DIY: Long Division with Numbers

To review long division with numbers, watch the following set of YouTube videos explaining the basic techniques for doing long division with numbers, followed by 16 division practice problems for you to try covering the basic techniques, with answers and detailed solutions. Some additional resources are included for more practice at the end.

1. Basics of Division
2. Long Division Basics
3. Long Division with 2-digit Divisors
4. Converting fractions to Decimals and Long Division with Decimals
5. Examples of long division with decimals

Practice problems: The following problems use the techniques demonstrated in the above videos. The answers are given after the problems. Then detailed solutions, if you need them, are given after the answer section. For further assistance and help please contact ***Math Assistance Area***.

1. Fill in the blanks: $43 \div 60 =$ $\square \overline{)\square} = \dfrac{\square}{\square}$

2. Write a division problem using the information that $7 \times 5 = 35$.

3. $4\overline{)96} =$

4. Divide, then express your answer in the 3 different forms indicated.

$6\overline{)219} = \square$ r $\square$

$= \square.$

$= \square \dfrac{\square}{\square}$

5. Divide, then express your answer in the 3 different forms indicated.

(Note: in the decimal form, round your answer to three decimal places.

$21\overline{)432}$ = ☐ r ☐

= ☐.

= ☐ ☐/☐

6. Divide, then express your answer in the 3 different forms indicated. (This will be a repeating decimal.)

$72\overline{)8524}$ = ☐ r ☐

= ☐.

= ☐ ☐/☐

7. Divide: $2.4\overline{)9.12}$

8. Divide. Then round your answer to 3 decimal places

$2.84\overline{)15.9}$

9. $\frac{0.01932}{7} =$

10. $\frac{4.48}{.4} =$

11. 5.48 ÷ 0.8 =

12. Divide 524 by .04

13. Divide: $\frac{0.45}{2.2} =$ Give your answer in the exact form (as a repeating decimal) and rounded to five decimal places. Also, write an equivalent fraction in lowest terms.

14. Convert the fraction $\frac{3}{7}$ to a repeating decimal. (Hint: you will have to carry the division out several places before it starts to repeat!)

15. Which is larger: $\frac{5}{16}$ or $\frac{8}{23}$? (Hint: convert both fractions to decimals.)

16. You have $25.82. What is the maximum amount of money you could give to each of your 6 friends if each must have the same amount? How much would you have left?

Answers:

1. $60\overline{)\ 43}$ = $\frac{\boxed{43}}{\boxed{60}}$

2. If 7 x 5 = 35, then 35 ÷ 7 = 5 or 35 ÷ 5 = 7

3. 24

4. = 36 r 3
   = 36.5 = $36\frac{1}{2}$
   ("r" means "remainder")

5. = 20 r 12
   = 20.571 = $20\frac{4}{7}$

6. = 118 r 28
   = $118.3\overline{8}$
   = $118\frac{7}{18}$

7. 3.8

8. 5.599

9. 0.00276

10. 11.2

11. 6.85

12. 13,100

13. $.20\overline{45}$ = .20455
    = $\frac{9}{44}$

14. $\frac{3}{7} = .\overline{428571}$

15. $\frac{8}{23} > \frac{5}{16}$

16. $4.30 with $0.02 (2 cents) left

Detailed Solutions:

3. $4\overline{)96} \rightarrow 4\overline{)\underline{9}6} \rightarrow 4\overline{)96}$ -8 1 $\rightarrow 4\overline{)96}$ -8 16

$\rightarrow 4\overline{)96}$ -8 16 16 so, $96 \div 4 = \boxed{24}$

4. $6\overline{)219} \rightarrow 6\overline{)\underline{21}9} \rightarrow 6\overline{)219}$ -18 3 $\rightarrow 6\overline{)219}$ -18 39

$\rightarrow 6\overline{)219}$ -18 39 -36 3 so, $219 \div 6 = 36$ r 3.

to get the answer as a decimal

so $219 \div 6 = 36.5$

$6\overline{)219.0} \rightarrow 36.$ -18 39 -36 30 $\rightarrow 36.5$ -18 39 -36 30 30

for the mixed number, we have that $219 \div 6 = 36$ r 3

$= 36\frac{3}{6}$

reduce: $\boxed{36\frac{1}{2}}$

5. $21\overline{)432}$ → quotient 2; $432 - 42$ → 12

→ $21\overline{)432}$ → quotient 20; -42, remainder 12

note: because $12 < 21$, we put a "0" in the quotient.

→ = **20 r 12**

to get the decimal: continue by adding zeros after decimal in dividend as needed.

$21\overline{)432.0}$ → quotient 20.; -42, 12, -0, bring down 0 → 120

→ $21\overline{)432.0}$ → quotient 20.5; -42, 12, -0, 120, -105, 15 →

$21\overline{)432.00}$ → quotient 20.57; -42, 12, -0, 120, -105, 150, -147, 3

continue, we want an answer correct to 3 decimal places.

$21\overline{)432.0000}$ → quotient 20.571|4; -42, 12, -0, 120, -105, 150, -147, 30, -21, 90, 84, 6

so, $432 \div 21 = 20.571|4\ldots$ ← less than 5. Leave 3RD decimal place as is.

$\approx$ **20.571** (note: $\approx$ means "is approximately equal to")

To get the mixed number, recall $21\overline{)432} = 20 \text{ r } 12$

$= 20\frac{12}{21}$ (reduce fraction)

$=$ **$20\frac{4}{7}$**

6. $72\overline{)8524}$ → $72\overline{)8524}$ (1) → $72\overline{)8524}$ (11) → $72\overline{)8524}$ (118)

-72 → 132 → -72 → 604 → -576 → 28

$\frac{8524}{72} = \boxed{118 \text{ r } 28}$

decimal: $72\overline{)8524.0}$ (118.3) → $72\overline{)8524.000}$ (118.388) $= \boxed{118.3\overline{8}}$

-72 → 132 → -72 → 604 → -576 → 280 → -216 → 64 → 216 → 640 → -576 → 640

remainder is repeating, so we can stop division. The "8" in the quotient will repeat.

mixed number $72\overline{)8524} = 118 \text{ r } 28 = 118\frac{28}{72}$

$\frac{28}{72} = \frac{4 \cdot 7}{4 \cdot 18} = \frac{7}{18}$ $= \boxed{118\frac{7}{18}}$

7. $2.4\overline{)9.12}$ → $24\overline{)91.2}$ → $24\overline{)91.2}$ (3.) → $24\overline{)91.2}$ (3.8)

-72 → 192 → -192 → 0

So, $\frac{9.12}{2.4} = \boxed{3.8}$

8. $2.84\overline{)15.9} \rightarrow 2.84\overline{)15.90} \rightarrow 284\overline{)1590} \rightarrow$ (5; −1420; 170)

$$\begin{array}{r} 5.6 \\ 284\overline{)1590.0} \\ -1420\downarrow \\ \hline 1700 \\ (1704) \end{array}$$

note: when we "guess" what digit will go into the quotient line, we are estimating, in this case, how many times → 284 goes into 1700. I guessed 6 times, but $6 \times 284 = 1704$ which is too big. Now I go back and correct.

$$\begin{array}{r} 5.5985 \\ 284\overline{)1590.0000} \\ -1420 \\ \hline 1700 \\ -1420 \\ \hline 2800 \\ -2556 \\ \hline 2440 \\ -2272 \\ \hline 1680 \\ -1420 \\ \hline 260 \end{array}$$

We need our answer correct to 3 decimal places, so we must carry the division out to 4 decimal places to round correctly.

$5.598\underset{\uparrow}{5}\ldots \approx \boxed{5.599}$

note: if we were asked for the quotient correct to 2 decimal places, $5.59\underset{\uparrow}{8}5 \approx 5.60$

9. $\frac{.01932}{7} = 7\overline{).01932} \rightarrow$

$$\begin{array}{r} .00276 \\ 7\overline{).01932} \\ -014 \\ \hline 53 \\ -49 \\ \hline 42 \end{array}$$

first non-zero digit will be placed over the 9.

$\boxed{.00276}$

10. $\frac{4.48}{.4} \times \frac{10}{10} = \frac{44.8}{4} = 4\overline{)44.8} =$

$$\begin{array}{r} 11.2 \\ 4\overline{)44.8} \\ -4 \\ \hline 04 \\ -4 \\ \hline 08 \\ -8 \\ \hline \end{array}$$

$= \boxed{11.2}$

11. $5.48 \div 0.8 = .8\overline{)5.48} = 8\overline{)54.8} = 8\overline{)54.8}$

$$
\begin{array}{r}
6.8 \\
8\overline{)54.8} \\
-48 \\
\hline
68 \\
-64 \\
\hline
4
\end{array}
$$

continuing,

$$
\begin{array}{r}
6.85 \\
8\overline{)54.80} \\
-48 \\
\hline
68 \\
-64 \\
\hline
40 \\
40 \\
\hline
\end{array}
$$

$5.48 \div 0.8 = \boxed{6.85}$

12. $\frac{524}{.04} = .04\overline{)524} = .04\overline{)524.00} = 4\overline{)52400.}$

$$
\begin{array}{r}
13100 \\
4\overline{)52400.} \\
-4 \\
\hline
12 \\
-12 \\
\hline
04 \\
-4 \\
\hline
000
\end{array}
$$

$= \boxed{13,100}$

13. $\frac{.45}{2.2} = 2.2\overline{).45} = 22\overline{)4.5} = 22\overline{)4.500}$

$$
\begin{array}{r}
.2 \\
22\overline{)4.5} \\
-44 \\
\hline
1
\end{array}
\qquad
\begin{array}{r}
.204 \\
22\overline{)4.500} \\
-44 \\
\hline
10 \\
-0 \\
\hline
100 \\
-88 \\
\hline
12
\end{array}
$$

continue dividing because digits in quotient aren't repeating yet.

$$
\begin{array}{r}
.204545 \\
22\overline{)4.500000} \\
-44 \\
\hline
10 \\
-0 \\
\hline
100 \\
88 \\
\hline
120 \\
110 \\
\hline
100 \\
88 \\
\hline
120 \\
110 \\
\hline
10
\end{array}
$$

digits will start to repeat.

$\frac{.45}{2.2} = .204545\ldots$

$= .20\overline{45}$

$\approx .20454545\ldots$ (round up)

$\approx \boxed{.20455}$

as a fraction, $\frac{.45}{2.2} \times \frac{100}{100} = \frac{45}{220} = \frac{5 \cdot 9}{5 \cdot 44} = \boxed{\frac{9}{44}}$

14. $\frac{3}{7} =$

$$
\begin{array}{r}
.428571\overline{4} \\
7\overline{)3.0000000} \\
-28 \\
\hline
20 \\
-14 \\
\hline
60 \\
-56 \\
\hline
40 \\
-35 \\
\hline
50 \\
-49 \\
\hline
10 \\
-7 \\
\hline
30 \\
-28 \\
\hline
2
\end{array}
$$

In longer division problems like this, it is especially important to keep columns straight.

} the remainders have begun to repeat

$$\frac{3}{7} = .428571428571\ldots$$

$$= .\overline{428571}$$

15. $\frac{5}{16} =$

$$
\begin{array}{r}
.31 \\
16\overline{)5.00} \\
-48 \\
\hline
20 \\
-16 \\
\hline
4
\end{array}
$$

$\frac{8}{23} =$

$$
\begin{array}{r}
.34 \\
23\overline{)8.00} \\
-69 \\
\hline
110 \\
-92 \\
\hline
18
\end{array}
$$

No need to continue dividing. We can see that

$.34\ldots > .31\ldots$

so $\frac{8}{23} > \frac{5}{16}$

16. $\$25.82 \div 6 = 6\overline{)25.82} =$

$$
\begin{array}{r}
4.30 \\
6\overline{)25.82} \\
-24 \\
\hline
18 \\
-18 \\
\hline
2
\end{array}
$$

← left over

Stop at 2 decimal places, since this is money. You could give up to $4.30 to each of your 6 friends with 2¢ ($0.02) left over.

Additional Resources

For more practice problems, click on the following link for some long division worksheets:

Practice with Long Division

Practice with Long Division with Decimals