

Division Widget Proofs

Bus-stop frames and chunking examples across carries, decimals, prompts, remainders, and long working.

Bus-stop / short division

empty prompt - whole number	empty prompt - decimal	intro carry
$4 \overline{) 484}$	$8 \overline{) 7.000}$	$3 \overline{) 12}^4$
whole number, no carry	whole number, carry + remainder	leading zero quotient + carries
$4 \overline{) 484}^{121}$	$4 \overline{) 925}^{231 \text{ r}1}$	$5 \overline{) 378}^{075 \text{ r}3}$
decimal answer	decimal dividend, added zero	long decimal expansion
$3 \overline{) 4.98}^{1.66}$	$5 \overline{) 7.60}^{1.52}$	$7 \overline{) 4.0000}^{0.5714}$

Rule gap invariance

bus stop: no carry vs carry		chunk rows: no carry vs carry	
no carry	carry	no carry	carry
$4 \overline{) 484}^{121}$	$4 \overline{) 925}^{231 \text{ r}1}$	$\begin{array}{r} 14 \overline{) 252} \\ -140 \\ \hline 112 \\ -70 \\ \hline 42 \\ -42 \\ \hline 0 \end{array}$	$\begin{array}{r} 18 \overline{) 633.6} \\ -360 \\ \hline 273.6 \\ -180 \\ \hline 93.6 \\ -90 \\ \hline 3.6 \\ -3.6 \\ \hline 0 \end{array}$
		-10×14	-20×18
		-5×14	-10×18
		-3×14	-5×18
			-0.2×18

Chunking / long division

whole number, exact

$$\begin{array}{r}
 14 \overline{) 252} \\
 \underline{-140} \quad -10 \times 14 \\
 112 \\
 \underline{-70} \quad -5 \times 14 \\
 42 \\
 \underline{-42} \quad -3 \times 14 \\
 0
 \end{array}$$

whole number, leading zero remainder

$$\begin{array}{r}
 17 \overline{) 546} \\
 \underline{-340} \quad -20 \times 17 \\
 206 \\
 \underline{-170} \quad -10 \times 17 \\
 036 \\
 \underline{-034} \quad -2 \times 17 \\
 2
 \end{array}$$

decimal answer step

$$\begin{array}{r}
 15 \overline{) 186} \\
 \underline{-150} \quad -10 \times 15 \\
 36 \\
 \underline{-30} \quad -2 \times 15 \\
 6 \\
 \underline{-6} \quad -0.4 \times 15 \\
 0
 \end{array}$$

decimal dividend + borrow marks

$$\begin{array}{r}
 18 \overline{) \overset{5}{6} \overset{1}{3} \overset{1}{3}.6} \\
 \underline{-360} \quad -20 \times 18 \\
 \overset{1}{2} \overset{1}{7} 3.6 \\
 \underline{-180} \quad -10 \times 18 \\
 93.6 \\
 \underline{-90} \quad -5 \times 18 \\
 3.6 \\
 \underline{-3.6} \quad -0.2 \times 18 \\
 0
 \end{array}$$