once more - the exercise will be good for you! We can go the other way next time, starting at the bottom.

Good. We got the same number of stones the second time so our measurements are about right.

height 150cm ✓  
number of heights 10 ✓

Yes, if the two measurements are different, you need to do it a third time to find out the correct number of stones.

13

14

This month is good as the stream is at its lowest.

Now we are going to measure the amount of water in your stream. It is important to do this during the dry season as we must be sure that there is enough water all year round.

15

If the stream is very small, take a large container and see how many litres of water it takes to fill it.

Now I know why you wanted me to borrow that large container from the hardware store! I am filling it from a 5 litre bucket, I can see it takes 100 litres to fill it.

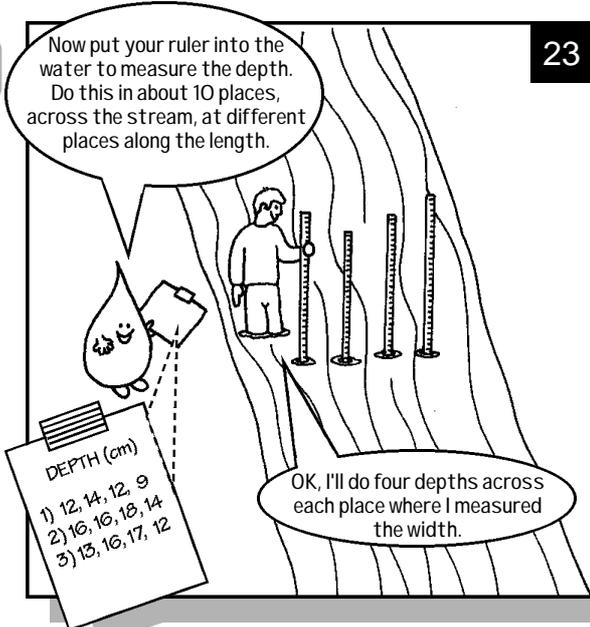
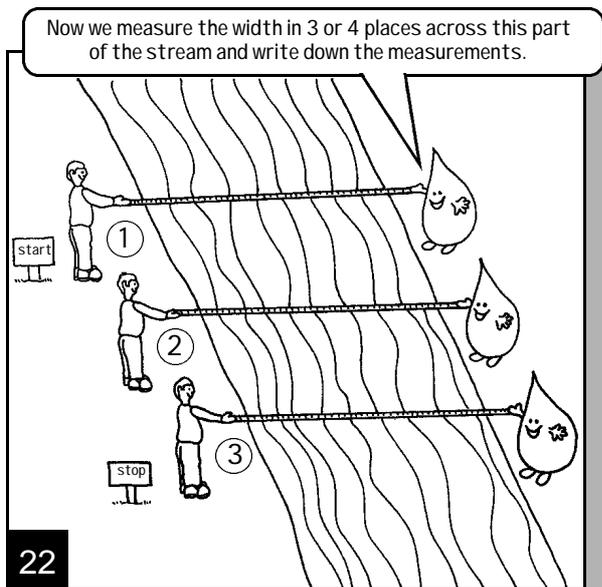
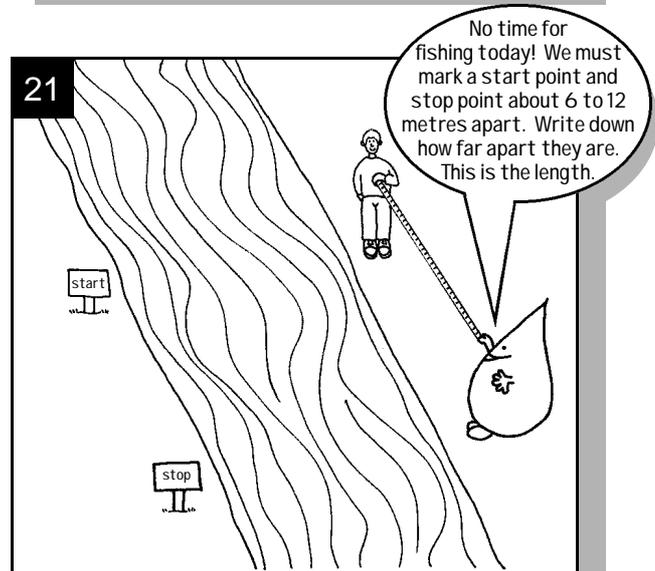
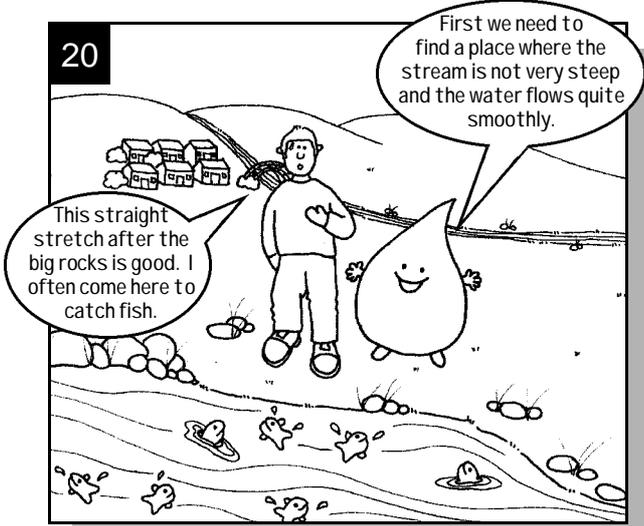
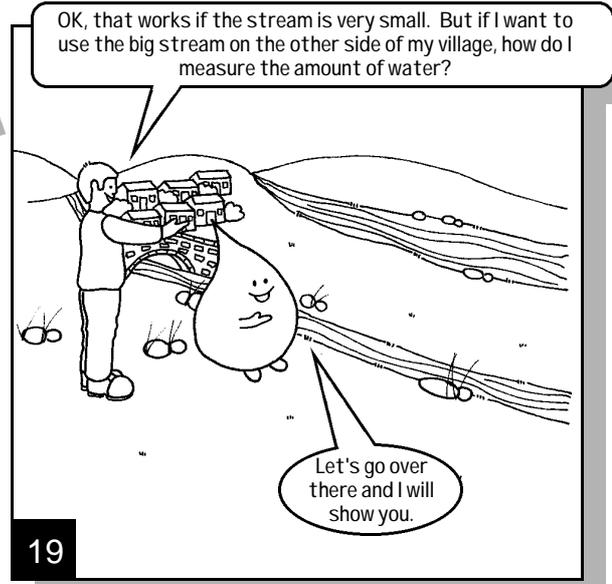
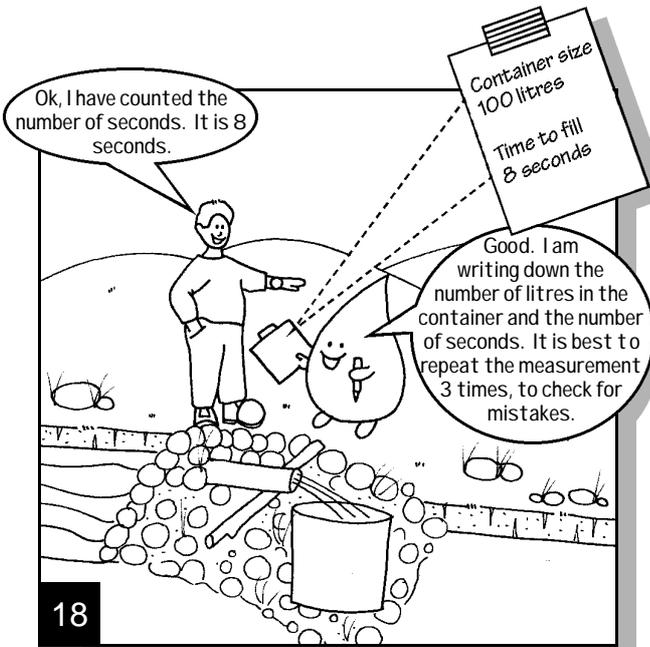
We can stop the stream with mud, rocks and grass and use a piece of pipe to take all the water. The pipe can be about 10 centimetres wide.

I understand. All the water goes through the pipe into the container.

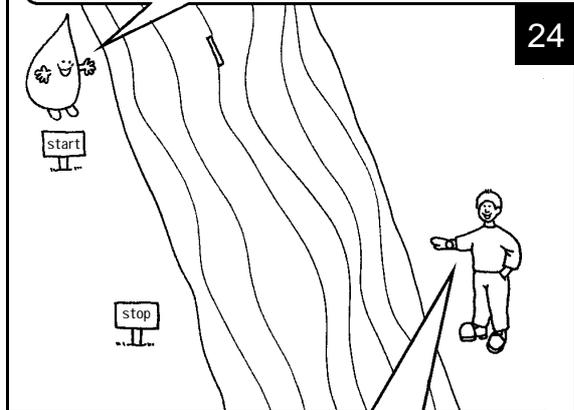
16

Yes, now use a watch and count the number of seconds it takes for the container to fill, from empty to full. Start when I place the container under the pipe.

17



OK. Now we float a piece of stick in the middle of the stream. I've thrown it in before the start point, use the watch to find the time it takes to float along the length that you measured.



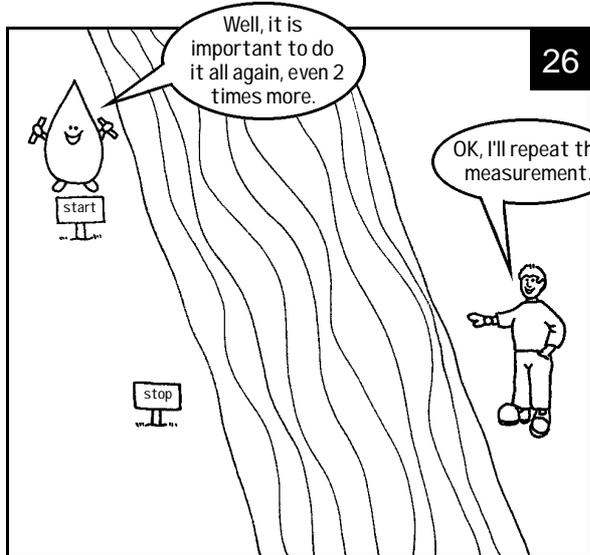
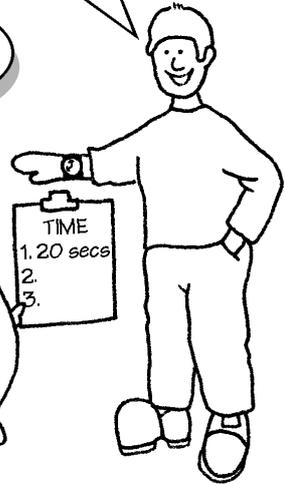
24

I understand how to do this now. When the floating stick passes the start point, I start to count the seconds. When it passes the stop point, I stop counting.

25

I will write down the number of seconds, with the length, depth and width measurements we took.

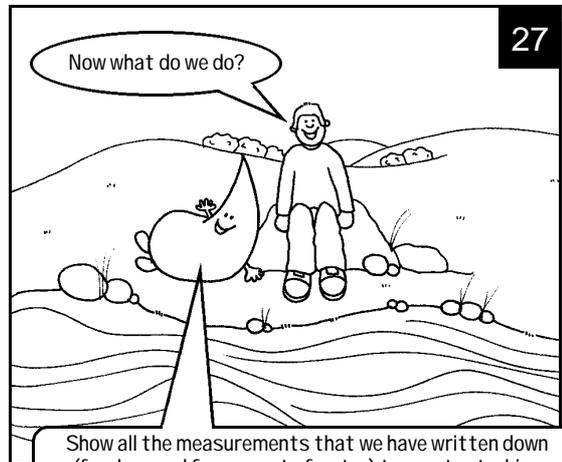
It took 20 seconds, what do we do next?



26

Well, it is important to do it all again, even 2 times more.

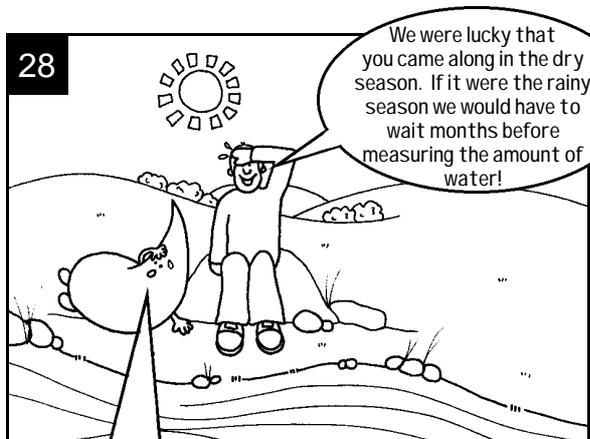
OK, I'll repeat the measurement.



27

Now what do we do?

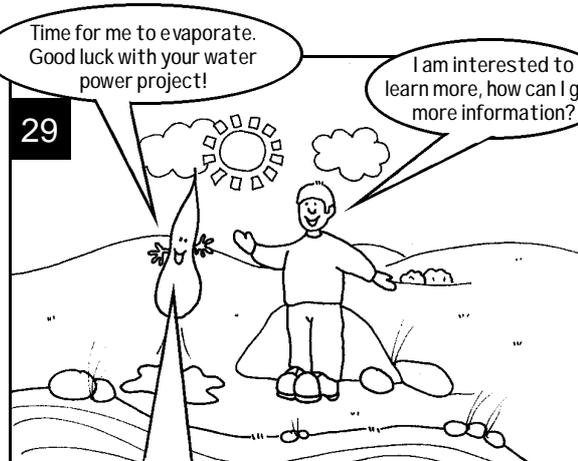
Show all the measurements that we have written down (for drop and for amount of water) to a water turbine manufacturer or a water power expert in the town. Tell them how you did the measurements. They will tell you if your stream is strong enough for a water turbine.



28

We were lucky that you came along in the dry season. If it were the rainy season we would have to wait months before measuring the amount of water!

It is best if you can measure the water in the dry season, but you can go and talk to a manufacturer with just the drop measurement. He will still be able to advise you, if you just tell him how big the stream is in the dry season, and how much bigger it is in other months.



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Time for me to evaporate. Good luck with your water power project!

I am interested to learn more, how can I get more information?

There is a booklet for technicians and engineers. It has information on how to decide the size of the water turbine, pipe and other equipment that you will need and how to work out whether you can make a profit. It is called "Pico Hydro for Village Power".