Foundational Numeracy

MATH 1525

Working with Decimals

Introduction to Decimals

Decimals are similar to fractions as they are also used to <u>represent parts of a whole</u>

$18.98

- The price tag to the left reads **$18.98**

- The number **18.98** is written in **decimal notation**

- A number written in decimal notation is often just called a **decimal**

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Introduction to Decimals

Decimals are similar to fractions as they are also used to <u>represent parts of a whole</u>

$18.98

A number written as a **decimal** has 3 parts:

1. Whole Number Portion

2. Decimal Point

3. Decimal Portion (the numbers that come after the decimal point)

18.98

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Decimals – Place Value is 🔑

18.98

Periods:	Billions			Millions			Thousands			Ones		
PLACE VALUE:	Hundred-billions	Ten-billions	Billions	Hundred-millions	Ten-millions	Millions	Hundred-thousands	Ten-Thousands	Thousands	Hundreds	Tens	Ones
Example:												

If you recall, this is the place value chart we used for WHOLE NUMBERS on Day 1

Place names and place values for the **whole number portion** of a decimal number are exactly the same

Place names and place values for the **decimal portion** are *similar*, but move the opposite direction and end in suffix "ths"

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Decimals – Place Value is 🔑

A number written as a **decimal** has 3 parts:

1. Whole Number Portion

2. Decimal Point

3. **Decimal Portion (the numbers that come *after* the decimal point)**

Place Value (Whole Numbers AND Decimals)												
Hundred-Thousands	Ten-Thousands	Thousands	Hundreds	Tens	Ones	DECIMAL POINT	Tenths	Hundredths	Thousandths	Ten-Thousandths	Hundred-Thousandths	Millionths
						.						

Writing/Reading a Decimal in Words

Step 1: Write/say the whole number portion in words

Step 2: Write/say "and" for the decimal point

Step 3: Write/say the decimal portion in words as though it were a whole number, followed by the place value of only the **last** digit of the decimal portion

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Writing/Reading a Decimal in Words

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Place Value (Whole Numbers AND Decimals)												
Hundred-Thousands	Ten-Thousands	Thousands	Hundreds	Tens	Ones	DECIMAL POINT	Tenths	Hundredths	Thousandths	Ten-Thousandths	Hundred-Thousandths	Millionths
				2	1	.	9	4				

21.94   **"Twenty one and ninety four hundredths"**

Writing/Reading a Decimal in Words

Step 1: Write/say the whole number portion in words

Step 2: Write/say "and" for the decimal point

Step 3: Write/say the decimal portion in words as though it were a whole number, followed by the place value of only the **last** digit of the decimal portion

						Place Value (Whole Numbers AND Decimals)						
Hundred-Thousands	Ten-Thousands	Thousands	Hundreds	Tens	Ones	DECIMAL POINT	Tenths	Hundredths	Thousandths	Ten-Thousandths	Hundred-Thousandths	Millionths
			1	9	2	.	6	3	9			

192.639   **"One hundred ninety two** **and** **six hundred thirty nine thousandths"**

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Writing/Reading a Decimal in Words

Step 1: Write/say the whole number portion in words

Step 2: Write/say "and" for the decimal point

Step 3: Write/say the decimal portion in words as though it were a whole number, followed by the place value of only the **last** digit of the decimal portion

9729.4538

					Place Value (Whole Numbers AND Decimals)							
Hundred-Thousands	Ten-Thousands	Thousands	Hundreds	Tens	Ones	DECIMAL POINT	Tenths	Hundredths	Thousandths	Ten-Thousandths	Hundred-Thousandths	Millionths
		9	7	2	9	.	4	5	3	8		

"Nine thousand, seven hundred twenty nine **and** **four thousand five hundred thirty eight ten-thousandths"**

The Golden Jubilee Diamond

Carats: 545.67 carats

- The largest cut and largest faceted diamond in the whole world

- Outweighs the 2nd largest diamond in the world (The Cullinan I) by 15.37 carats

- Approximate value in 2021: $4-12 Million

- Discovered in 1985; bought by De Beers group in 1995

- Now displayed in the Royal Palace in Bangkok as part of the "Crown Jewels" of Thailand

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Writing/Reading a Decimal in Words

Step 1: Write/say the whole number portion in words

Step 2: Write/say "and" for the decimal point

Step 3: Write/say the decimal portion in words as though it were a whole number, followed by the place value of only the **last** digit of the decimal portion

						Place Value (Whole Numbers AND Decimals)						
Hundred-Thousands	Ten-Thousands	Thousands	Hundreds	Tens	Ones	DECIMAL POINT	Tenths	Hundredths	Thousandths	Ten-Thousandths	Hundred-Thousandths	Millionths
			5	4	5	.	6	7				

545.67   "Five hundred forty five and sixty seven hundredths"

From Words to Numbers

"Twenty one and eight hundred two thousandths"

Place Value (Whole Numbers AND Decimals)											
Hundred-Thousands	Ten-Thousands	Thousands	Hundreds	Tens	Ones	DECIMAL POINT	Tenths	Hundredths	Thousandths	Ten-Thousandths	Hundred-Thousandths	Millionths
				2	1	.	8	0	2			

21.802

From Words to Numbers

"Six and ninety four ten-thousandths"

Place Value (Whole Numbers AND Decimals)											
Hundred-Thousands	Ten-Thousands	Thousands	Hundreds	Tens	Ones	DECIMAL POINT	Tenths	Hundredths	Thousandths	Ten-Thousandths	Hundred-Thousandths	Millionths
					6	.	0	0	9	4		

6.0094

From Words to Numbers

"Five and twenty five hundredths"

Place Value (Whole Numbers AND Decimals)												
Hundred-Thousands	Ten-Thousands	Thousands	Hundreds	Tens	Ones	DECIMAL POINT	Tenths	Hundredths	Thousandths	Ten-Thousandths	Hundred-Thousandths	Millionths
					5	.	2	5				

5.25

From Words to Numbers

"Eight thousandths"

Place Value (Whole Numbers AND Decimals)											
Hundred-Thousands	Ten-Thousands	Thousands	Hundreds	Tens	Ones	DECIMAL POINT	Tenths	Hundredths	Thousandths	Ten-Thousandths	Hundred-Thousandths	Millionths
					0	.	0	0	8			

0.008

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Rounding - Decimals

We round the decimal portion of a decimal number in nearly the same way as we round whole numbers

Rounding to the Nearest THOUSAND

Periods:		Billions			Millions			Thousands			Ones		
PLACE VALUE:		Hundred-billions	Ten-billions	Billions	Hundred-millions	Ten-millions	Millions	Hundred-thousands	Ten-Thousands	Thousands	Hundreds	Tens	Ones
Example:										9	3	7	6

1. Identify which place value you are rounding to; this is your target
2. Look to the next smallest place value (the number to the RIGHT of your target)
    If this digit is less than 5 (being 0, 1, 2, 3, 4), leave your target digit as is
    If this digit is 5 or more (being 5, 6, 7, 8, 9), increase the value of the digit you are rounding to by 1
3. All digits to the right of your target become 0's

= 9,000

The only difference:

For Whole numbers, we turn the digits to the right of the intended place value into 0's.
Ex: Round 925 to the nearest **hundred** → 900

For decimals, we simple *drop* the values to the right of the intended place value

Rounding - Decimals

1) Establish your intended place value ⬆

2) Look to the right of your intended place value

- If the number to the right of your intended place value is less than 5, keep the digit in your intended place value the same

- If the number to the right of your intended place value is 5 or greater, increase the digit in your intended place value by 1

- IN BOTH SCENARIOS, be sure to **drop** all digits that come after your intended place value

Round 34.3617 to the nearest **tenth**

$$34.3617$$

⬆

$$34.4$$

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Rounding - Decimals

1) Establish your intended place value ⬆

2) Look to the right of your intended place value

- If the number to the right of your intended place value is less than 5, keep the digit in your intended place value the same

- If the number to the right of your intended place value is 5 or greater, increase the digit in your intended place value by 1

- IN BOTH SCENARIOS, be sure to **drop** all digits that come after your intended place value

Round 34.3617 to the nearest **hundredth**

34.3617
⬆

34.36

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Rounding - Decimals

1) Establish your intended place value ⬆

2) Look to the right of your intended place value

- If the number to the right of your intended place value is less than 5, keep the digit in your intended place value the same

- If the number to the right of your intended place value is 5 or greater, increase the digit in your intended place value by 1

- IN BOTH SCENARIOS, be sure to **drop** all digits that come after your intended place value

Round 34.3617 to the nearest **thousandth**

34.3617
⬆

34.362

Converting Decimals into Fractions

Decimal	In Words	Fraction
0.1	"one tenth"	$\dfrac{1}{10}$
0.39	"thirty nine hundredths"	$\dfrac{39}{100}$
0.096	"ninety six thousandths"	$\dfrac{96}{1000}$
0.0008	"eight ten thousandths"	$\dfrac{8}{10,000}$

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Converting Decimals into Fractions

Write each decimal as a fraction or a mixed number. Write your answers in *simplest form*.

0.125   "one hundred twenty five thousandths"

$$\frac{125}{1000}$$

$$\frac{\cancel{5} \cdot \cancel{5} \cdot \cancel{5}}{2 \cdot 2 \cdot 2 \cdot \cancel{5} \cdot \cancel{5} \cdot \cancel{5}}$$

The Prime Factorization of the **numerator**: $5 \cdot 5 \cdot 5$

The Prime Factorization of the **denominator**: $2 \cdot 2 \cdot 2 \cdot 5 \cdot 5 \cdot 5$

$$= \frac{1}{8}$$

Converting Decimals into Fractions

Write each decimal as a fraction or a mixed number. Write your answers in *simplest form*.

0.8   "eight tenths"

$$\frac{8}{10}$$

$$\frac{2 \cdot 2 \cdot 2}{2 \cdot 5}$$

The Prime Factorization of the **numerator**: $2 \cdot 2 \cdot 2$

$$\frac{2 \cdot 2}{5}$$

The Prime Factorization of the **denominator**: $2 \cdot 5$

$$= \frac{4}{5}$$

Mixed Numbers and Decimals: "AND"

Mixed Numbers and decimals are similar in that both use the word **"AND"** to separate the whole number portion from the part of a whole portion

6.5

"six and five tenths"

$$6\frac{5}{10}$$

$$6\frac{1}{2}$$

3.75

"three and seventy five hundredths"

$$3\frac{75}{100}$$

$$3\frac{3}{4}$$

23.625

"twenty three and six hundred twenty five thousandths"

$$23\frac{625}{1000}$$

$$23\frac{5}{8}$$

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Converting Fractions into Decimals

"Write each fraction as a decimal"

- We use <u>long-division</u> to convert fractions into decimals

Up until this point, we have only performed long-division on fractions that look like this:

$$\frac{10}{4}$$

$$4 \overline{\smash{)}\,10}$$ with quotient 2, subtract 8, remainder 2

$$2\frac{2}{4} \quad \text{or} \quad 2\frac{1}{2}$$

$$2.5$$

Now, we will perform long-division on fractions that look like this:

$$\frac{4}{10}$$

SO WHAT'S THE DIFFERENCE?

Other than the fact that this fraction is the **reciprocal** of $\frac{10}{4}$, this will be the first instance in which we perform long division on a fraction whose numerator is smaller than its denominator

$$10 \overline{\smash{)}\,4}$$ "10 doesn't go into 4. What do I do?!"

Because of this, we must perform one extra step before doing long-division

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Converting Fractions into Decimals

"Write each fraction as a decimal"

$$\frac{4}{10}$$

For ANY decimal, inserting 0's after the last digit to the RIGHT of the decimal point does not change the value of the number

- Some questions will require you to add 2 decimal places to the numerator/dividend… sometimes you will need 3 decimal places…
- Keep dividing until you get a good picture of what the decimal will actually be

$$10 \overline{\smash{)}4}$$

To make the long division possible, we must add decimal places to our **numerator/dividend**

$$
\begin{array}{r}
.40 \\
10 \overline{\smash{)}4.00} \\
-\underline{4\,0} \\
00 \\
-\underline{0} \\
0
\end{array}
$$

Place a decimal in the **quotient** directly above the decimal point of the **numerator/dividend**

Divide as per usual (ignore the decimal points for now)

"10 does not go into 4, but it does go into 40."

$$\frac{4}{10} = \mathbf{0.4}$$

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Converting Fractions into Decimals

"Write each fraction as a decimal"

$$\frac{3}{8}$$

$$8\overline{)3}$$

$$
\begin{array}{r}
.375 \\
8\overline{)3.000} \\
-\underline{24} \\
60 \\
-\underline{56} \\
40 \\
-\underline{40} \\
0
\end{array}
$$

$$\frac{3}{8} = \mathbf{0.375}$$

Note: 0.375 → "three hundred seventy five thousandths" is literally $\frac{375}{1000}$

$\frac{375}{1000}$ in simplest form is $\frac{3}{8}$

Converting Fractions into Decimals

Write each mixed number as a decimal:

$$5\frac{2}{3}$$ ⟹ $3\overline{\smash{\big)}2}$ ⟹

$$
\begin{array}{r}
.666\overline{} \\
3\,\overline{\smash{\big)}\,2.000} \\
-\underline{18} \\
20 \\
-\underline{18} \\
20 \\
-\underline{18} \\
2
\end{array}
$$

Ignore the whole number portion for now and place all focus on the fraction portion… we will "re-attach" the whole number portion after we have completed the long division on the fraction portion

What's going on here?

$5\frac{2}{3}$ expressed as a decimal: $5.\overline{6}$

Operations on Decimals

Addition & Subtraction

Multiplication & Division

Extensions
- comparing, rounding, converting, etc.

2021 Spanish Grand Prix

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The following information is based off Laps 13 and 14 for $\frac{5}{20}$ drivers during the 2021 Formula 1 Spanish Grand Prix that took place on Sunday, May 9th, 2021

Driver		Lap 13 (seconds)	Lap 14 (seconds)
Lewis Hamilton		83.038	83.18
Daniel Ricciardo		84.619	84.666
Charles Leclerc		83.839	83.846
Max Verstappen		83.038	83.155
Sebastian Vettel		85.487	85.315

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2021 Spanish Grand Prix

1) Which driver was able to **improve** their lap time on the 14th lap in comparison to their previous lap?

Hamilton	83.038	<	83.18
Ricciardo	84.619	<	84.666
Leclerc	83.839	<	83.846
Verstappen	83.038	<	83.155
Vettel	85.487	>	85.315

∴ **The only driver that was able to improve their lap time on the 14th lap in comparison to their previous lap was Sebastian Vettel**

Driver		Lap 13 (seconds)	Lap 14 (seconds)
Lewis Hamilton		83.038	83.18
Daniel Ricciardo		84.619	84.666
Charles Leclerc		83.839	83.846
Max Verstappen		83.038	83.155
Sebastian Vettel		85.487	85.315

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2021 Spanish Grand Prix

2) How much better did Sebastian Vettel do in lap 14 in comparison to lap 13? Round your answer to the nearest tenth.

We have to find the difference!   Subtraction

When adding or subtracting decimals, write your numbers so that the decimal points and all place values line up vertically

Then, add or subtract as with whole numbers! Line up decimal in sum/difference

$$
\begin{array}{r}
85.487 \\
-\ 85.315 \\
\hline
00.172
\end{array}
$$

0.2

∴ **Sebastian Vettel was able to improve his 14th lap time by** 0.2 **seconds (two tenths of a second)**

Driver	Lap 13 (seconds)	Lap 14 (seconds)
Lewis Hamilton	83.038	83.18
Daniel Ricciardo	84.619	84.666
Charles Leclerc	83.839	83.846
Max Verstappen	83.038	83.155
Sebastian Vettel	85.487	85.315

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2021 Spanish Grand Prix

Driver		Lap 13 (seconds)	Lap 14 (seconds)
Lewis Hamilton		83.038	83.18
Daniel Ricciardo		84.619	84.666
Charles Leclerc		83.839	83.846
Max Verstappen		83.038	83.155
Sebastian Vettel		85.487	85.315

3) What was Lewis Hamilton's combined time for both laps? Round your answer to the nearest hundredth.

Combined means: Addition

When adding or subtracting decimals, write your numbers so that the decimal points and all place values line up vertically

Then, add or subtract as with whole numbers! Line up decimal in sum/difference

$$
\begin{array}{r}
1 \\
83.180 \\
+\ \underline{83.038} \\
166.218
\end{array}
$$

$$= 166.22$$

∴ **Lewis Hamilton's combined time for both laps 13 and 14 is** 166.22 **seconds**

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2021 Spanish Grand Prix

4) Calculate each driver's combined lap times. Then, rank each driver from <u>fastest to slowest</u> at this specific interval of the race.

Hamilton
$$
\begin{array}{r}
1\\
83.180\\
+\ 83.038\\
\hline
166.218
\end{array}
$$

Verstappen
$$
\begin{array}{r}
1\\
83.155\\
+\ 83.038\\
\hline
166.193
\end{array}
$$

Leclerc
$$
\begin{array}{r}
1\ \ 1\\
83.846\\
+\ 83.839\\
\hline
167.685
\end{array}
$$

Ricciardo
$$
\begin{array}{r}
1\ \ 1\\
84.666\\
+\ 84.619\\
\hline
169.285
\end{array}
$$

Vettel
$$
\begin{array}{r}
1\ \ 11\\
85.315\\
+\ 85.487\\
\hline
170.802
\end{array}
$$

Driver		Lap 13 (seconds)	Lap 14 (seconds)
Lewis Hamilton		83.038	83.18
Daniel Ricciardo		84.619	84.666
Charles Leclerc		83.839	83.846
Max Verstappen		83.038	83.155
Sebastian Vettel		85.487	85.315

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2021 Spanish Grand Prix

Driver		Lap 13 (seconds)	Lap 14 (seconds)
Lewis Hamilton		83.038	83.18
Daniel Ricciardo		84.619	84.666
Charles Leclerc		83.839	83.846
Max Verstappen		83.038	83.155
Sebastian Vettel		85.487	85.315

4) Calculate each driver's combined lap times. Then, rank each driver from <u>fastest to slowest</u> at this specific interval of the race.

Hamilton: 166.218 seconds

Ricciardo: 169.285 seconds

Leclerc: 167.685 seconds

Verstappen: 166.193 seconds

Vettel: 170.802 seconds

∴ **After calculating each driver's combined lap times in this specific interval, the ranking of each driver from <u>fastest to slowest</u> is:**

1. **Verstappen (166.193 seconds)**
2. **Hamilton (166.218 seconds)**
3. **Leclerc (167.685 seconds)**
4. **Ricciardo (169.285 seconds)**
5. **Vettel (170.802 seconds)**

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Multiplying Decimals

Multiply. 0.03×0.3

IF WE WERE TO CONVERT TO FRACTIONS FIRST...

$$\frac{3}{100} \quad \times \quad \frac{3}{10}$$

$$\frac{3 \cdot 3}{100 \cdot 10}$$

$$\frac{9}{1000}$$

Is there a way to multiply decimals without converting to fractions first?

Yes!

$$= 0.009$$

$$\therefore \ 0.03 \times 0.3 = \mathbf{0.009}$$

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Multiplying Decimals

Multiply.

$$0.03 \times 0.3$$

We do not have to convert these decimals to fractions in order to multiply them.

$$3 \times 3$$

To multiply decimals,

$$9$$

Step 1: Multiply the decimals as if they were whole numbers

Factor 1: 0.03 2 decimal places

Step 2: The decimal point of the final product is placed so that the number of decimal places in the product is equal to the *sum* of the number of decimal places in each original factor

Factor 2: 0.3 $+$ 1 decimal places

3 total decimal places

Step 3: Starting from the **right** of your modified product (which in this case is **9**), move the decimal place to the left the same amount of total decimal places calculated in Step 2 (which in this case, is **3**)

$$9.$$

Multiplying Decimals

Multiply.

$$0.03 \times 0.3$$

We do not have to convert these decimals to fractions in order to multiply them.

$$3 \times 3$$

To multiply decimals,

$$9$$

Step 1: Multiply the decimals as if they were whole numbers

Factor 1: 0.03 2 decimal places

Step 2: The decimal point of the final product is placed so that the number of decimal places in the product is equal to the *sum* of the number of decimal places in each original factor

Factor 2: 0.3 $+\underline{1 \text{ decimal places}}$

3 total decimal places

Step 3: Starting from the **right** of your modified product (which in this case is **9**), move the decimal place to the left the same amount of total decimal places calculated in Step 2 (which in this case, is **3**)

$$0.0 \; 0 \; 9$$

$$\therefore 0.03 \times 0.3 = \mathbf{0.009}$$

Multiplying Decimals

Multiply.

We do not have to convert these decimals to fractions in order to multiply them.

To multiply decimals,

Step 1: Multiply the decimals as if they were whole numbers

Step 2: The decimal point of the product is placed so that the number of decimal places in the product is equal to the *sum* of the number of decimal places in each original factor

Step 3: Starting from the **right** of your modified product, move the decimal place to the left the same amount of total decimal places calculated in Step 2

32.6×0.28

$$
\begin{array}{r}
\overset{1}{} \\
\overset{\cancel{2}\cancel{4}}{} \\
326 \\
\times \quad 28 \\
\hline
{}_{1}\,2\,6\,0\,8 \\
+\quad 6\,5\,2 \\
\hline
9\,1\,2\,8
\end{array}
$$

9128.

Factor 1: 32.6   **1** decimal places

Factor 2: 0.28   **2** decimal places

$+$ _____

3 total decimal places

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Multiplying Decimals

Multiply.

We do not have to convert these decimals to fractions in order to multiply them.

To multiply decimals,

Step 1: Multiply the decimals as if they were whole numbers

Step 2: The decimal point of the product is placed so that the number of decimal places in the product is equal to the *sum* of the number of decimal places in each original factor

Step 3: Starting from the **right** of your modified product, move the decimal place to the left the same amount of total decimal places calculated in Step 2

$$32.6 \times 0.28$$

$$
\begin{array}{r}
1 \\
2\!\!\!/ 4\!\!\!/ \\
326 \\
\times\ \ 28 \\
1 \\
\hline
2\,6\,0\,8 \\
+\ 6\,5\,2\ \ \\
\hline
9\,1\,2\,8
\end{array}
$$

9.128

$$\therefore 32.6 \times 0.28 = \mathbf{9.128}$$

Factor 1: 32.6 1 decimal places

Factor 2: 0.28 + 2 decimal places

3 total decimal places

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Multiplying by factors of 10 (10, 100, 1000, etc.)

When you multiply by a factor of 10, the decimal simply moves to the **right**.

If you multiply by 10, the decimal moves one place value.

If you multiply by 100, the decimal moves two places.

An easy way to remember this is to **count the number of zeroes**. If the number is multiplied by 100,000, that means that the decimal moves to the right 5 places.

Using "1" as an example:

Multiplication Form	Decimal Moves	Standard Form
1×1	None	1
1×10	1 to the right	10
1×100	2 to the right	100
1×1000	3 to the right	1000
$1 \times 10,000$	4 to the right	10,000
$1 \times 100,000$	5 to the right	100,000
$1 \times 1,000,000$	6 to the right	1,000,000
$1 \times 10,000,000$	7 to the right	10,000,000

Using "4.53962" as an example:

Multiplication Form	Decimal Moves	Standard Form
4.53962×1	None	4.53962
4.53962×10	1 to the right	45.3962
4.53962×100	2 to the right	453.962
4.53962×1000	3 to the right	4539.62
$4.53962 \times 10,000$	4 to the right	45,396.2
$4.53962 \times 100,000$	5 to the right	453,962
$4.53962 \times 1,000,000$	6 to the right	4,539,620
$4.53962 \times 10,000,000$	7 to the right	45,396,200

Dividing Decimals

With division and decimals, you will see these 2 kinds of questions:

Dividing by a Whole Number   Dividing by a Decimal

$$270.2 \div 7$$ $$10.764 \div 2.3$$

$$\frac{270.2}{7}$$ $$\frac{10.764}{2.3}$$

$$7\overline{)270.2}$$ $$2.3\overline{)10.764}$$

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Dividing by a Whole Number

1) Place the decimal point in the quotient directly above the decimal point in the numerator/dividend

This should be familiar: you've done this exact thing when converting fractions to decimals!

Converting Fractions into Decimals

"Write each fraction as a decimal"

$$\frac{3}{8}$$

$$8\overline{)3}$$

$$\begin{array}{r} .375 \\ 8\overline{)3.000} \\ -\,24 \\ \hline 60 \\ -\,56 \\ \hline 40 \\ -\,40 \\ \hline 0 \end{array}$$

$$\frac{3}{8} = \mathbf{0.375}$$

Note: 0.375 → "three hundred seventy five thousandths" is literally $\frac{375}{1000}$

$\frac{375}{1000}$ in simplest form is $\frac{3}{8}$

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2) Divide as per usual

$$270.2 \div 7$$

$$\frac{270.2}{7}$$

$$\begin{array}{r} 38.6 \\ 7\overline{)270.2} \\ -\,21 \\ \hline 60 \\ -\,56 \\ \hline 42 \\ -\,42 \\ \hline 0 \end{array}$$

$$\therefore \quad 270.2 \div 7 = \mathbf{38.6}$$

Dividing by a Whole Number

1) Place the decimal point in the quotient directly above the decimal point in the numerator/dividend

This should be familiar: you've done this exact thing when converting fractions to decimals!

Converting Fractions into Decimals

"Write each fraction as a decimal"

$\frac{3}{8}$

$8\overline{)3}$

$$
\begin{array}{r}
.375 \\
8\overline{)3.000} \\
-\,24 \\
\hline
60 \\
-\,56 \\
\hline
40 \\
-\,40 \\
\hline
0
\end{array}
$$

$\frac{3}{8} = \mathbf{0.375}$

Note: 0.375 → "three hundred seventy five thousandths" is literally $\frac{375}{1000}$

$\frac{375}{1000}$ in simplest form is $\frac{3}{8}$

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2) Divide as per usual

$6.195 \div 15$

$$\frac{6.195}{15}$$

$$
\begin{array}{r}
.413 \\
15\overline{)6.195} \\
-\,60 \\
\hline
19 \\
-\,15 \\
\hline
45 \\
-\,45 \\
\hline
0
\end{array}
$$

$$\therefore \quad 6.195 \div 15 = \mathbf{0.413}$$

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Dividing by a Decimal

$$10.764 \div 2.3$$

1) Move the decimal point of the denominator/divisor to the right until the denominator/divisor is a whole number

$$\frac{10.764}{2.3}$$

2.3   2.3 is now a whole number at **23**
(by moving decimal point 1 spot to the right)

$$2.3\,\overline{)\,10.764}$$

2) Move the decimal point in the numerator/dividend to the right the same number of places as the decimal point was moved in Step 1

Since we moved the decimal 1 spot to the right in the denominator/divisor, we must also move the decimal 1 spot to the right for the numerator/dividend

$$
\begin{array}{r}
4.68 \\
23\,\overline{)\,107.64} \\
-\underline{92} \\
156 \\
-\underline{138} \\
184 \\
-\underline{184} \\
0
\end{array}
$$

$$\therefore \; 107.64 \div 2.3 = \mathbf{4.68}$$

10.764   10.764 is now **107.64**
(by moving decimal point 1 spot to the right)

3) Divide as per usual with your new numbers

Dividing by a Decimal

$5.264 \div 0.32$

1) Move the decimal point of the denominator/divisor to the right until the denominator/divisor is a whole number

$$\frac{5.264}{0.32}$$

0.32

0.32 is now a whole number at **32**
(by moving decimal point 2 spots to the right)

$$0.32\overline{)5.264}$$

2) Move the decimal point in the numerator/dividend to the right the same number of places as the decimal point was moved in Step 1

Since we moved the decimal 2 spots to the right in the denominator/divisor, we must also move the decimal 2 spots to the right for the numerator/dividend

5.264

5.264 is now **526.4**
(by moving decimal point 2 spots to the right)

$$
\begin{array}{r}
16.4 \\
32\overline{)526.4} \\
-32 \\
\hline
206 \\
-192 \\
\hline
144 \\
-128 \\
\hline
16
\end{array}
$$

Part of the dividend still exists… what do we do?

3) Divide as per usual with your new numbers

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Dividing by a Decimal

$$5.264 \div 0.32$$

1) Move the decimal point of the denominator/divisor to the right until the denominator/divisor is a whole number

$$\frac{5.264}{0.32} \qquad 0.32\overline{)5.264}$$

0.32 0.32 is now a whole number at **32**
(by moving decimal point 2 spots to the right)

2) Move the decimal point in the numerator/dividend to the right the same number of places as the decimal point was moved in Step 1

Since we moved the decimal 2 spots to the right in the denominator/divisor, we must also move the decimal 2 spots to the right for the numerator/dividend

5.264 5.264 is now **526.4**
(by moving decimal point 2 spots to the right)

$$
\begin{array}{r}
16.45 \\
32\overline{)526.40} \\
-\underline{32} \\
206 \\
-\underline{192} \\
144 \\
-\underline{128} \\
160 \\
-\underline{160} \\
0
\end{array}
$$

$$\therefore \quad 5.264 \div 0.32 = \mathbf{16.45}$$

3) Divide as per usual with your new numbers

The People of Foundational Literacy:
Michael Abraham

Michael is a young man who is currently enrolled in NorQuest College's Cannabis Trimming & Production Online Course.

As part of his studies, Michael and a few of his classmates have decided to take a tour of Aurora Cannabis' production facility in Edmonton. They all hope to gain an understanding of how their studies can translate into careers through real world experience.

The People of Foundational Literacy: Michael Abraham

During his tour of Aurora's massive 800,000 sq. ft production facility, **Michael** is intently watching one of the many technicians trim and package cannabis. The technician notices **Michael's** interest, and actually calls upon him to help him at his work station.

Actual photos of Aurora's production facility in Edmonton

AURORA

NORQUEST COLLEGE

The People of Foundational Literacy:
Michael Abraham

"During Aurora's packaging process, I have to ensure that each of these little childproof containers (exactly like the ones shown on the right) contains 3.5g of cannabis.

How many total (3.5g) containers will I be able to produce if I have 28g of trimmed, ready-for-packaging, cannabis?"

1) Read the problem multiply times to familiarize yourself with the question

2) Collect evidence / organize thoughts

3) Build your equation

4) Solve and ANSWER

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The People of Foundational Literacy:

Michael Abraham

"During Aurora's packaging process, I have to ensure that each of these little childproof containers (exactly like the ones shown on the right) contains 3.5g of cannabis.

How many total (3.5g) containers will I be able to produce if I have 28g of trimmed, ready-for-packaging, cannabis?"

Collect Evidence / Organize Thoughts
- 28g of "loose" cannabis
- Each container must contain 3.5g of cannabis
- How many containers?

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The People of Foundational Literacy:

Michael Abraham

"During Aurora's packaging process, I have to ensure that each of these little childproof containers (exactly like the ones shown on the right) contains 3.5g of cannabis.

How many total (3.5g) containers will I be able to produce if I have 28g of trimmed, ready-for-packaging, cannabis?"

$$28 \div 3.5 \quad \longrightarrow \quad \frac{28}{3.5} \quad \longrightarrow \quad 3.5\overline{)28}$$

3.5   **35**

28   **280**

$$35\overline{)280} \\ \quad \underline{-280} \\ \qquad 0$$

(quotient: 8)

∴ **With 28g, you would produce 8 total containers if each one carries 3.5g**

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