Chapter 2 – Fractions Study Card

Vocabulary:
Improper fraction- a fraction where the numerator is greater than the denominator
Multiplicative inverse (reciprocal) – the fraction formed when switching the numerator and denominator of a fraction

$$\underline{3} \leftarrow \text{numerator}$$
$$5 \leftarrow \text{denominator}$$

Equivalent Fractions
To find an equivalent fraction, multiply or divide the numerator and denominator by the same number

Ex: $\frac{3}{7} \times 5 = \frac{15}{21}$ $\qquad \frac{8}{9} \times 11 = \frac{88}{99}$

Reducing Fractions
Divide a common factor out of a numerator and denominator until the only common factor is 1.

Ex: $\frac{15}{18} \div 3 = \frac{5}{6}$ $\qquad \frac{48}{60} \div 4 = \frac{12}{15} \div 3 = \frac{4}{5}$

$\frac{48}{60} \div 6 = \frac{8}{10} \div 2 = \frac{4}{5}$

$\frac{48}{60} \div 12 = \frac{4}{5}$

Mixed # → Improper Fraction
Multiply, Add, Slide, Slide

Ex: $6\frac{2}{3} \rightarrow \frac{20}{3}$ $\quad 6 \times 3 = 18 \quad 18 + 2 = 20$

Improper Fraction → Mixed #
Divide the numerator by the denominator

Ex: $\frac{29}{6}$

Fraction → Decimal
Divide the numerator by the denominator

Terminating decimal   Repeating decimal
(stops or ends)   (repeats)

Decimal → Fraction
Write the decimal as a fraction and reduce if necessary

$0.65 \rightarrow \frac{65}{100} \div 5 = \frac{13}{20}$

$4.375 \rightarrow 4\frac{375}{1000} \div 125 = 4\frac{3}{8}$

Addition and Subtraction of Fractions and Mixed #'s
1. Find a common denominator (if necessary)
2. Find the new equivalent fractions
3. Add or subtract numerators and whole numbers
4. Reduce (if necessary)

$$\frac{2\times 8}{5\times 8}=\frac{16}{40}$$
$$+\frac{3\times 5}{8\times 5}=\frac{15}{40}$$
$$\overline{\quad\quad\frac{31}{40}}$$

$$5\;\frac{2\times 3}{3\times 3}=\frac{6}{9}$$
$$+4\;\frac{8}{9}=\frac{8}{9}$$
$$\overline{9\;\frac{14}{9}=10\frac{5}{9}}$$

$$\overset{11}{\cancel{12}}\;\frac{7}{7}$$
$$-5\frac{3}{7}$$
$$\overline{6\frac{4}{7}}$$

$$\overset{12}{\cancel{13}}\;\frac{2\times 4}{5\times 4}=\frac{8}{20}\rightarrow\frac{28}{20}$$
$$-\;9\;\frac{3\times 5}{4\times 5}=\frac{15}{20}=\frac{15}{20}$$
$$\overline{\quad\quad 3\frac{13}{20}}$$

Multiplication of Fractions
Cancelling – dividing a common factor out of one numerator and one denominator prior to multiplying

Steps:
1. Cancel (if possible)
2. Multiply numerators
3. Multiply denominators
4. Reduce (if necessary)

$$\frac{2}{3}\times\frac{4}{5}=\frac{8}{15}$$

$$\frac{\overset{4}{\cancel{12}}}{\underset{3}{\cancel{15}}}\times\frac{\overset{1}{\cancel{5}}}{\underset{1}{\cancel{3}}}=\frac{4}{3}=1\frac{1}{3}$$

Remember: All mixed #'s need to be changed to improper fractions

$$3\frac{3}{4}\times 6\frac{2}{5}$$
$$\frac{\overset{3}{\cancel{15}}}{\underset{1}{\cancel{4}}}\times\frac{\overset{8}{\cancel{32}}}{\underset{1}{\cancel{5}}}=\frac{24}{1}=\boxed{24}$$

$$3\frac{1}{5}\times 4\frac{1}{6}$$
$$\frac{\overset{8}{\cancel{16}}}{\underset{1}{\cancel{5}}}\times\frac{\overset{5}{\cancel{25}}}{\underset{3}{\cancel{6}}}=\frac{40}{3}=\boxed{13\frac{1}{3}}$$

Division of Fractions

Reciprocal (Multiplicative Inverse) – the fraction formed when switching the numerator and denominator of a fraction

Ex: $\frac{4}{7} \rightarrow \frac{7}{4}$ $9 \rightarrow \frac{1}{9}$ $3\frac{1}{5} \rightarrow \frac{5}{16}$

Keep-Change-Flip
1. Keep the first fraction
2. Change the ÷ to ×
3. Flip the 2nd fraction (reciprocal)

Remember: All mixed #'s need to be changed to improper fractions

$$\frac{12}{15} \div \frac{18}{5}$$

$$\frac{\overset{2}{\cancel{12}}}{\underset{3}{\cancel{15}}} \times \frac{\overset{1}{\cancel{5}}}{\underset{3}{\cancel{18}}} = \boxed{\frac{2}{9}}$$

$$3\frac{1}{7} \div \frac{11}{49}$$

$$\frac{22}{7} \div \frac{11}{49} \rightarrow \frac{\overset{2}{\cancel{22}}}{\underset{1}{\cancel{7}}} \times \frac{\overset{7}{\cancel{49}}}{\underset{1}{\cancel{4}}} = \frac{14}{1} = \boxed{14}$$

Order of Operations with Fractions and Mixed #'s

Still the same as integers:

Steps: 1. Parentheses ( ), [ ] and Absolute Value
　　　2. Exponents and Square Roots $\sqrt{}$
　　　3. Multiplication and Division (left to right)
　　　4. Addition and Subtraction (left to right)

$$\frac{\frac{4}{5} - \frac{1}{3}}{\frac{1}{6} + \frac{4}{5}}$$

$$\frac{\frac{4}{5} - \frac{1}{3}}{\frac{1}{6} + \frac{4}{5}} \Rightarrow \frac{\frac{12}{15} - \frac{5}{15}}{\frac{5}{30} + \frac{24}{30}} = \frac{\frac{7}{15}}{\frac{29}{30}}$$

$$\frac{7}{\cancel{15}} \times \frac{\overset{2}{\cancel{30}}}{29} = \boxed{\frac{14}{29}}$$