

17 Sep' 24

HW1: Write numbers 0-9 neatly - practice
Last homework - several mistakes

(12 / 16)

Divisions:

$$\begin{array}{r} 4556 \text{ } / \text{ } 365 \\ 12 \checkmark \\ \hline 365 \overline{) 4556} \\ \underline{365} \\ 906 \\ \underline{730} \\ 176 \checkmark \end{array}$$

$$\begin{array}{r} 11 \\ 365 \\ \hline 2 \\ \hline 730 \end{array}$$

$$\begin{array}{r}
 580 \checkmark \\
 973 \overline{) 564391} \\
 \underline{4865} \\
 07789 \\
 \underline{7784} \\
 00051 \checkmark
 \end{array}$$

$$\begin{array}{r}
 41 \\
 973 \\
 \times 6 \\
 \hline
 5838 \\
 52 \\
 973 \\
 \hline
 8 \\
 7784
 \end{array}$$

$$\begin{array}{r}
 31 \\
 973 \\
 \times 5 \\
 \hline
 4865
 \end{array}$$

$$\begin{array}{r}
 70 \\
 9 \overline{) 631} \\
 \underline{63} \\
 001 \\
 0 \\
 \hline
 1
 \end{array}$$

How to verify $+, -, *, |$:

$$\rightarrow a + b = c \xRightarrow{\text{implies/means}} c - b = a ; c - a = b$$

$$\rightarrow a - b = c \Rightarrow c + b = a$$

$$\rightarrow a * b = c \Rightarrow c / b = a \quad \downarrow \text{quotient}, \text{remainder} = 0$$

$$c / a = b, \text{remainder} = 0$$

$$\rightarrow a / b = c \text{ (quotient)} \Rightarrow b * c + d = a$$

d (remainder)

$$\begin{array}{r} c \\ b \overline{) a} \end{array}$$

$$\underline{\quad}$$
$$\underline{d}$$

HW: Do 5 each of $+$, $-$, $*$, $/$ of 3 and 4 digit numbers ; In each case, verify your answers

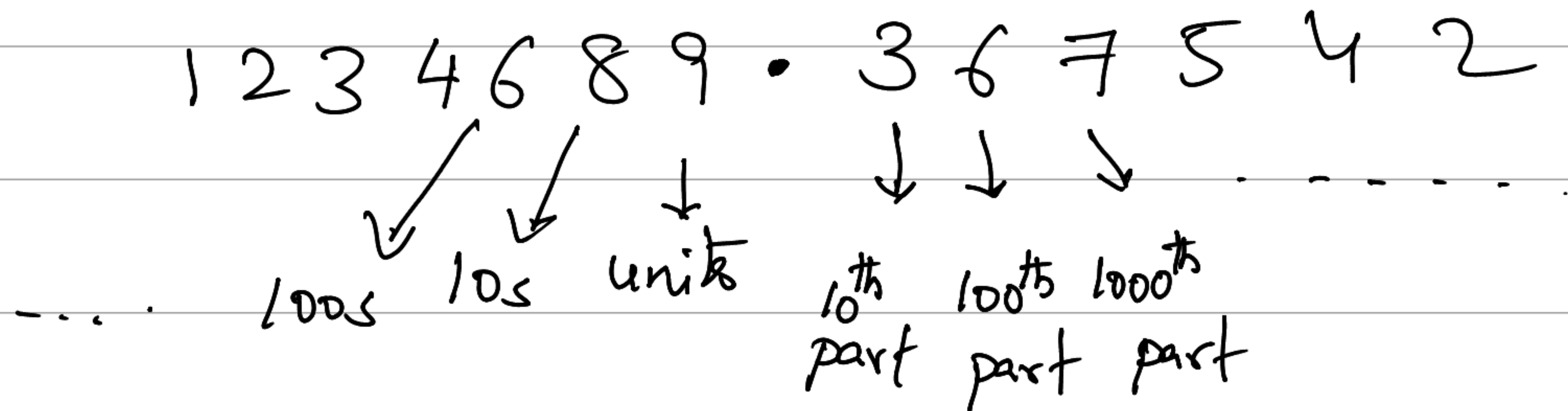
Decimals: (1) 0.3 apples \Rightarrow 1 apple cut into 10 pieces and only 3 of those pieces are left

(2) out of those 3 pieces, each of those pieces is cut into 10 more parts

$$0.3 = 0.30 = 0.300 = 0.300 \dots$$

$$\dots 003 = 003 = 03 = 3$$

$$(3) \quad 0.3 = 0.30$$



$$\rightarrow 100 \div 10 = 10$$

$$\rightarrow 1230 \div 10 = 123 \quad ; \quad \frac{1230}{10} = \frac{1230 \cdot 0}{10} = 123.00 = 123$$

$$\rightarrow \frac{123}{10} = \frac{123 \cdot 0}{10} = 12.3$$

Dividing by 10 moves the 'point' left by 1 digit

$$\rightarrow 123 \times 10 = 123.000\dots \times 10 = 1230.000\dots = 1230$$

Multiplying by 10 moves the 'decimal point' once to the right

$$\rightarrow 123 \times 1000 = 123.00000\dots \times 1000 = 123000.000\dots$$

Multiplying by '1000' moves the decimal point to the right 3 times

$$\rightarrow \frac{123}{1000} = \frac{\dots 0000.123.0000\dots}{1000} = \dots 0000.123000\dots$$

Left 3 times

→ HW: Type these into a program (python)
and answer here (with extra zeros
and move the decimal point)

(1) 123×1000

(2) $123 \div 10000$

(3) 0.123×100

(4) $643 \div 100000$

(5) 23.24×1000

(6) 0.096×10

(7) $70.01 \div 1000$

(8) 901.765×100

(9) 446.1×100

(10) $76.3 \div 1000$

24 Sep' 24

Last class — we multiplied or divided decimal numbers with 'powers' of 10

$$10^4 = 10 \times 10 \times 10 \times 10 = 10,000$$

$$23.4 \times 10,000 = 23.4 \times 10^4$$

↓
10 power '4' so we move decimal point 4 digits to the right

$$= 234000.0$$

Powers of 10 for all integers

$$1 = 001.00$$

$$10^1 = 10$$

$$10^2 = 100$$

$$10^3 = 1000$$

⋮

$$10^n = 1 \underbrace{00 \dots 0}_{n \text{ zeros}}$$

(n is a Natural number)

$$10^0 = 1$$

$$10^{-1} = \frac{1}{10^1} = \frac{1}{10} = 0.1$$

$$10^{-2} = \frac{1}{10^2} = \frac{1}{100} = 0.01$$

$$10^{-3} = \frac{1}{10^3} = \frac{1}{1000} = 0.001$$

⋮

$$10^{-n} = \frac{1}{10^n} = \frac{1}{1 \underbrace{00 \dots 0}_{n \text{ zeros}}} = 0. \underbrace{00 \dots 0}_{n-1 \text{ zeros}} 1$$

$$76.3 \div 1000 = 76.3 \times \frac{1}{1000} = 76.3 \times 10^{-3}$$

HW: Enter these into a program file in check.

→ move decimal
'-3' times to right
→ 3 times to left