Complete worksheet 1 (WS 1) before starting with the Gadget.

This worksheet explains why numbers get larger when divided by a decimal.

Note: This is a very difficult concept for students to understand. Students' mathematical experience up until now has shown that dividing a number results in a smaller answer. Dividing by decimals does not; instead the number gets larger. We will want to help students to answer the question "Why is this so?"

Partitioning is not a useful example

Explaining this using a *partition* model (sharing into groups), such as 12 shared between 4 people, makes no sense when used for dividing by a decimal. It is meaningless to talk of sharing 12 between 0.5 people.

The Recommended Model: Quotition

However, it ~~is possible to model dividing using a quotition model as repeated subtraction.~~

Take 2 who

- **Demo**
- **Ask:** H
- **Say:** T

- **Write this:** $2 \div \frac{1}{4} = 8$

- Refer to dividing by a whole number using quotition: we can ask "how many *x* can we subtract from *y*?

- **Say:** Looking at this equation, we can ask "how many quarters (fourths) can we subtract from 2 applies?"

- Refer to the pieces of apple to demonstrate that the answer to the question is 8

- **Demonstrate:** Put the apples back together. Repeat the example.

- **Say:** The 2 apples are cut into quarters, making 8 pieces. The answer to two divided by one quarter (fourth) is the 8 pieces.

- **Do:** Hand out WS 1 and complete first section of the worksheet, revising what has been covered so far.

Take 3 chocolate bars to model tenths: (the second part of the worksheet)

Before starting the lesson: Try and find bars that have 10 segments already. If not then pre-cut a larger bar into bars with blocks of ten. Show the cut bars to students as three individual bars. To be even more creative wrap the new smaller bar in alfoil to give the illusion of a single bar.

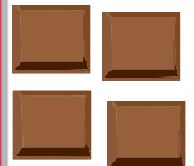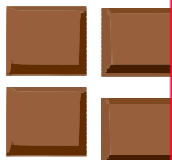- **Demonstrate:** cut one chocolate bar into 10 pieces

- **Ask:** I...iece? (one tenth)

- **Ask:** I...e be? (30 pieces...
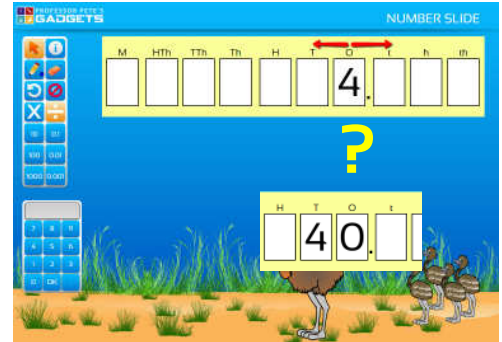
30 pieces altogether

- **Say:** So when I divided the 3 chocolate bars into tenths, the number of pieces is larger than the number of bars we started with (30)

- **Say:** Let's look at this in the written form (read the expression as you point to it):

- **Write:**

$$3 \div \frac{1}{10} = 30$$

- **Say:** I could write this using decimals:

- **Write:**

$$3 \div 0.1 = 30$$

- **Say:** This is what happens when a number is divided by a decimal: The answer is larger. Complete the second section of the worksheet.

Use the Number Slide Gadget to help with these questions which are on WS 1.

- **Write:** $4 \div 0.1 =$ _____

- **Say:** Look at the Number Slide.

- Enter **4 > OK**

- **Ask:** If I divide the number 4 by a tenth, which way will I need to slide the number? To the right where the number gets smaller? Or to the left where the number gets larger? (the left as the number gets larger)

- Click **÷ > 0.1**

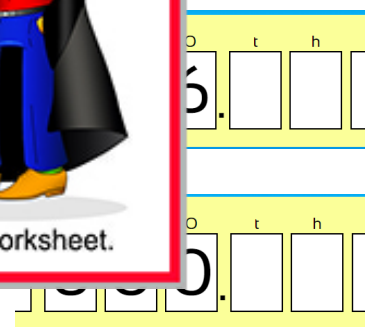- **Ask:** What is my answer? (40) Write it on the worksheet.

- **Ask:** ~~...~~

- **Ask:** ~~...~~ .00 pieces each.

- **Write:** ~~...~~

- **Say:** ~~...~~

- Enter ~~...~~

- **Ask:** ~~...~~ the lef~~...~~

- **Ask:** ~~...~~ decim~~...~~ (2 plac~~...~~

- Click **÷ 0.01** and watch the result. Have students write their answer on the worksheet.

- **Say:**

Think:
"Dividing by decimals the numbers gets **larger.**"
÷ 0.1: one place
÷ 0.01: two places
÷ 0.001: three places
Remember:
"The number of places moved is the same as the number of decimal places"