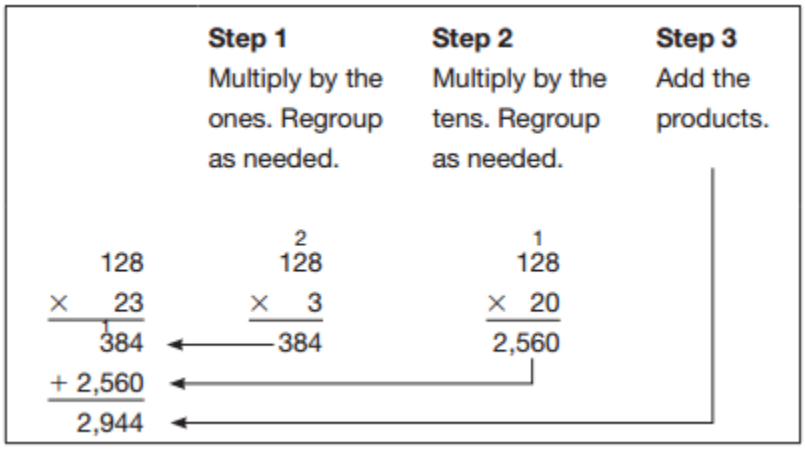
# *Grade 5 Module 2 Student Reference Sheets*

**Vocabulary:**

- Commutative Property: changing the order of the factors does not change the product
  Example: 3 X 4 = 4 X 3
- Associative Property: factors can be grouped differently
  Example: (3 X 10) X 2 = 3 X (10 X 2)
- Distributive Property: you distribute the factors
  Example: 5 X (7 + 3) = (5 X 7) + (5 X 3)
- Product: the result of multiplication
- Quotient: the answer of dividing one quantity by another
- Divisor: the number by which another number is divided
- Remainder: the number left over when one integer is divided by another
- Estimate: approximation of the value of a quantity or number
- Rounding: approximating the value of a given number to the nearest ____

**Key Concepts:**

## *Whole Number Multiplication*



## *Multiplying With Decimals*

You can use patterns to multiply decimals mentally by 10, 100, and 1,000.

When you multiply by

| | |
|---|---|
| 10 ($10^1$) | Move decimal point by 1 place to the right |
| 100 ($10^2$) | Move decimal point by 2 places to the right |
| 1,000 ($10^3$) | Move decimal point by 3 places to the right |

**Step 1. Estimate**

$3.5 \times 2 = 7$

**Step 2. Compare each factor to 1 to determine the relative size of the product.**

$3.6 > 1$
$2.1 > 1$

Because both factors are greater than 1, your answer will be greater than both factors.

**Step 3. Multiply as you would with whole numbers. Use reasoning to place the decimal appropriately.**

$$\begin{array}{r} 3.6 \\ \times\ 2.1 \\ \hline 3\ 6 \\ 7\ 2\ 0 \\ \hline 7.5\ 6 \end{array}$$

Or

**Step 1. Use powers of 10 to multiply as you would with whole numbers.**

$2.6 \times 10^1 = 26$
$18 \times 1 = 18$

$$\begin{array}{r} 26 \\ \times\ 18 \\ \hline 208 \\ +\ 260 \\ \hline 468 \end{array}$$

**Step 2. Divide the whole number answer by $10^1$ so that the number of decimal places in the factors and the product does not change.**

$468 \div 10^1 = 46.8$

***Dividing With Whole Numbers:***

**Using Mental Math Strategies:**

You can use math facts and patterns to help you divide mentally.

| What is 480 ÷ 6? | What is 60,000 ÷ 6? |
|---|---|
| You already know that 48 ÷ 6 = 8. | 60 ÷ 6 = 10 |
| 480 has one more zero than 48, so place one more zero in the quotient. | 60,000 has three more zeros than 60, so place three zeros in the quotient. |
| 480 ÷ 6 = 80. | 60,000 ÷ 6 = 10,000. |

**Standard Algorithm:**

Find 196 ÷ 32.

**Step 1**

Put the decimal point in the dividend. Divide. Put the decimal in the quotient right above the decimal in the dividend. Subtract.

```
    6.
32 ) 196.
   -192
      4
```

**Step 2**

Add a zero after the decimal point in the dividend. Bring down the zero. Divide. Subtract.

```
    6.1
32 ) 196.0
   -192
      40
    -32
      8
```

**Step 3**

Repeat Step 2 until there is no remainder.

```
     6.125
32 ) 196.000
   -192
      40
    -32
      80
     -64
      160
     -160
        0
```

Remember, you can use estimation to see if your answer is reasonable: 180 ÷ 30 = 6. You can check your answer using multiplication: 32 × 6.125 = 196

## *Dividing with Decimals*

To divide a whole number by a decimal, multiply both numbers by a power of 10 to make the divisor a whole number.

**Divide:** 138 ÷ 0.04

Multiply by 100 to make 0.04 a whole number. Remember to multiply 138 by 100, too.

$0.04 \times 100 = 4$ $\quad\quad$ $138 \times 100 = 13{,}800$

Use long division to find the quotient:

$$
\begin{array}{r}
3{,}450 \\
4\overline{)13{,}800} \\
\underline{12} \\
18 \\
\underline{16} \\
20 \\
\underline{20}
\end{array}
$$

So, 138 ÷ 0.04 = 3,450.

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## *Dividing a Decimal by a Decimal*

When you divide by a decimal, you need to rewrite the dividend and the divisor so that you are dividing by a whole number.

Find 4.96 ÷ 0.8.

**Step 1:** Estimate. Use compatible numbers.

480 ÷ 80 = 6

**Step 2:** Make the divisor a whole number. Multiply the divisor AND the dividend by the same power of 10.

$0.8\overline{)4.96}$

$0.8 \times 10 = 8$
$4.96 \times 10 = 49.6$

Place the decimal point in the quotient.

**Step 3:** Divide as you would with whole numbers. Remember that sometimes you may need to annex zeros to complete your division.

$8\overline{)49.6}$ → $8\overline{)49.6}$

$$
\begin{array}{r}
6.2 \\
8\overline{)49.6} \\
\underline{48} \\
16 \\
\underline{16} \\
0
\end{array}
$$

**Step 4:** Compare the quotient with your estimate.

Because 6.2 is close to 6, the answer checks.

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Find each quotient.

**1.** $0.02\overline{)1.5}$

Estimate: _____

Multiply dividend and divisor by what power of 10? _____

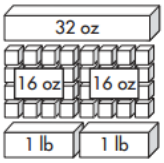
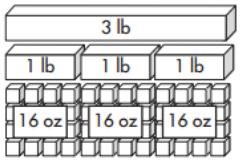
Place the decimal point in the quotient.

Divide. How many zeros do you need to annex? _____

Compare the quotient to your estimate.
Is the answer reasonable? _____

## *Converting Customary Units of Weight*

**How to change a weight measurement from one unit to another:**

| Converting a weight measurement from a smaller unit to a larger unit | Converting a weight measurement from a larger unit to a smaller unit |
|---|---|
| 32 ounces = _____ pounds | 3 pounds = _____ ounces |
|  |  |
| **Think:** If I measure the same weight using a larger unit, I will need a smaller number of units. | **Think:** If I measure the same weight using a smaller unit, I will need a larger number of units. |
| **Operation:** Divide. | **Operation:** Multiply. |
| You know 16 oz = 1 lb. | You know 1 lb = 16 oz. |
| Find 32 ÷ 16; 32 oz = 2 lb | Find 3 × 16; 3 lb = 48 oz |