# Section 1.1b – Fraction Basics

### **Fractions**

- What are they?
  - They are rational numbers, which means they can be written as a terminating (stops) or repeating decimals
- Everything we do with fractions is dependent on if we know what a fraction is to begin with.

So, what is a Fraction?

- Piece of a whole (Context: The Whole has to be the same size, for numbers the Whole is 1)
- Piece of something
- Something broken into pieces

In addition, this is the representation:



## Consider this:

- If you have 5 pieces and they are all **one fifth in size**, you have a whole.
- $\frac{5}{5}$  Think about a Kit Kat bar, 5 pieces all the same size, makes 1 bar!

The **whole** that is **broken in to pieces** is always the same size, namely: 1

If you have 4 pieces of size 4 and 24 pieces of size 24, the whole they create is the same size.

#### Example:

SAME size WHOLE, DIFFERENT size PIECES

## **Converting from a Fraction to a Decimal**

• The distinguishing thing about fractions is that **every fraction** is either a:

## Terminating (ends) or Repeating decimal number.

- Numbers that **neither terminate nor repeat cannot** be expressed as fractions,  $Pi(\pi)$  being the most famous example, but there are an **infinite number** of them
- We can figure out the decimal expansion of any fraction, using good old fashion long division



## **Short Division**

Write  $\frac{7}{8}$  as a decimal number

$$\begin{array}{c} 0.875\\ \hline 7.0_{6}0_{4}0 \end{array}$$

Therefore:

$$\frac{7}{8} = 0.875$$

#### Equivalence

Equivalence is a term that means 'the same value'

• Two or more fractions can be **equivalent**, meaning they have the **same value**, but **look different** 

**Example:**  $\frac{1}{2}$  is the same as  $\frac{2}{4}$   $\frac{3}{6}$   $\frac{4}{8}$   $\frac{15}{30}$ 

How do we get there?

- We multiply the original fraction by 1.
- The catch is that **anything divided by itself** is one.

So, by multiplying by 1, we use a fraction instead, that will give us the desired denominator.

$$1 = \frac{3}{3} = \frac{5}{5} = \frac{21}{21} = \frac{-4}{-4} = \frac{156}{156}$$

To make equivalent fractions we multiply the original fraction by 1, in the form of a fraction.

#### Example:

1	?		1	2	2
- =	_	$\rightarrow$	- •	- =	—
3	6		3	2	6

 $\frac{5}{7} = \frac{15}{?} \longrightarrow \frac{5}{7} \cdot \frac{3}{3} = \frac{15}{21}$ 

9	?		9.	4	36
$\frac{-}{4} =$	16	$\rightarrow$	4	$\frac{1}{4} =$	16

# **Comparing Fractions**

 ✓ In order to compare accurately two or more fractions, we need to make sure all the pieces are the same size. That means we need a common denominator.

Example:
 
$$\frac{2}{3}$$
 and  $\frac{3}{4}$ 
 $\frac{6}{7}$  and  $\frac{7}{8}$ 
 $\frac{2}{3} \cdot \frac{4}{4} = \frac{8}{12}$ 
 $\frac{3}{4} \cdot \frac{3}{3} = \frac{9}{12}$ 
 $\frac{6}{7} \cdot \frac{8}{8} = \frac{48}{56}$ 
 $\frac{7}{8} \cdot \frac{7}{7} = \frac{49}{56}$ 

 Since
  $\frac{9}{12}$ 
 bigger than
  $\frac{8}{12}$ 
 Since
  $\frac{49}{56}$ 
 bigger than
  $\frac{48}{56}$ 
 $\frac{3}{4}$ 
 is bigger than
  $\frac{2}{3}$ 
 $\frac{7}{8}$ 
 is bigger than
  $\frac{6}{7}$ 

### **Mixed vs Improper Fractions**

**Improper fractions:** Fractions where the numerator is bigger than the denominator (bottom number)

**Example:**  $\frac{13}{5}$   $\frac{11}{3}$   $\frac{4}{3}$ 

**Mixed fractions:** Fractions with a whole number and a proper fraction

**Example:**  $3\frac{1}{4}$   $7\frac{2}{3}$   $2\frac{5}{6}$ 

# Converting from Mixed to Improper and Improper to Mixed

- Again, think about your pieces (size and number)
- $\frac{11}{4}$  means that you have **11 pieces** and it takes **4 to make a whole**

Let's break that down then,

$$4 + 4 + 3 = 11$$
 So, we can have:  $\frac{4}{4} + \frac{4}{4} + \frac{3}{4}$ 

• We still have 11 pieces of size 4.

And since 
$$\frac{4}{4}$$
 is 1 We can write it as:  $1 + 1 + \frac{3}{4}$  or  $2\frac{3}{4}$ 

 $\frac{11}{4}$ 



• Then Ask: How many pieces are left? 3 Pieces of Size 4

## Let's see this visually,



### Mixed to Improper



Let's see this visually,



# Section 1.1b – Practice Questions

# **EMERGING LEVEL QUESTIONS**

Convert the following fractions into decimals. Use either short or long division.



## **PROFICIENT LEVEL QUESTIONS**

Convert the following two fractions to decimals; use long or short division steps



6. What makes two fractions equivalent? Why does changing to another form not change the value of the original fraction? Give me an example.

#### **EMERGING LEVEL QUESTIONS**

Convert the following fractions to equivalent fractions with the given denominator. Show the process.

7. $\frac{3}{4} = \frac{1}{16}$	8. $-\frac{2}{3} = -\frac{1}{9}$	9. $\frac{12}{15} = \frac{12}{45}$
10. $\frac{4}{5} = \frac{100}{100}$	11. $\frac{1}{7} = \frac{1}{14}$	12. $\frac{6}{7} = \frac{1}{21}$
13. $\frac{12}{13} = \frac{1}{169}$	14. $\frac{9}{11} = \frac{1}{99}$	15. $-\frac{2}{9} = -\frac{36}{36}$
16. $\frac{14}{3} = \frac{1}{6}$	17. $\frac{18}{7} = \frac{18}{28}$	18. $\frac{5}{8} = \frac{1}{32}$

19. When attempting to compare two fractions, what makes it very easy, why?

# **PROFICIENT LEVEL QUESTIONS**

Compare the following fractions using: <,>,= Justify your reasoning using a common denominator.

20. $\frac{2}{3}$ $\frac{3}{4}$	21. $\frac{1}{2}$ $\frac{25}{50}$	22. $\frac{6}{7}$ $\frac{7}{8}$
23. $\frac{4}{5}$ $\frac{8}{10}$	24. $-\frac{2}{3}$ $\frac{2}{3}$	25. $\frac{12}{13}$ $\frac{11}{12}$
26. $\frac{3}{7}$ $\frac{5}{8}$	27. $\frac{6}{6}$ $\frac{13}{13}$	28. $\frac{8}{9}$ $\frac{6}{7}$

Use visuals to convert the following fractions from MIXED to IMPROPER or VICE VERSE





Convert the following from Improper to Mixed or Vice Versa, no diagrams needed



# Answer Key – Section 1.1b

1.	0. 6	2.	0.375	3.	0.583	4.	0.625
5.	0.571428	6. An.	swers Vary	7.	12	8.	6
9.	36	10.	80	11.	2	12.	18
13.	156	14.	81	15.	8	16.	28
17.	72	18.	20	19.	Common Denominator	20.	<
21.	=	22.	<	23.	=	24.	<
25.	>	26.	<	27.	=	28.	>
29.	<u>23</u> 7	30.	17 4	31.	<u>45</u> 7	32.	$5\frac{2}{3}$
33.	$4\frac{3}{5}$	34.	$2\frac{4}{7}$	35.	58 11	36.	$\frac{17}{6}$
37.	<u>43</u> 10	38.	$-3\frac{5}{6}$	39.	$4\frac{3}{4}$	40.	$-3\frac{3}{10}$

# Extra Work Space