Operations with Decimals

WORKSHEETS

Mathletics

love learning.

Multiplying and dividing by powers of ten

Move the decimal point depending on the number of zeros.

$\bigotimes$ = decimal point moves right $\bigodot$ = decimal point moves left

1 **Calculate these multiplication and division questions involving powers of** 10:

a $5 \times 1,000$

$$5 \times 1,000 = 5.0 \times 1,000 \quad \text{The whole number in decimal form}$$

$$= 5.0 \overset{1 \ 2 \ 3}{\frown\frown\frown} .$$

We can simply add the same number of zeros to the end of the whole number

$$= 5,000 \qquad \text{Fill the empty bounces with 0s}$$

If the decimal point is on the left after dividing, an extra 0 is placed in front.

b $8 \div 100$

$$8 \div 100 = 8.0 \div 100 \qquad \text{The whole number in decimal form}$$

Remember to include the leading zero ☺

$$= .\overset{2 \ 1}{\frown\frown} 8.0 \qquad \div 100 \text{ has 2 zeros, so move decimal point 2 spaces left}$$

$$= 0.08 \qquad \text{Fill the empty bounces with 0s and put a zero in front}$$

c $1.25893 \times 10,000$

$$1.25893 \times 10,000 = 1.2589\overset{1 \ 2 \ 3 \ 4}{\frown\frown\frown\frown}3 \qquad \text{Move decimal point 4 spaces right}$$

$$= 12,589.3 \qquad \text{No empty bounces to fill, so this is the answer}$$

d $24.905 \div 100,000$

$$24.905 \div 100,000 = .\overset{5 \ 4 \ 3 \ 2 \ 1}{\frown\frown\frown\frown\frown}24.905 \qquad \text{Move decimal point 5 spaces left}$$

$$= 0.00024905 \qquad \text{Fill empty bounces with 0s and put a zero in front}$$

e $260.15 \times \dfrac{1}{1,000}$

$$260.15 \times \frac{1}{1,000} = 260.15 \div 1,000 \qquad \times \frac{1}{1,000} \text{ is the same as } \div 1,000$$

$$= .\overset{3 \ 2 \ 1}{\frown\frown\frown}260.15 \qquad \text{Move decimal point 3 spaces left}$$

$$= 0.26015 \qquad \text{Place a leading zero in front of the decimal point}$$

Multiplying and dividing by powers of ten

1 **Calculate these multiplications. Remember, multiply means move decimal point to the right:**

a 8×100

b 3.4×10

c $29 \times 1,000$

d $12.45 \times 10,000$

e 0.512×100

f $0.0000469 \times 1,000,000$

2 **Calculate these divisions. Remember, divide means move decimal point to the left:**

a $2 \div 100$

b $4,590 \div 1,000$

c $0.014 \div 10$

d $70.80 \div 10,000$

e $1,367.512 \div 1,000$

f $421,900 \div 100,000,000$

Here are some of the powers of 10 using exponent notation. The power $=$ the number of zeros.

$10^1 = 10$ $10^2 = 100$ $10^3 = 1,000$

$10^4 = 10,000$ $10^5 = 100,000$ $10^6 = 1,000,000$

3 **Calculate these mixed problems written using exponent notation:**

a 31×10^2

b $2,400 \div 10^5$

c 0.0027×10^6

d 90.008×10^4

e $3.45 \div 10^3$

f $2,159,951 \div 10^7$

Multiplying and dividing by powers of ten

4 **For these calculations:**

   i Show where our character needs to spray paint a new decimal point, and

   ii write down the two numbers the new decimal point is between to solve the puzzle

a $2{,}830.3920 \times 100$ 2 8 3 0 3 9 ✻ 2 0   **I** | 9 and 2

b $23{,}857 \div 1{,}000$ 2 3 8 5 7   **N**

c 0.4763892×10^5 0 4 7 6 3 8 9 2   **A**

d $382{,}961 \div 10{,}000$ 3 8 2 9 6 2   **O**

e $19{,}238.07 \times 10^1$ 1 9 2 3 8 0 7   **X**

f $8.9236701 \times 10{,}000$ 8 9 2 3 6 7 0 1   **T**

g $20{,}917{,}983 \times \dfrac{1}{1{,}000{,}000}$ 2 0 9 1 7 9 8 3   **R**

h $83{,}917 \div 10^5$ 8 3 9 1 7   **I**

i $902{,}873.021 \times \dfrac{1}{10^2}$ 9 0 2 8 7 3 2 0 1   **D**

j 0.08390×10^3 0 0 8 3 9 0   **P**

This is another mathematical name for a decimal point:

☐ ☐ ☐ I ☐ ☐ ☐ ☐ ☐ ☐

0 and 9 8 and 9 8 and 7 9 and 2 0 and 7 3 and 9 8 and 2 0 and 8 3 and 8 6 and 7

Adding and subtracting decimals

Just add or subtract the digits in the same place value.

To do this, line up the decimal points and matching place values vertically first.

- Add 2.45 to 6.31 (i.e. $2.45 + 6.31$)

$$
\begin{array}{r}
2 . 4\ 5\ + \\
6 . 3\ 1 \\
\hline
8 . 7\ 6
\end{array}
$$

Decimal points lined up vertically

Add matching place values together

- Subtract 5.18 from 11.89 (i.e. $11.89 - 5.18$)

$$
\begin{array}{r}
1\ 1 . 8\ 9\ - \\
5 . 1\ 8 \\
\hline
6 . 7\ 1
\end{array}
$$

Decimal points lined up vertically

Subtract matching place values

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1 **Calculate each of these further additions and subtractions**

a $24.105 + 11.06 + 6.5902$

$$
\begin{array}{r}
2\ 4 . 1\ 0\ 5\ \ + \\
1\ 1 . 0\ 6 \\
_1\ 6 . 5_1 9\ 0\ 2 \\
\hline
4\ 1 . 7\ 5\ 5\ 2
\end{array}
$$

Decimal points lined up vertically

Add matching place values together

Any place value spaces are treated as 0s

$$24.105 + 11.06 + 6.5902 = 41.7552$$

Rounding decimal values before adding is sometimes used to quickly approximate the size of the answer.

b Round each value in question (i) to the nearest whole number before adding.

$$24.105 + 11.06 + 6.5902 \approx 24 + 11 + 7$$

Values rounded to nearest ones

$$\approx 42$$

Approximate value for addition

Note: Rounding values **before** adding/subtracting is not as accurate as rounding **after** adding/subtracting.

c $80.09 - 72.6081$

$$
\begin{array}{r}
8\ ^1 0 . ^1 0\ 9\ ^1 0\ ^1 0\ - \\
7_1\ 2_1 . 6\ 0_1\ 8_1\ 1 \\
\hline
7 . 4\ 8\ 1\ 9
\end{array}
$$

Decimal points lined up vertically

Subtract matching place values

Fill each place value space in the top number with a "0" when subtracting.

$$80.09 - 72.6081 = 7.4819$$

Adding and subtracting decimals

1   **Complete these additions and subtractions:**

a   0 . 1 4 +
     0 . 7 3

b   1 . 6 8 +
     5 . 3 0

c   0 . 2 4 6 +
     0 . 8 3 2

d   1 2 . 1 9 4 +
      9 . 0 5 7

e   0 . 9 9 −
     0 . 2 6

f   5 . 0 7 4 −
     1 . 0 6 4

g   5 . 2 4 −
     0 . 8 3

h   2 4 . 1 5 8 −
     1 3 . 6 9 4

....

2   **Calculate these additions and subtractions, showing all working:**

a Add 8.75 to 1.24

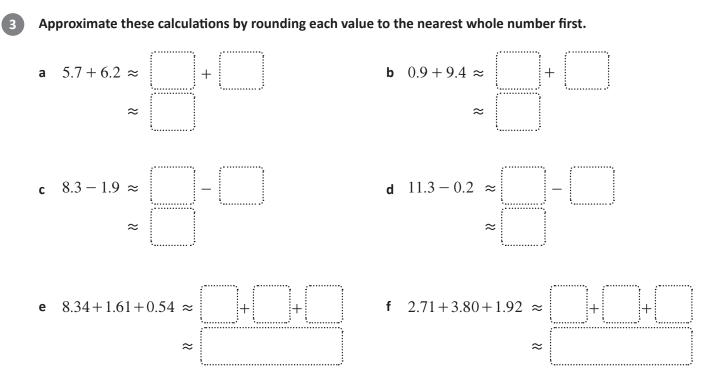**b** Subtract 3.15 from 4.79

c Add 0.936 to 0.865

d Add 2.19, 5.6, and 0.13

e Subtract 0.9356 from 8.6012

f Add 10.206, 4.64, and 8.0159

Adding and subtracting decimals

3 **Approximate these calculations by rounding each value to the nearest whole number first.**

a $5.7 + 6.2 \approx$ ☐ $+$ ☐

$\approx$ ☐

b $0.9 + 9.4 \approx$ ☐ $+$ ☐

$\approx$ ☐

c $8.3 - 1.9 \approx$ ☐ $-$ ☐

$\approx$ ☐

d $11.3 - 0.2 \approx$ ☐ $-$ ☐

$\approx$ ☐

e $8.34 + 1.61 + 0.54 \approx$ ☐ $+$ ☐ $+$ ☐

$\approx$ ☐

f $2.71 + 3.80 + 1.92 \approx$ ☐ $+$ ☐ $+$ ☐

$\approx$ ☐

Calculate parts **e** and **f** again, this time rounding after adding the numbers to get a more accurate approximate value.
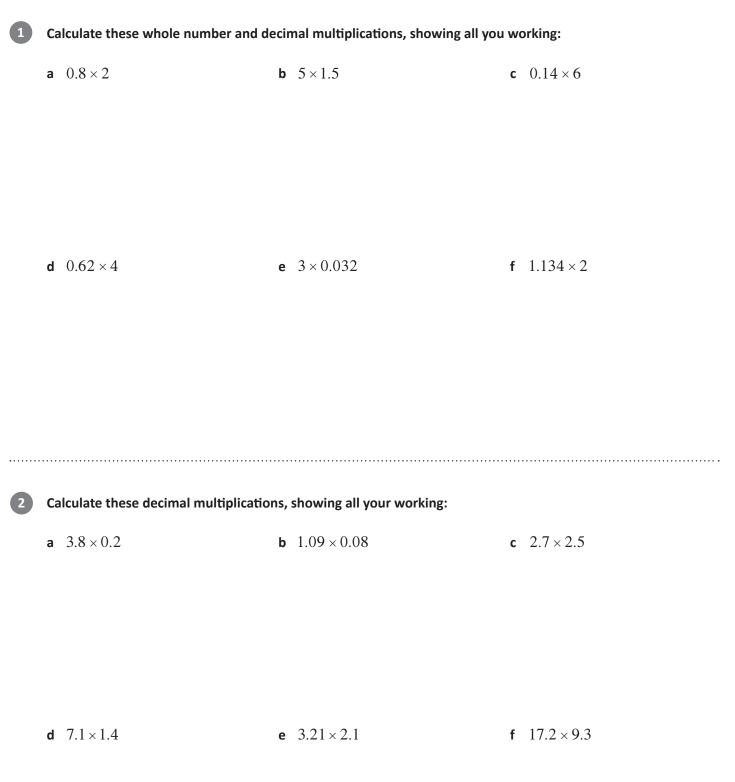
g $8.34 + 1.61 + 0.54$

h $2.71 + 3.80 + 1.92$

. . . .

4 **Calculate these subtractions, showing all your working:**

a $7.8 - 2.56$

b $13.09 - 8.4621$

c $0.52 - 0.12532$

Multiplying with decimals

Just write the terms as whole numbers and multiply. Put the decimal point back in when finished.

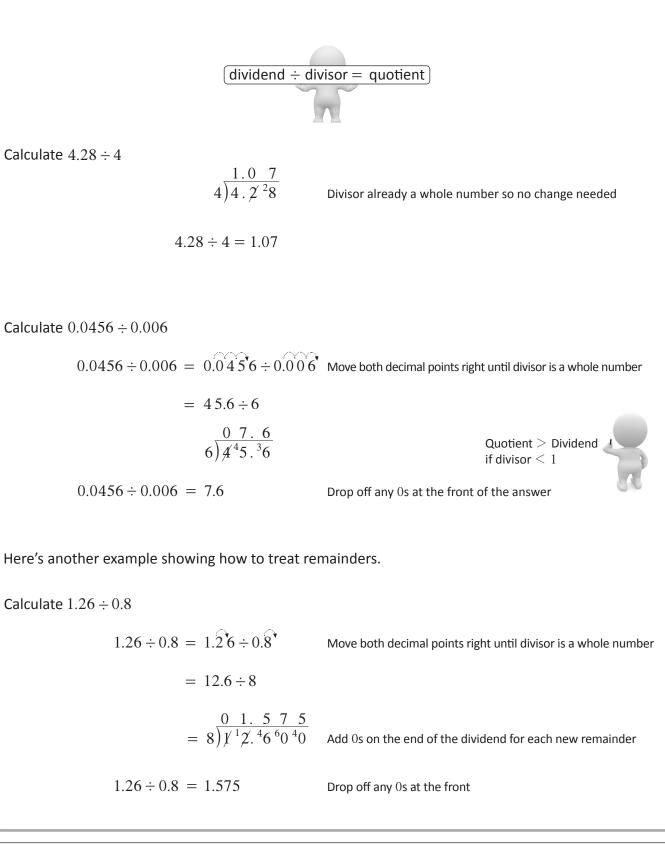The number of decimal places in the answer $=$ the number of decimal places in the question!

1 **Calculate** 4×1.2

$$4 \times 12 = 4\,8$$ Multiply both terms as whole numbers

$$4\,8$$ 1 decimal place in question $=$ 1 decimal place in answer

$$4 \times 1.2 = 4.8$$

2 **Calculate** 0.02×1.45

$$2 \times 145 = 2\,9\,0$$ Multiply both terms as whole numbers

$$2\,9\,0$$

$$0.02 \times 1.45 = 0.0\,2\,9\,0$$ 4 decimal places in question $=$ 4 decimal places in answer

Let's do the second one again but this time change the decimals to equivalent fractions first.

$$0.02 \times 1.45 = \frac{2}{100} \times \frac{145}{100}$$ Changing the decimals to fractions

$$= \frac{2 \times 145}{100 \times 100}$$ Multiply numerators and denominators together

$$= \frac{290}{10,000}$$ Number of zeros in denominator $=$ total of decimal places in question

$$= 290 \div 10,000$$

$$= 0.2\,9\,0$$ Dividing by $10,000$ moves decimal point four places to the left

$$= 0.0290$$ 4 decimal places in question $=$ 4 decimal places in answer

Try this method for yourself on the first example above, remembering that $4 = \frac{4}{1}$ as a fraction.

Multiplying with decimals

1 **Calculate these whole number and decimal multiplications, showing all you working:**

a 0.8×2

b 5×1.5

c 0.14×6

d 0.62×4

e 3×0.032

f 1.134×2

2 **Calculate these decimal multiplications, showing all your working:**

a 3.8×0.2

b 1.09×0.08

c 2.7×2.5

d 7.1×1.4

e 3.21×2.1

f 17.2×9.3

Dividing with decimals

We move the decimal point before dividing if needed.

To find the quotient when working with decimals, the question must be changed so the divisor is a whole number.

$$\boxed{\text{dividend} \div \text{divisor} = \text{quotient}}$$

Calculate $4.28 \div 4$

$$4 \overline{)4 . \overset{1.0\ 7}{2\,^28}}$$

Divisor already a whole number so no change needed

$$4.28 \div 4 = 1.07$$

Calculate $0.0456 \div 0.006$

$$0.0456 \div 0.006 = 0.0\,4\,5\,6 \div 0.0\,0\,6$$

Move both decimal points right until divisor is a whole number

$$= 4\,5.6 \div 6$$

$$6 \overline{)4\,^45 . \,^36}^{\,0\ 7.\ 6}$$

Quotient $>$ Dividend
if divisor < 1

$$0.0456 \div 0.006 = 7.6$$

Drop off any 0s at the front of the answer

Here's another example showing how to treat remainders.

Calculate $1.26 \div 0.8$

$$1.26 \div 0.8 = 1.2\,6 \div 0.8$$

Move both decimal points right until divisor is a whole number

$$= 12.6 \div 8$$

$$= 8 \overline{)1\,^12 . \,^46\,^60\,^40}^{\,0\ 1.\ 5\ 7\ 5}$$

Add 0s on the end of the dividend for each new remainder

$$1.26 \div 0.8 = 1.575$$

Drop off any 0s at the front

Dividing with decimals

1 **Calculate these decimal and whole number divisions:**

a $3.6 \div 4$

$$\overline{)}$$

$3.6 \div 4 = \boxed{}$

b $17.5 \div 5$

$$\overline{)}$$

$17.5 \div 5 = \boxed{}$

c $16.2 \div 9$

$$\overline{)}$$

$16.2 \div 9 = \boxed{}$

d $0.63 \div 3$

$$\overline{)}$$

$0.63 \div 3 = \boxed{}$

e $0.489 \div 5$

$$\overline{)}$$

$0.489 \div 5 = \boxed{}$

f $10.976 \div 7$

$$\overline{)}$$

$10.976 \div 7 = \boxed{}$

....

2 **Calculate these decimal divisions, showing all your working:**

a $5.2 \div 0.4$

$$\overline{)}$$

$5.2 \div 0.4 = \boxed{}$

b $9.6 \div 0.6$

$$\overline{)}$$

$9.6 \div 0.6 = \boxed{}$

c $0.56 \div 0.8$

$$\overline{)}$$

$0.56 \div 0.8 = \boxed{}$

d $1.58 \div 0.4$

$$\overline{)}$$

$1.58 \div 0.4$

$= \boxed{}$

e $0.8125 \div 0.05$

$$\overline{)}$$

$0.8125 \div 0.05$

$= \boxed{}$

f $5.3682 \div 0.006$

$$\overline{)}$$

$5.3682 \div 0.006$

$= \boxed{}$