## Section 1.1b - Fraction Basics

This booklet belongs to: $\qquad$ Block: $\qquad$

## 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.
- $\frac{5}{5} \quad$ 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:



## 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

Example: Write $\frac{5}{7}$ as a decimal number
This reads 5 divided by 7


## Short Division

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

$$
8 \longdiv { 0 . 8 7 5 }
$$

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

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:

$$
\begin{array}{lll}
\frac{1}{3}=\frac{?}{6} & \rightarrow & \frac{1}{3} \cdot \frac{2}{2}=\frac{2}{6} \\
\frac{5}{7}=\frac{15}{?} & \rightarrow & \frac{5}{7} \cdot \frac{3}{3}=\frac{15}{21} \\
\frac{9}{4}=\frac{?}{16} & \rightarrow & \frac{9}{4} \cdot \frac{4}{4}=\frac{36}{16}
\end{array}
$$

## Comparing Fractions

$\checkmark$ 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:

$$
\begin{gathered}
\frac{2}{3} \text { and } \frac{3}{4} \\
\frac{2}{3} \cdot \frac{4}{4}=\frac{8}{12}, \quad \frac{3}{4} \cdot \frac{3}{3}=\frac{9}{12} \quad \frac{6}{7} \cdot \frac{8}{8}=\frac{48}{56}, \quad \frac{7}{8} \cdot \frac{7}{7}=\frac{49}{56} \\
\text { Since } \frac{9}{12} \text { bigger than } \frac{8}{12} \\
\frac{3}{4} \text { is bigger than } \frac{2}{3}
\end{gathered}
$$

## Mixed vs Improper Fractions

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

Example:

$$
\frac{13}{5} \quad \frac{11}{3} \quad \frac{4}{3}
$$

Mixed fractions: $\quad$ Fractions with a whole number and a proper fraction

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

## 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: $\quad \frac{4}{4}+\frac{4}{4}+\frac{3}{4}$
- We still have 11 pieces of size 4 .

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


- Ask: How many times does 4 go into 11 completely?
- Then Ask: How many pieces are left?

3 Pieces of Size 4

Let's see this visually,


## Mixed to Improper

$3 \frac{2}{5}$ means we have $1+1+1+\frac{2}{5} \quad$ but we can write 1 as $\frac{5}{5}$

We can say we have,

$$
\frac{5}{5}+\frac{5}{5}+\frac{5}{5}+\frac{2}{5}=\frac{17}{5}
$$

## $3 \frac{2}{5}=\frac{17}{5}$ <br> $\frac{(\text { Denominator } \cdot \text { Whole Number })+\text { Numerator }}{\text { Denominator }}$ <br> Note: If the fraction is negative you do not include it in the conversion process. <br> It just means that the improper fraction is negative too.

- You have 3 Whole of pieces of size $5: \quad 3 \cdot 5=15$
- And 2 other pieces of size 5:
$15+2=17$

Let's see this visually,


We have wholes, split into 5 pieces. Because the denominator is 5 .


Then we shade 3 whole bars. Because the
Whole Number is 3 .

And we shade 2 out of 5 .
Because the Numerator is 2.
How many individual cells
are shaded?

## Section 1.1b - Practice Questions

## EMERGING LEVEL QUESTIONS

Convert the following fractions into decimals. Use either short or long division.
1.

3.

2.
$\frac{3}{8}$


## PROFICIENT LEVEL QUESTIONS

Convert the following two fractions to decimals; use long or short division steps
4. $\frac{5}{8}$
5. $\frac{4}{7}$

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

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

## PROFICIENT LEVEL QUESTIONS

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

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

Use visuals to convert the following fractions from MIXED to IMPROPER or VICE VERSE
30. $4 \frac{1}{4} \rightarrow$

31. $6 \frac{3}{7} \rightarrow$

32. $\frac{17}{3} \rightarrow$

34. $\frac{18}{7} \rightarrow$


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

| 35. $5 \frac{3}{11} \rightarrow$ | $37.2 \frac{3}{10} \rightarrow$ |  |
| :--- | :--- | :--- |
| $38 .-\frac{23}{6} \rightarrow$ | $39 . \frac{19}{4} \rightarrow$ | $40 .-\frac{33}{10} \rightarrow$ |

## Answer Key - Section 1.1b

| 1. | $0 . \overline{6}$ | 2. | 0.375 | 3. | $0.58 \overline{3}$ | 4. | 0.625 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 5. | 0.571428 | 6. | Answers 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 | > |
|  | $\frac{23}{7}$ |  | $\frac{17}{4}$ |  | $\frac{45}{7}$ |  | $5 \frac{2}{3}$ |
| 33. | $4 \frac{3}{5}$ | 34 | $2 \frac{4}{7}$ |  | $\frac{58}{11}$ |  | $\frac{17}{6}$ |
|  | $\frac{43}{10}$ | 38 | $-3 \frac{5}{6}$ |  | $4 \frac{3}{4}$ |  | $-3 \frac{3}{10}$ |

Extra Work Space

