PROFESSOR PETE'S CLASSROOM

Extended Multiplication & Division Number Facts

Teaching Strategies

Once students know all their basic multiplication and division number facts, they are ready to learn the extended number facts.

Extended number facts are based on basic number facts, when they are applied to larger or smaller numbers.

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For example:

4 x 7	= 28
40 x 7	= 280
400 x 70	= 28 000

Introduce these extended facts first by changing one of the terms in a basic number fact, leaving the other number as a single digit number.

Note: Avoid talking of "adding zeros" to a result. Not only is this not an accurate description of the process, it does not apply when the result is a decimal fraction.

Students should be encouraged to see that multiplying powers of ten results in specific products relating to the original terms. These "power of ten products" can be applied to a basic fact to find the extended fact product.

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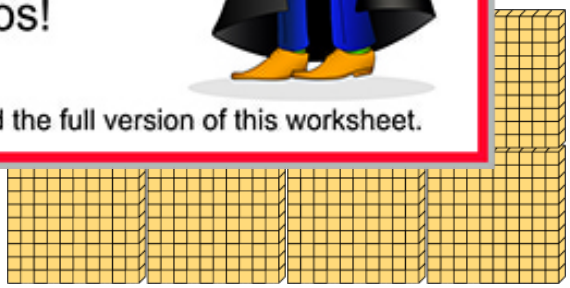

20 x 40	= 800

Principles such as "tens times hundreds equals thousands" can be applied to a basic fact such as

2 x 6	= 12

like so:

20 x 600	= 12 000
200 x 60	= 12 000

and so on.

Multiples of Decimal Fractions

Decimal fractions such as 0.1, 0.01, and so on are also powers of ten, and so behave in similar ways, except that the resulting product will be smaller than the related basic fact.

For example:

9 x 4 = 36
9 x 0.4 = 3.6
0.9 x 0.004 = 0.0036

As with larger powers of ten, start by changing one of the two terms in a basic fact, l
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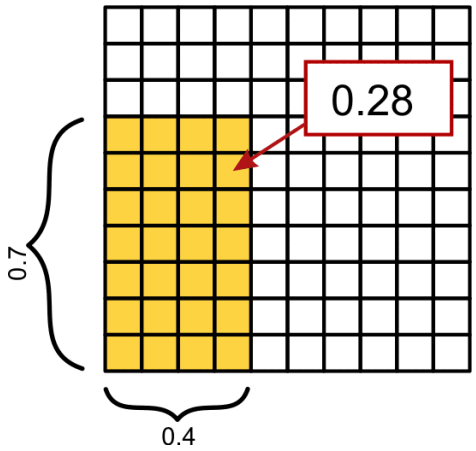
0.1 x 0.1 = 0.01
1 tenth x 1 hundredth = 1 thousandth
0.1 x 0.01 = 0.001

The knowledge that the product of one tenth and one tenth is one hundredth can then be applied to an operation such as:

0.4 x 0.7 = 0.28

This can also be modelled using a square hundred grid:



After students have developed familiarity with multiples of decimal fractions, they can be taught the rule of "counting the decimal

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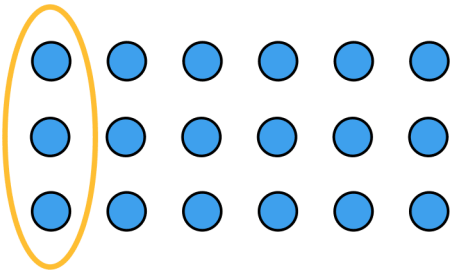
numerator is "1") is multiplied, it behaves exactly the same as the denominator of the fraction applied as a divisor. For example:

$\frac{1}{8}$ x 32 = 4

is the same as

32 ÷ 8 = 4

Students can use physical models to see what a "fraction of a group" means. For example:



$\frac{1}{6}$ x 18 = 3

Fractions can also be multiplied by a related number raised by a power of ten. For example:

$\frac{1}{9}$ x 5400 = 600

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Division of Decimal Fractions

Dividing a decimal fraction by a whole number is not difficult if the student first names the decimal fraction in terms of its last place. This can then be related to the relevant basic fact. For example:

36 ÷ 9 = 4
36 thousandths ÷ 9 = 4 thousandths
0.036 ÷ 9 = 0.004

Division by Decimal Fractions

Dividing by a decimal fraction is conceptually difficult, and should be understood via a "quotition" model, in which division is understood as *repeated subtraction* of the divisor. Thus, a question such as

3.5 ÷ 0.5 = 7

can be thought of as "How many times can 7 tenths be subtracted from 35 tenths?"

An alternative way to approach division by a decimal fraction is to write the question as

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