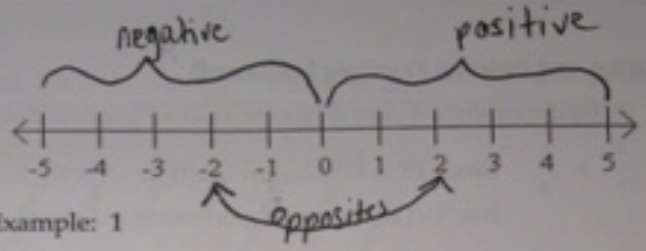
Investigation 3 Cheat Sheet



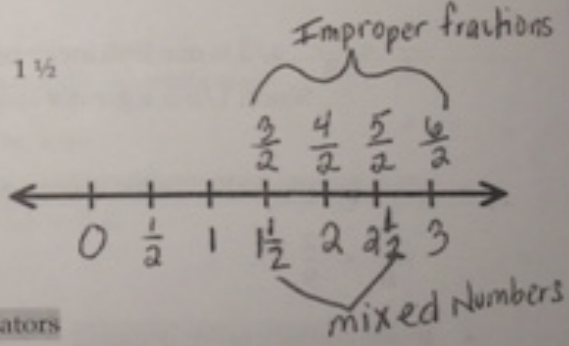
Integers & The Number Line

- positive numbers: greater than 0. Example: 1
- negative numbers: less than 0. Example: -1
- opposites: numbers that are the same distance from zero, but in opposite directions. Example: 1 and -1
- absolute value: the distance a number is from 0 on the number line. (a numbers absolute value is always positive)
  Example: $|6| = 6$ $|-6| = 6$ both are 6 units away from zero

Mixed Numbers and Improper Fractions (fractions greater than a whole)

- mixed number – a whole number and a fractional part Example: 1 ½
- improper fraction – the numerator is greater than or equal to the denominator. Example: $\frac{3}{2}$
- Converting a mixed number into an improper fraction
  - multiply the denominator by the whole number and then add the numerator to your product. This gets your numerator.
  - The denominator stays the same.
    - Example: $2\frac{1}{4} = \frac{9}{4}$ ($2 \times 4 + 1$)
- Converting an improper fraction into a mixed number
  - Divide the numerator by the denominator
    - Example: $\frac{3}{2} = 1\frac{1}{2}$ (1 ← whole #; $2\overline{)3}$; -2; 1 ← numerator; denominator)

Mixed numbers and improper fractions can be equivalent. This means they have the same location on a number line.



Comparing and Ordering Fractions

- If the denominators are the same – compare the numerators

$\frac{3}{8} < \frac{5}{8}$ Since the pieces(denominators) are the same size, 3 out of 8 is less than having 5 out of 8

- If the numerators are the same- compare the denominators (remember the smaller the denominator the bigger the piece)

$\frac{2}{9} < \frac{2}{3}$ Since 9ths are smaller pieces than 3rds, 2 smaller pieces are less than 2 bigger pieces

Comparing and Ordering Fractions (continued)

- If the denominators are different, find a common denominator

$\frac{4}{5} > \frac{2}{3}$ Since 15 is a common multiple of both denominators, I will make an equivalent fraction for each fraction using a denominator of 15.

$\frac{4 \times 3}{5 \times 3} = \frac{12}{15} > \frac{2 \times 5}{3 \times 5} = \frac{10}{15}$

- If numbers are not in simplest form , simplify

$\frac{6}{9} = \frac{2}{3}$ Put 6/9 into simplest form $\frac{6 \div 3}{9 \div 3} = \frac{2}{3}$

- Use benchmarks:
  - Ask yourself – is this more than ½ or less than ½? **Do this by seeing if the denominator is more or less than half of the numerator.**

$\frac{7}{10} > \frac{2}{9}$ 7/10 is more than a half because a half in 10ths is 5/10. 7/10 is more than 5/10.
2/9 is less than a half because a half in 7ths is 3.5/7. 2/7 is less than 3.5/7

  - Compare to a whole.

$\frac{7}{6} < \frac{4}{3}$ 7/6 is one sixth over a whole (1 1/6). 4/3 is one third over a whole (1 1/3).
7/6 is less than 4/3 because the 1/6 extra is less than the 1/3 extra.

$\frac{4}{5} < \frac{7}{8}$ 4/5 is one fifth away from one whole. 7/8 is one eighth away from one whole.
Since, 1/5 is a greater space needed to make a whole than 1/8, 4/5 is less than 7/8.

- A positive number is always greater than a negative number

$-\frac{1}{6} < \frac{2}{9}$

- If both numbers are negative
  - The number further away from zero is always less
  - Or pretend both numbers are positive and then write the opposite sign

$-\frac{1}{6} > -\frac{5}{6}$ On a number line 5/6 is further away from 0, so it is less.
Or…. If both numbers were positive 1/6 is **less** than 5/6. Since Negative #'s work in the **opposite** fashion, -1/6 is **greater** than -5/6

Decimal names for place value groups	10,000	1, 000	100	10	1	0.1	0. 01	0. 001	0. 0001
Fraction names for place value groups	10,000	1, 000	100	10	1	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1,000}$	$\frac{1}{10,000}$
	Ten-Thousands	Thousands	Hundreds	Tens	Ones	Tenths	Hundredths	Thousandths	Ten-Thousandths

Comparing & Ordering Decimals

- Line up the decimal points and compare place values.

  0.045 > 0.04 because 0.045
  0.040

  Both match up until the thousandths place. 5 thousandths is more than 0 thousandths.

- Think of Money $$$

  0.3 = 0.30 because 0.3 is the same as 30¢ and 0.30 is 30¢

  0.12 > 0.115 because 0.12 =12¢ and 0.115 is a little more than 11¢

- A positive number is always greater than a negative number

  - 0.20 < 0.20

- If both numbers are negative
  - The number further away from zero is always less
  - Or pretend both numbers are positive and then write the opposite sign

  - 0.5 < - 0.42 because -0.5 is further away from zero

    or if both numbers were positive 0.5 > 0.42. Since negative #'s work in the **opposite** fashion, -0.5 < -0.42

Converting Decimals to Fractions

- The way you read it is the way you write it.
  - If there is a whole number, write it down.
  - The number after the decimal point is your numerator
  - The place value the number ends in is the denominator

$0.3 = \frac{3}{10}$ ↑ tenths place

$1.21 = 1\frac{21}{100}$ ↑ hundredths place

$0.003 = \frac{3}{1000}$ ↑ thousandths place

Converting Fractions to Decimals

- Make an equivalent fraction with the denominator being a power of 10 (10, 100, 1000…)

$\frac{2}{5} \times \frac{2}{2} = \frac{4}{10} = 0.4$ $\quad \frac{1}{20} \times \frac{5}{5} = \frac{5}{100} = 0.05$ $\quad \frac{1}{8} \times \frac{125}{125} = \frac{125}{1000} = 0.125$

- Use benchmarks.

Here are some helpful ones to memorize:

Fraction	½	⅓	¼	⅕	⅙	⅛	1/10
Decimal	0.50	$0.\overline{3}$	0.25	0.20	$0.1\overline{6}$	0.125	0.10

If ¼ = 0.25 then ¾ = 0.25 x 3 or 0.75

If 1/5 = 0.20 then 4/5 = 0.20 x 4 or 0.80

- Divide the numerator by the denominator

$\frac{4}{9} = 4 \div 9 = 0.4444444\ldots$ or $0.\overline{4}$ (bar notation represents the number that is repeating)

$\frac{3}{13} = 3 \div 13 = 0.2307\ldots$ can be rounded to ≈ 0.231

$\frac{5}{8} = 5 \div 8 = 0.625$