Section 2: Ratios and Conversions

This booklet belongs to:_____**Block:** _____

Section	Due Date	How Did It Go?	Corrections Made and Understood
2.1			
2.2			
2.3			

Assessment Rubric

Category	L-T Score	Learning Target Procedure	Algebraic/Arithmetic Procedure	Communication	Anecdotal Example
Extending	4	Procedural context demonstrates a detailed understanding of the learning targets	Algebraic/Arithmetic process is error free, logic is clear and easy to follow	Written output is clear, easy to follow, and shows depth of understanding	"You could teach this" or "It's an answer key"
	3.5	Procedural context demonstrates a thorough understanding of the learning targets	Algebraic/Arithmetic process contains very minor errors, logic is clear and easy to follow	Written output is clear, easy to follow, and shows depth of understanding	"Almost perfect, one or two little errors"
Proficient	3	Procedural context is clear, demonstrates sound reasoning and thought of the learning targets	Algebraic/Arithmetic process contains minor errors, logic is clear and easy to follow	Written output is clear and organized, and shows depth of understanding	"Good understanding with a few errors"
Developing	2.5	Procedural context is clear, contains errors but demonstrates sound reasoning and thought of the learning targets	Algebraic/Arithmetic process contains errors, logic is clear and easy to follow	Written output is difficult to follow, but shows an understanding of the task	"You know what to do bet not clear how to do it"
	2	Procedural context contains errors. Understanding of the learning targets is developing	Algebraic/Arithmetic process contains numerous errors, difficult to follow	Written output is difficult to follow but shows an understanding of the task	"You are on the right track but key concepts are missing"
Emerging	1	Procedural context is not clear, demonstrates minimal understanding of the learning targets	Algebraic/Arithmetic process contains numerous errors, difficult to follow	Written output is difficult to follow, but shows an understanding of the task	"You have achieved the bare minimum to meet the learning outcome"
Not Yet Meeting Outcomes	IE	Procedural context is not clear, demonstrates minimal understanding of the learning targets	Algebraic/Arithmetic process contains numerous errors, difficult to follow	Written output is difficult to follow or completely absent and lacks clarity	"Learning outcomes are not met at this time"

Learning Targets

L – T	Description	Mark
2 – 1	• Understanding how ratios and fractions relate to conversion of units • Using tools and appropriate units to measure computational fluency	
2 – 2	• Executing conversions with a focus on length to increase computation • Using tools and appropriate units to measure computational fluency	
2 – 3	• Understanding how ratios relate to converting mass, time, and temperature • Solving multiple step, multiple units conversions with emphasis on distance and time relationships	

Comments:

Competency Evaluation

A valuable aspect to the learning process involves self-reflection and efficacy. Research has shown that authentic self-reflection helps improve performance and effort, and can have a direct impact on the growth mindset of the individual. In order to grow and be a life-long learner we need to develop the capacity to monitor, evaluate, and know what and where we need to focus on improvement. Read the following list of Core Competency Outcomes and reflect on your behaviour, attitude, effort, and actions throughout this unit.

- Rank yourself on the left of each column: 4 (Excellent), 3 (Good), 2 (Satisfactory), 1 (Needs Improvement)

		4	3	2	1
Personal Responsibility	• I **listen** during instruction and come ready to ask questions				
	• I am **on time** for class • I am **fully prepared** for the class, with all the required supplies				
	• I am **fully prepared** for Tests				
	• I **follow** instructions keep my Workbook organized and tidy • I am **on task** during work blocks • I **complete** assignments **on time**				
Self-Regulation	• I keep track of my **Learning Targets**				
	• I take **ownership** over my goals, learning, and behaviour • I can **solve problems** myself and know when to ask for help • I can **persevere** in challenging tasks • I **am actively** engaged in lessons and discussions				
	• I only **use my phone** for school tasks				
Classroom Responsibility and Communication	• I am **focused** on the discussion and lessons • I **ask questions** during the lesson and class • I give **my best effort** and **encourage** others to work well • I am polite and communicate questions and concerns with my peers and teacher in a timely manner • I clean up after myself and leave the classroom tidy when I leave				
Collaborative Actions	• I can **work with others** to achieve a common goal • I make **contributions** to my group • I **am kind** to others, can work collaboratively and **build relationships** with my peers • I **can identify** when others need support and provide it				
Communication Skills	• I present informative **clearly**, in an organized way • I **ask and respond** to simple direct questions • I am an **active listener**, I support and encourage the speaker • I **recognize** that there are different points of view and can disagree respectfully • I do not interrupt or speak over others				
	Overall				
Goal for next Unit – refer to the above criteria. **Please select** (underline/highlight) **two areas** you want to focus on					

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Section 2.1 - Ratios

Ratios

What is a Ratio?

- It is a numerical relationship between two amounts

Example: $1:2$ this means

- $1\ out\ of\ 2$
- $1\ to\ 2\ ratio$
- $For\ every\ 1\ (blank)\ there\ are\ 2\ (blank)$

Ratios are specifically important when we get to conversions, because we can use relationships between units

- Ratios are also the **SIMPLIFIED** representation of a **FRACTION**

Example:

$\frac{1}{2}\ means\ 1:2$	$\frac{4}{5}\ means\ 4:5$
$\frac{11}{12}\ means\ 11:12$	$\frac{2}{6}=\frac{1}{3}\ means\ 1:3$

When we see or make recipes ratios between items allow us to reduce or increase the batch.

- Below is a recipe for Chocolate Chip Cookies

Homemade Oatmeal Chocolate Chip Cookies

1 stick plus 6 TBsp butter, softened
3/4 cup firmly packed brown sugar
1/2 cup granulated sugar
2 eggs
1 tsp vanilla
1 1/2 cups all-purpose flour
1 tsp baking soda
1 tsp ground cinnamon
1/2 tsp salt
3 cups quick oats or old fashioned, uncooked
1 cup chocolate chips

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- The important question to ask in this case is, what item do I base my ratios on?
- Look at the ingredients, any ingredient that is a measurement can be adjusted by the ratio
- Concrete ingredients: Eggs in this case, I can't have one and a half eggs of five eighths of an egg
- So since the original recipe calls for 2 eggs and I want 1 egg I use the ratio $1:2$, so $\frac{1}{2}$ everything else

So what I have to do is **MULTIPLY** (You'll see with Conversions, we always MULTIPLY) **everything by a half**

- It is really important to understand one thing...
    - You may say from above that we just divide everything by 2. You aren't wrong.
    - But the truth is **that division** is just the **MULTIPLICATION of a FRACTION**
    - If we always multiply we will be able to cancel units, which means **CONVERSIONS**

Example: DIVISION IS MULTIPLYING OF THE RECIPROCAL

$2 \div 2 = 2 \cdot \frac{1}{2} = \frac{2}{2} = 1$	$\frac{1}{2} \div 2 = \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$
$\frac{1}{3} \div 2 = \frac{1}{3} \times \frac{1}{2} = \frac{1}{6}$	$\frac{1}{8} \div 2 = \frac{1}{8} \times \frac{1}{2} = \frac{1}{16}$

Now as we move into Conversions we always want to set them up as MULTIPLICATION. We do this because units (cm , km, m, etc.) cancel out just like numbers when they are in the numerator and the denominator.

Conversions

- When we are converting, say from kilometers to meters, there may be an inner monologue: "Do I multiply or Divide?"
- Remember that division is multiplication, it is just the multiplication of the reciprocal of the given value
- The key to conversions is **ALWAYS** multiply.
    - Just multiply by the ratio you are comparing

Remember that multiplying by a fraction is: $\frac{Top}{Bottom} \cdot \frac{Top}{Bottom} = \frac{Top \cdot Top}{Bottom \cdot Bottom}$

Example: I have six items in my recipe: Half it, Triple it and Quarter it.

▪ 2 Cups of Flour	▪ 4 eggs	▪ 1 Tablespoon of Sugar (tbsp)
▪ $\frac{1}{2}$ Teaspoon of Salt (tsp)	▪ 1 Teaspoon of Baking Soda (tsp)	▪ $1\frac{1}{2} = \frac{3}{2}$ Cups of Milk

	Half x $\frac{1}{2}$	Triple x 3	Quarter x $\frac{1}{4}$
Flour	$2 \text{ cups} \cdot \frac{1}{2} = 1 \text{ cup}$	$2 \text{ cups} \cdot 3 = 6 \text{ cups}$	$2 \text{ cups} \cdot \frac{1}{4} = \frac{1}{2} \text{ cup}$
Eggs	$4 \cdot \frac{1}{2} = 2$	$4 \cdot 3 = 12$	$4 \cdot \frac{1}{4} = 1$
Sugar	$1 \text{ tbsp} \cdot \frac{1}{2} = \frac{1}{2} \text{ tbsp}$	$1 \text{ tbsp} \cdot 3 = 3 \text{ tbsp}$	$1 \text{ tbsp} \cdot \frac{1}{4} = \frac{1}{4} \text{ tbsp}$
Salt	$\frac{1}{2} \text{ tsp} \cdot \frac{1}{2} = \frac{1}{4} \text{ tsp}$	$\frac{1}{2} \text{ tsp} \cdot 3 = \frac{3}{2} = 1\frac{1}{2} \text{ tsp}$	$\frac{1}{2} \text{ tsp} \cdot \frac{1}{4} = \frac{1}{8} \text{ tsp}$
Baking Soda	$1 \text{ tsp} \cdot \frac{1}{2} = \frac{1}{2} \text{ tsp}$	$1 \text{ tsp} \cdot 3 = 3 \text{ tsp}$	$1 \text{ tsp} \cdot \frac{1}{4} = \frac{1}{4} \text{ tsp}$
Milk	$\frac{3}{2} \text{ cups} \cdot \frac{1}{2} = \frac{3}{4} \text{ cups}$	$\frac{3}{2} \text{ cups} \cdot 3 = \frac{9}{2} = 4\frac{1}{2} \text{ cups}$	$\frac{3}{2} \text{ cups} \cdot \frac{1}{4} = \frac{3}{8} \text{ cup}$

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Monday.

Section 2.1 – Practice Problems

Simplify the following fractions and write the answer as a ratio.

1. $\frac{12}{24} = \frac{2 \cdot 2 \cdot 3}{2 \cdot 2 \cdot 2 \cdot 3} = \frac{1}{2}$ 1:2

2. $\frac{14}{21}$

3. $\frac{6}{15}$

4. $\frac{15}{25}$

Multiply the following proper fractions, simplify the answer and write the result as a ratio.

5. $\frac{2}{3} \cdot \frac{6}{7}$

6. $\frac{4}{5} \cdot \frac{20}{40}$

7. $\frac{1}{3} \cdot \frac{6}{11}$

8. $\frac{7}{8} \cdot \frac{16}{35}$

9. $\frac{11}{12} \cdot \frac{12}{22}$

10. $\frac{4}{7} \cdot \frac{49}{56}$

Multiply the following improper fractions, simplify the answer and write the result as a ratio.

11. $\frac{5}{3} \cdot \frac{9}{4}$

12. $\frac{7}{5} \cdot \frac{60}{49}$

13. $\frac{9}{3} \cdot \frac{22}{11}$

14. $\frac{13}{8} \cdot \frac{16}{24}$

15. $\frac{13}{12} \cdot \frac{48}{22}$

16. $\frac{15}{7} \cdot \frac{56}{55}$

17. Explain why multiplying always works when doing conversions.

18. When you are adjusting a list of measurements by a given ratio, what item should you base your conversions on and why?

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19. Find a recipe that you like to cook or would want to cook and list the ingredients and their quantities below.

Using that recipe as a guide.

i) Triple the batch

ii) Half the batch

Section 2.2 – Converting Length using Conversion Factors

Metric System

Equations:

$1cm = 10mm$

$1m = 100cm$

$1km = 1000m$

These equations can be written as conversion factors

Equation	Conversion Factor
$1cm = 10mm$	$\frac{1\ cm}{10\ mm} \longleftrightarrow \frac{10\ mm}{1\ cm}$
$1m = 100cm$	$\frac{1\ m}{100\ cm} \longleftrightarrow \frac{100\ cm}{1\ m}$
$1km = 1000m$	$\frac{1\ km}{1000\ m} \longleftrightarrow \frac{1000\ m}{1\ km}$

Use the following map when converting length in the metric system

mm ⟷ cm ⟶ m ⟷ km

Now, to convert from one unit to another:

$$What\ you\ are\ given * Conversions\ Factor = Answer$$

cm ⟷ m ⟷ km

1 cm = 10 mm
1 m = 100 cm
1 km = 1000 m

Example:

How many centimeters are in 123 meters?

Solution:

$$123\ \text{m} \times \frac{100\ \text{cm}}{1\ \text{m}} = 123\,000\ \text{cm}$$

Example:

How many *km* are there in 15 242 *centimeters*? cm → m → km

Solution:

Step 1:

$$15\,242\ \text{cm} \times \frac{1\ \text{m}}{100\ \text{cm}} = \frac{15\,242}{100} = 152.42\ \text{m}$$

Step 2:

$$152.42\ \text{m} \times \frac{1\ \text{km}}{1000\ \text{m}} = \frac{152.42}{1000} = 0.15242\ \text{km}$$

We can do it **all in one step**, just **set up** the **ratios, continuous multiplication**, so the **units cancel!**

$$15\,242\ \text{cm} \times \frac{1\ \text{m}}{100\ \text{cm}} \times \frac{1\ \text{km}}{1000\ \text{m}} = \frac{15\,242}{100\,000}$$

$$= 0.15242\ \text{km}$$

Worksheet Only

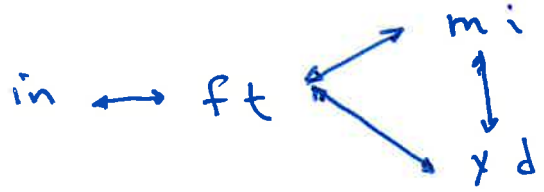
Imperial System

The conversion ratios for the Imperial System are not Base 10, so they are not as easy to visualize

Here they are:

Equation	Conversion Factor
$1\ mile = 1760\ yards$	$\frac{1mi}{1760yds} \leftrightarrow \frac{1760yds}{1mi}$
$1\ mile = 5280\ ft$	$\frac{1mi}{5280ft} \leftrightarrow \frac{5280ft}{1mi}$
$1\ yards = 3\ feet$	$\frac{1yd}{3ft} \leftrightarrow \frac{3ft}{1yd}$
$1\ foot = 12\ inches$	$\frac{1ft}{12in} \leftrightarrow \frac{12in}{1ft}$

Use the following map when converting length in the Imperial System



Example:

How many $feet$ are in 64 $inches$?

Solution:

$$64\,in \cdot \frac{1\,ft}{12\,in} = \frac{64}{12} = 5.3\,ft$$

Example:

How many inches are there in 3 *miles*?

Solution:

Multi Step Set-Up

$$3\text{ mi}\ \frac{5280\text{ ft}}{1\text{ mi}} = 15840\text{ ft}$$ *Cancel miles*

$$15840\text{ ft}\ \frac{12\text{ in}}{1\text{ ft}} = 190080\text{ in}$$ *Cancel feet*

One Step Set-Up

$$3\text{ mi}\ \frac{5280\text{ ft}}{1\text{ mi}}\ \frac{12\text{ in}}{1\text{ ft}} = 190080\text{ in}$$

Example:

How many *yards* in 450 *inches*?

Solution:

Multi-Step

$$450\text{ in}\ \frac{1\text{ ft}}{12\text{ in}} = \frac{450}{12} = 37.5\text{ ft}$$ *Cancel inches*

$$37.5\text{ ft}\ \frac{1\text{ yd}}{3\text{ ft}} = 12.5\text{ yd}$$ *Cancel feet*

One Step

$$450\text{ in}\ \frac{1\text{ ft}}{12\text{ in}}\ \frac{1\text{ yd}}{3\text{ ft}} = \frac{450}{36} = 12.5\text{ yd}$$

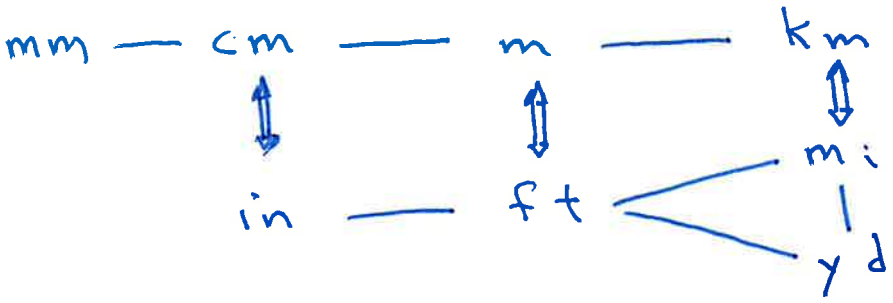
Handout only

Metric to Imperial ↔ Imperial to Metric

Here are the conversions from system to system

Equation	Conversion Factor
$1\ mi \cong 1.609km$	$\frac{1mi}{1.609km} \leftrightarrow \frac{1.609km}{1mi}$
$1\ ft \cong 0.305\ m$	$\frac{1ft}{0.305\ m} \leftrightarrow \frac{0.305\ m}{1ft}$
$1\ in \cong 2.54cm$	$\frac{1in}{2.54cm} \leftrightarrow \frac{2.54cm}{1in}$

Use the following map when converting between systems



When converting across systems of units, make the conversion at the smallest unit of measure

Example:

How many kilometers are in 730ft?

Solution:

$$730\ ft \quad \frac{0.305\ m}{1\ ft} \quad \frac{1\ km}{1000\ m} = \frac{222.65}{1000}$$

$$= 0.22265\ km$$

$$= 0.223\ km$$

Example:

How many *centimeters* are there in $42yds$?

Solution:

$$42\text{ yds}\ \frac{3\text{ ft}}{1\text{ yd}}\ \frac{12\text{ in}}{1\text{ ft}}\ \frac{2.54\text{ cm}}{1\text{ in}}$$

$$= 3840.48\text{ cm}$$

$$= 3840\text{ cm}$$

Example:

How many $feet$ are there in $4km$

Solution:

$$4\text{ km}\ \frac{1000\text{ m}}{1\text{ km}}\ \frac{1\text{ ft}}{0.305\text{ m}}$$

$$= \frac{4000}{0.305}$$

$$= 13\,114.75\text{ ft}$$

$$= 13\,100\text{ ft}$$

Section 2.2 – Practice Problems

Perform the following conversions and show the ratio being used and the cancelling of units, does your answer make sense?

Convert the following measurements to centimeters.

1. $3245\ km$

---

2. $6.2\ miles$

---

3. $984\ yards$

---

4. $784.56\ ft$

---

5. $0.003\ yards$

Convert the following measurements to feet.

6. 12 690 $miles$

7. 0.567 km

8. 1 234 567 mm

9. 3.4 cm

Convert the following measurement to miles.

10. 43 567 in

11. 3562 cm

12. 0.392 m

Convert the following measurements to meters.

13. $9\ miles$

14. $15\,555\ in$

15. $38.76\ yds$

16. Come up with three of your own questions, of varying level of difficulty. Solve them, these will be used in class at a later date.

Section 2.3 – Converting Mass, Time, and Temperature

Metric System

Equation	Conversion Factor
$1\,t = 1000kg$	$\frac{1t}{1000kg} \leftrightarrow \frac{1000kg}{1t}$
$1kg = 1000g$	$\frac{1kg}{1000g} \leftrightarrow \frac{1000g}{1kg}$
$1g = 1000mg$	$\frac{1g}{1000mg} \leftrightarrow \frac{1000mg}{1g}$

Use the following map when converting mass in the metric system

mg ⟷ g ⟷ kg ⟷ t

Example:

How many *grams* are in $12kg$?

$$12\ kg \ \frac{1000\ g}{1\ kg} = 12000\ g$$

How many *kilograms* in $23\,420mg$?

$$23420\ mg \ \frac{1\ g}{1000\ mg} \ \frac{1\ kg}{1000\ g} = 0.02342\ kg$$

How many *grams* in 42.7 *tonnes*?

$$42.7\ t \ \frac{1000\ kg}{1\ t} \ \frac{1000\ g}{1\ kg} = 42700.000\ g$$

Imperial System

Equation	Conversion Factor
$1\,T = 2000lb$	$\frac{1T}{2000lb} \leftrightarrow \frac{2000lb}{1T}$
$1lb = 16oz$	$\frac{1lb}{16oz} \leftrightarrow \frac{16oz}{1lb}$

Use the following map when converting "mass" in the Imperial System

oz ⟷ lb ⟷ T

Example:

How many *ounces* in $4lbs$?

$$4\text{ lbs} \quad \frac{16\text{ oz}}{1\text{ lb}} = 64\text{ oz}$$

How many *pounds* in $3T$?

$$3\text{ T} \quad \frac{2000\text{ lbs}}{1\text{ T}} = 6000\text{ lbs}$$

How many *ounces* in $12.4T$?

$$12.4\text{ T} \quad \frac{2000\text{ lbs}}{1\text{ T}} \quad \frac{16\text{ oz}}{1\text{ lb}} = 396\,800\text{ oz}$$

How many tons in 3 000 000 ounces?

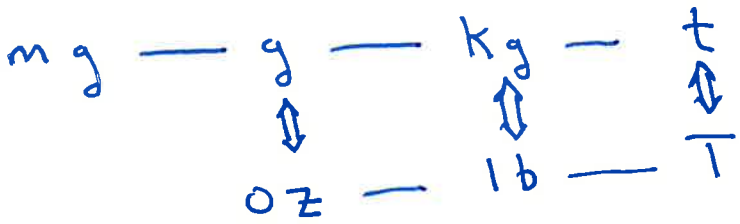
$$3\,000\,000\text{ oz} \quad \frac{1\text{ lb}}{16\text{ oz}} \quad \frac{1\text{ T}}{2000\text{ lbs}} = \frac{3000000}{32000}$$

$$= 93.75\text{ T}$$

Metric ↔ Imperial

Equation	Conversion Factor
$1g = 0.03527oz$	$\frac{1g}{0.03527oz} \leftrightarrow \frac{0.03527oz}{1g}$
$1kg = 2.2046lb$	$\frac{1kg}{2.2046lb} \leftrightarrow \frac{2.2046lb}{1kg}$
$1t = 1.1023T$	$\frac{1t}{1.1023T} \leftrightarrow \frac{1.1023T}{1t}$

Use the following map when converting mass between systems



Examples

How many *grams* in $17ounces$?

$$17\,oz \times \frac{1g}{0.03527\,oz} = 481.996g = 482.0g$$

How many *pounds* in $42kg$?

$$42\,kg \times \frac{2.2046\,lbs}{1\,kg} = 92.593\,lbs$$

How many *grams* in 1.4*T*

$$1.4\,T \times \frac{2000\,lbs}{1\,T} \times \frac{16\,oz}{1\,lb} \times \frac{1\,g}{0.03527\,oz}$$

$$= 1270201\,g$$

$$= 1270000\,g$$

How many tonnes in 50 000 g?

$$50000\,g \times \frac{0.03527\,oz}{1\,g} \times \frac{1\,lb}{16\,oz} \times \frac{1\,T}{2000\,lbs}$$

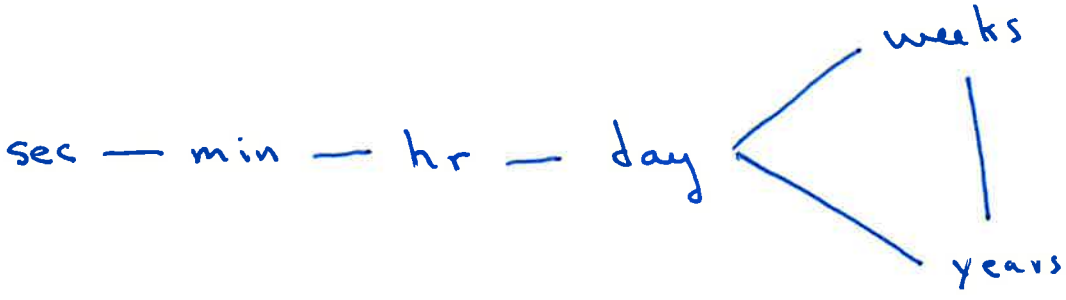
$$= 0.0551\,T$$

Time

- Time conversions work the same, but we need to remember: $60sec\ 60mins, not\ 100$!

Equation	Conversion Factor
$60sec = 1min$	$\frac{60sec}{1min} \leftrightarrow \frac{1min}{60sec}$
$60min = 1hr$	$\frac{60min}{1hr} \leftrightarrow \frac{1hr}{60min}$
$24hr = 1day$	$\frac{1day}{24hr} \leftrightarrow \frac{24hr}{1day}$
$7day = 1week$	$\frac{7day}{1week} \leftrightarrow \frac{1week}{7day}$
$52week = 1year$	$\frac{52week}{1year} \leftrightarrow \frac{1year}{52week}$
$365days = 1year$	$\frac{365days}{1year} \leftrightarrow \frac{1year}{365days}$

Use the following map when converting time units



Example: How *minutes* in a *day*?

$$1\,day \cdot \frac{24\,hr}{1\,day} \cdot \frac{60\,min}{1\,hr} = 1440\,min$$

Example:

How many *seconds* in a *week*?

$$1 \text{ week} \cdot \frac{7 \text{ day}}{1 \text{ week}} \cdot \frac{24 \text{ hr}}{1 \text{ day}} \cdot \frac{60 \text{ min}}{1 \text{ hr}} \cdot \frac{60 \text{ sec}}{1 \text{ min}}$$

$$= 604\,800 \text{ s}$$

How *weeks* in 40 320 *minutes*?

$$40320 \text{ min} \cdot \frac{1 \text{ hr}}{60 \text{ min}} \cdot \frac{1 \text{ day}}{24 \text{ hr}} \cdot \frac{1 \text{ week}}{7 \text{ day}}$$

$$= \frac{40320}{10080} = 4 \text{ weeks}$$

Temperature

- Unlike the other Conversions, this is not about ratios, but there are set equations to express the difference

Celsius to Fahrenheit	Fahrenheit to Celsius
$F = \frac{9}{5}C + 32$	$C = \frac{5}{9}(F - 32)$

Example:

What is 32°C in Fahrenheit

$$F = \frac{9}{5}C + 32 \Rightarrow F = \frac{9}{5}(32) + 32 = 89.6\,^{\circ}\text{F}$$

What is 101°F in Celsius

$$C = \frac{5}{9}(F - 32) \Rightarrow C = \frac{5}{9}(101 - 32) = \frac{5}{9}(69) = 38.3\,^{\circ}\text{C}$$

Conversions of Derived Units

- This is the most challenging situation, but the ratio work and cancelling of the units works exactly the same

Example:

How fast in $\boldsymbol{meters/second}$ is a car travelling at: $\boldsymbol{70km/hr}$

$$\frac{70\ km}{1\ hr} \cdot \frac{1000\ m}{1\ km} \quad \frac{1\ hr}{60\ min} \quad \frac{1\ min}{60\ sec}$$

$$= \frac{70\,000\ m}{3600\ s} = 19.4\ m/s$$

Example:

The speed of light is 299 792 458 $meters/second$

A **light year** is a measurement of how far light travels in **kilometers** in a **year.** Knowing how fast light travels we can use our ratios to figure this out!

$$\frac{299\,792\,458\ m}{1\ s} \quad \frac{1\ km}{1000\ m} \quad \frac{60\ sec}{1\ min} \quad \frac{60\ min}{1\ hr} \quad \frac{24\ hr}{day} \quad \frac{365\ day}{1\ yr}$$

$$= 9.45 \times 10^{12}\ km/yr$$

Section 2.3 – Practice Problems

Perform the following **MASS** conversions.

1. Convert $2.3T$ to $Ounces$

2. Convert $23.5lbs$ to $milligrams$

3. Convert $13.4kg$ to $pounds$

4. Convert $13\ 465oz$ to $tonnes\ (Metric)$

5. Convert $3.4T$ to $milligrams$

Perform the following TIME conversions.

6. How many $seconds$ are in $3\ days$?

7. How many $weeks$ are in $3\ and\ a\ half\ years$?

8. How many $minutes$ in the $months\ of\ July\ and\ August$?

9. How many $seconds$ are in the first $6\ months\ of\ the\ year$?

Perform the following TEMPERATURE conversions

10. How hot is $112°F$ in $°C$?

11. What is $7°C$ in $°F$?

12. Prove where Celsius and Fahrenheit are the same.

Perform the following conversions of MULTIPLE UNITS.

13. If I can run at $8km/hr$ how fast am I going in m/s?

14. You watch an ant move $8cm$ in $3seconds$, how fast is it travelling in km/hr?

15. How long, $in\ minutes$, does it take light to travel $12\ million\ km$?

16. If you are strong enough to push an object, with constant speed of $2\ meters/sec$, how far can you push it in $2\ weeks$?

Extra Work Space

Answer Key

Section 2.1

1. $\frac{1}{2}$
2. $\frac{2}{3}$
3. $\frac{2}{5}$
4. $\frac{3}{5}$
5. $\frac{4}{7}; 4:7$
6. $\frac{2}{5}; 2:5$
7. $\frac{2}{11}; 2:11$
8. $\frac{2}{5}; 2:5$
9. $\frac{1}{2}; 1:2$
10. $\frac{1}{2}; 1:2$
11. $\frac{15}{4}; 15:4$
12. $\frac{12}{7}; 12:7$
13. $\frac{6}{1}; 6:1$
14. $\frac{13}{12}; 13:12$
15. $\frac{26}{11}; 26:11$
16. $\frac{24}{11}; 24:11$
17. *Answers Vary*
18. *Answers Vary*
19. *Answers Vary*

Section 2.2

1. $324\ 500\ 000cm$
2. $997\ 793.3cm$
3. $89\ 977.0cm$
4. $23\ 913.4cm$
5. $0.274cm$
6. $67\ 003\ 200ft$
7. $1859.0ft$
8. $4047.8ft$
9. $0.11ft$
10. $0.69mile$
11. $0.02mile$
12. $0.0002mile$
13. $14\ 493.6m$
14. $395.4m$
15. $35.5m$
16. *Answer Vary*

Section 2.3

1. $73\ 600oz$
2. $10\ 660\ 000mg$
3. $29.54lbs$
4. $0.3817t$
5. $3\ 085\ 000\ 000mg$
6. $259\ 200seconds$
7. $182weeks$
8. $89\ 280mins$
9. $15\ 638\ 400secs$
10. $44.4°C$
11. $44.6°F$
12. See written Answer
13. $2.2\ ^{m}/_{s}$
14. $0.095\ ^{km}/_{hr}$
15. $0.67mins$
16. $2\ 419\ 200m$