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☑ SKILLS CHECKLIST

For **Module 2**

Fraction Notation

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<u>Assignment 1, Section 1.8 Divisibility</u>

❑ <u>SKILL</u>: *Determine whether the number 39 is divisible by* ***3.***

- A number is divisible by 3 if the sum of its digits is divisible by 3.
  - Ex: 3 + 9 = 12
  - Since 12 is divisible by 3, then 39 is also divisible by 3.
- Answer is “Yes” but choose the correct one.
  - The sum of the number’s digits is the only rule for 39 to be divisible by 3.
  - It has nothing to do with the ones digit being odd or even.

❑ <u>SKILL</u>: *Determine whether the number 2881 is divisible by* ***5.***

- A number is divisible by 5 if its ones digit is 0 or 5.
  - Ex: The ones digit of 2881 is 1.
  - Since the ones digit is not 0 or 5, the number 2881 is not divisible by 5.
- Answer is “No” but choose the correct one.
  - The number’s ones digit being 0 or 5 is the only rule for a number to be divisible by 5.
  - It has nothing to do with the ones digit being odd or even.
  - It has nothing to do with the sum of the number’s digits.

❑ <u>SKILL</u>: *Determine whether the number 843,010 is divisible by* ***10.***

- A number is divisible by 10 if its ones digit is 0.
  - Ex: The ones digit of 843,010 is 0.
  - Since the ones digit is 0, the number 843,010 is divisible by 10.
- Answer is “Yes” but choose the correct one.
  - A number’s ones digit being 0 is the only rule for 843,010 to be divisible by 10.
  - It has nothing to do with the ones digit being odd or even.
  - It has nothing to do with the sum of the number’s digits.

❑ <u>SKILL</u>: *Determine whether the number 1305 is divisible by* ***9.***

- A number is divisible by 9 if the sum of its digits is divisible by 9.
  - Ex: 1 + 3 + 0 + 5 = 9
  - Since 9 is divisible by 9, then 1305 is also divisible by 9.
- Answer is “Yes” but choose the correct one.
  - The sum of the number’s digits is the only rule for 1305 to be divisible by 9.
  - It has nothing to do with the ones digit being odd or even.
- <u>TIP</u>: The divisibility rule for **3** and **9** are similar.

❑ <u>SKILL</u>: *Determine whether the number 14,805 is divisible by* ***2.***

- A number is divisible by 2 if it has an even ones digit.
  - Ex: The ones digit of 14,805 is 5, which is odd.
  - Since 5 is not even, the number 14,805 is not divisible by 2.
- Answer is “No” but choose the correct one.
  - The number’s ones digit being even is the only rule for a number to be divisible by 2.
  - It has nothing to do with the sum of the number’s digits.

<u>Assignment 2, Section 1.7 Factorizations</u>

❑ <u>SKILL</u>: *Find all the factors of 20.*
1 • **20** = 20
2 • **10** = 20
4 • **5** = 20

- List **all** factors, including the number 1, prime numbers, and composite numbers.
- In MyLabsPlus, do not repeat factors; list only once. Use a comma to separate factors.
- Enter: **1,2,4,5,10,20**

❑ <u>SKILL</u>: *Multiply by 1, 2, 3, and so on, to find the first six multiples of the number 5.*

1 • 5 = **5**	4 • 5 = **20**
2 • 5 = **10**	5 • 5 = **25**
3 • 5 = **15**	6 • 5 = **30**

- In MyLabsPlus, use a comma to separate products.
- Enter: **5,10,15,20,25,30**

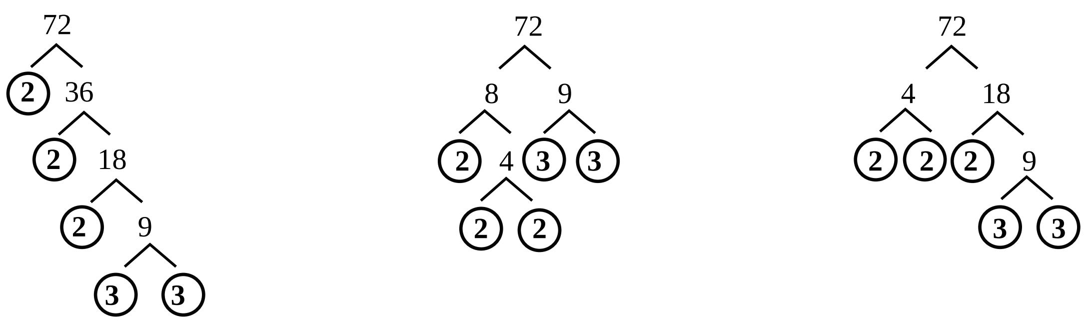
❑ <u>SKILL</u>: *Determine whether the following number is prime, composite, or neither.*

- **Prime number** has exactly two different factors, itself and 1.
    - Ex: 2,3,5,7,11,13,17,19,23,29,31,37,41,43,47,53…
- **Composite number** has other factors besides itself and 1.
    - Ex: 4,6,8,9,10,12,14,15,16,18,20,21,22,24,25…
- **Number 1** is neither prime nor composite.

❑ <u>SKILL</u>: *Find the prime factorization of 72.*

Factor Tree:

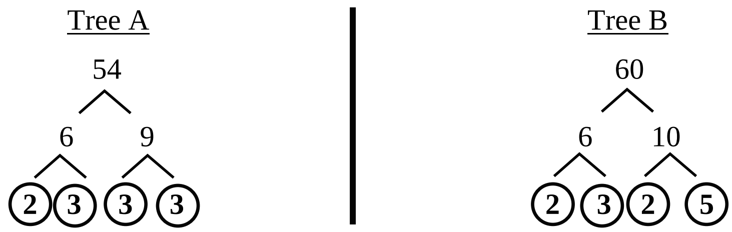
- One way to find the prime factorization is to use the *Factor Tree.* Think to yourself, "*What* number times *what* number gives you 72?"
- Circle the prime numbers as you go down the tree. It does not matter which factors you use along the way (which "branch" you take). When finished, you will get the same prime factors.



- In MyLabsPlus, list the prime factors from smallest to largest with a multiplication "dot" in-between.
- Enter: **2 • 2 • 2 • 3 • 3**

Assignment 3, Section 1.9 Least Common Multiples

❑ SKILL: *Find the LCM of this set of numbers: 54 and 60.*

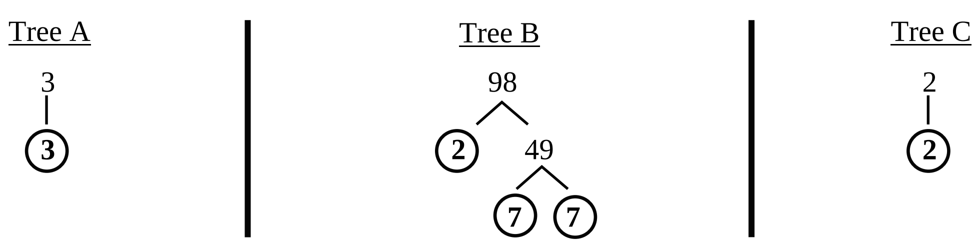


Least Common Multiples:

- Use the Factor Tree to find the prime numbers for 54 and 60.
- MyLabsPlus *Question Help* says: “Create a product of factors, using each factor the greatest number of times it occurs [the **most** occurrences] in any one factorization.”
- You will compare the number of occurrences of each prime number between Tree A and Tree B.
- Start with the leftmost prime number of Tree A, the number 2.
- Number 2 occurs one time in Tree A and two times in Tree B.
  - So, when comparing Tree A and Tree B, the **most** occurrences of the number 2, are two.
  - Therefore, “bring down” the two 2’s from Tree B to start forming the LCM.
    - So far: LCM = **2 • 2**
  - Leave the one 2 back in Tree A. Think of it as, “The winner comes down and the loser stays back.”
- Continue with the next prime number in Tree A, the number 3.
- Number 3 occurs three times in Tree A and one time in Tree B.
  - When comparing Tree A and Tree B, the **most** occurrences of the number 3, are three.
  - “Bring down” the three 3’s from Tree A to the LCM. Leave the one 3 back in Tree B.
    - So far: LCM = **2 • 2 • 3 • 3 • 3**
- Continue with the next prime number that has not been compared yet. Tree A is done so look in Tree B for a prime number not yet compared. The number 5 in Tree B is the last prime number to compare.
  - When comparing Tree A and Tree B, the **most** occurrences of the number 5, is one.
  - “Bring down” the one 5 from Tree B to finish forming the LCM.
    - LCM = **2 • 2 • 3 • 3 • 3 • 5**
- MyLabsPlus wants you to multiply out the LCM factors. So 2 • 2 • 3 • 3 • 3 • 5 = **540**
- Enter: **540**
- NOTE: When comparing prime numbers between Tree A and Tree B and there is a tie in the number of occurrences, “bring down” the prime number(s) from either Tree A or Tree B, but not from both.

❑ SKILL: *Find the LCM of the set of numbers: 3, 98, 2.*

- Use the Factor Tree for prime factorization.



- Use the same steps as above to form the LCM.
- Now you will compare Tree A, Tree B, and Tree C for the **most** occurrences of each prime number.
- LCM = 3 • 2 • 7 • 7 = **294** (Did you get this LCM? If not, review the previous problem again.)
- Enter: **294**

Assignment 4, Section 2.1 Fraction Notation and Simplifying

❑ SKILL: *Simplify.* $\frac{772}{0} =$ Undefined $\quad 772 \div 0 =$ Undefined $\quad 0\overline{)772}$ = Undefined

- When dividing **by** 0, the answer is undefined.

❑ SKILL: *Simplify.* $\frac{0}{3} = 0 \quad 0 \div 3 = 0 \quad 3\overline{)0}$ = 0

- When dividing **into** 0, the answer is zero.

❑ SKILL: *Multiply.* $\frac{2}{5} \cdot \frac{1}{7} = \frac{2}{35}$

- When multiplying fractions, multiply straight across. Multiply numerators. Then multiply denominators.
- Reduce result if possible.

❑ SKILL: *Multiply.* $\frac{6}{7} \cdot 5$ ⇨ $\frac{6}{7} \cdot \frac{5}{\mathbf{1}} = \frac{30}{7}$

- When multiplying a fraction and a whole number, write a **1** under the whole number to make it into a fraction.
- Multiply straight across and reduce result if possible.

❑ SKILL: *Find another name for the given number, but with the denominator indicated. Use multiplication by 1.*

$\frac{7}{9} = \frac{?}{27}$ ⇨ $\frac{\mathbf{3}}{\mathbf{3}} \cdot \frac{7}{9} = \frac{?}{27}$ ⇨ $\frac{7}{9} = \frac{\mathbf{21}}{27}$

- You have to find the missing number where the ‘ ? ’ is located.
- Look at both denominators and think to yourself, “What times 9 equals 27?” The answer is **3.**
- Therefore multiply the numerator of the left fraction (the 7) by **3** which results in 21.
- Replace the ‘ ? ’ with **21.** Do not reduce the fraction for this type of problem.
- CAUTION: “Use multiplication by 1” means that whatever number you use to multiply the denominator by, you have to use the exact same number to multiply the numerator. You have to multiply by a ‘ 1 ’ to maintain the ratio of the fraction.

❑ SKILL: *Simplify.* $\frac{49}{7}$ ⇨ 7

- You simplify a fraction by reducing the numerator and denominator, if possible.
- A fraction means division. The numerator is divided by the denominator. Sometimes the denominator (7 above) divides evenly into the numerator (49 above) without a remainder. The answer is 7.

Assignment 4, Section 2.1 continued…

❑ SKILL: *Simplify.* $\frac{21}{28} \Rightarrow \frac{\overset{\mathbf{3}}{\cancel{21}}}{\underset{\mathbf{4}}{\cancel{28}}} \Rightarrow \frac{3}{4}$

Reducing Fractions: ("simplifying fractions")

- **STEP 1 – Think Big:** Think to yourself, "What is the *biggest* number that divides evenly (without a remainder) into both the numerator and denominator?"
    - That number is **7.**
- **STEP 2 – Reduce Numerator:** The 7 you are thinking about divides into the numerator (21) exactly **3** times.
    - Slash out the 21 and put a **3** above it. This becomes the *new* numerator.
- **STEP 3 – Reduce Denominator:** The 7 you are thinking about divides into the denominator (28) exactly **4** times.
    - Slash out the 28 and put a **4** below it. This becomes the *new* denominator.
- NOTE: The numerator and denominator have no common factors other than 1 so this problem is fully reduced.
- $\frac{21}{28}$ has been simplified to $\frac{3}{4}$ (or reduced to lowest terms).
- Enter: $\mathbf{\frac{3}{4}}$

❑ SKILL: *Simplify.* $\frac{15}{6} \Rightarrow \frac{\overset{\mathbf{5}}{\cancel{15}}}{\underset{\mathbf{2}}{\cancel{6}}} \Rightarrow \frac{5}{2}$

- **STEP 1 – Think Big:** Think to yourself, "What is the *biggest* number that divides evenly (without a remainder) into both the numerator and denominator?"
    - That number is **3.**
- **STEP 2 – Reduce Numerator:** The 3 you are thinking about divides into the numerator (15) exactly **5** times.
    - Slash out the 15 and put a **5** above it. This becomes the *new* numerator.
- **STEP 3 – Reduce Denominator:** The 3 you are thinking about divides into the denominator (6) exactly **2** times.
    - Slash out the 6 and put a **2** below it. This becomes the *new* denominator.
- NOTE: The numerator and denominator have no common factors other than 1 so this problem is fully reduced.
- $\frac{15}{6}$ has been simplified to $\frac{5}{2}$ (or reduced to lowest terms).
- Enter: $\mathbf{\frac{5}{2}}$
- CAUTION: Leave the answer as a fraction even if the numerator is bigger than the denominator (sometimes called an "improper" fraction). Do not change the fraction to a mixed numeral in this section.

Assignment 5, Section 2.2 Multiplication and Division

❑ SKILL: *Multiply and simplify.* $\frac{12}{7}\cdot\frac{9}{8} \Rightarrow \frac{\overset{3}{\cancel{12}}}{7}\cdot\frac{9}{\underset{2}{\cancel{8}}} \Rightarrow \frac{27}{14}$ (thought: **4**)

- When multiplying fractions, the rule is to multiply straight across. Multiply numerators; multiply denominators; then reduce, if possible. However…
- To avoid having to reduce large numbers in the numerator and denominator after you multiply across, I recommend reducing the fractions, if possible, *before* you multiply across. I call it *reducing "up front"*.
- **Reducing Fractions "Up Front":**
  - **<u>STEP 1</u>:** Think to yourself, "What is the *biggest* number that divides into both the numerator and denominator of the **left** fraction?" No whole number (except 1) divides into both 12 and 7.
  - **<u>STEP 2</u>:** Think to yourself, "What is the *biggest* number that divides into both the numerator and denominator of the **right** fraction?" No number divides into both 9 and 8.
  - **<u>STEP 3</u>:** Think to yourself, "What is the *biggest* number that divides **diagonally** into both the numerator of the **left** fraction and denominator of **right** fraction?" That number is **4.**
    - The 4 in your head goes into 12 exactly **3** times. Slash out the 12 and put a **3** above it. This becomes the *new* numerator of the **left** fraction.
    - The 4 in your head goes into 8 exactly **2** times. Slash out the 8 and put a **2** below it. This becomes the *new* denominator of the **right** fraction.
  - **<u>STEP 4</u>:** Think to yourself, "What is the *biggest* number that divides **diagonally** into both the numerator of the **right** fraction and denominator of **left** fraction?" No number divides into both 9 and 7.
  - Re-examine the two fractions by using the four steps above to ensure that you cannot reduce further.
  - <u>CAUTION</u>: You *cannot reduce across,* only up-down and diagonally. You only multiply across.
- Next, multiply straight across. Multiply new numerator(s). Then multiply new denominator(s).
- <u>TIP</u>: If you reduced the two fractions "up front" as much as they can possibly be reduced, the result is *guaranteed* to be fully reduced. It is easier to reduce smaller numbers "up front" than it is to reduce larger numbers (after multiplying) when you do not reduce "up front".
- Enter: $\mathbf{\frac{27}{14}}$
- <u>CAUTION</u>: Leave the answer as a fraction even if the numerator is bigger than the denominator (sometimes called an "improper" fraction). Do not change the fraction to a mixed numeral in this section.

❑ SKILL: *Multiply.* $\frac{1}{6}\cdot 12 \Rightarrow \frac{1}{6}\cdot\frac{12}{\mathbf{1}} \Rightarrow \frac{1}{\underset{1}{\cancel{6}}}\cdot\frac{\overset{2}{\cancel{12}}}{1} \Rightarrow \frac{2}{1} \Rightarrow 2$ (thought: **6**)

- When multiplying a fraction and a whole number, write a **1** under the whole number to make it into a fraction.
- Reduce "up front" using the four steps from the problem above.
  - <u>TIP</u>: If there is a 1 in the numerator or denominator, you cannot reduce any further "up front" with the 1 (by looking up-down or diagonally). Instead, check if you can reduce the other numbers.
- Now multiply straight across. Multiply new numerator(s). Then multiply new denominator(s).
- Do not leave your answer with a 1 in the denominator. A fraction means division so divide the numerator (2) by the denominator (1) to get a result of 2.
- Enter: **2**

Assignment 5, Section 2.2 continued…

❑ <u>SKILL</u>: *Find the reciprocal of* ***3.*** $3 \Rightarrow \frac{3}{\mathbf{1}} \Rightarrow \frac{1}{3}$

- To find the reciprocal of a whole number, write a **1** under it in the denominator to convert the whole number into a fraction.
- Then flip the fraction.
- Enter: $\mathbf{\frac{1}{3}}$

❑ <u>SKILL</u>: *Find the reciprocal of* $\frac{1}{4}$. $\frac{1}{4} \Rightarrow \frac{4}{1} \Rightarrow 4$

- To find the reciprocal of a fraction, flip the fraction.
- If the original fraction had a 1 in the numerator, after flipping it, the 1 is now in the denominator.
- But you cannot leave your answer with a 1 in the denominator. A fraction means division. So divide numerator by denominator to get a result of 4.
- Enter: **4**

❑ <u>SKILL</u>: *Divide and simplify.*

$$\frac{2}{5} \div \frac{8}{15} \Rightarrow \frac{2}{5} \cdot \frac{15}{8} \Rightarrow \frac{\cancel{2}^{\,1}}{5} \cdot \frac{15}{\cancel{8}_{\,4}} \;(2) \Rightarrow \frac{1}{5} \cdot \frac{15}{4} \Rightarrow \frac{1}{\cancel{5}_{\,1}} \cdot \frac{\cancel{15}^{\,3}}{4} \;(5) \Rightarrow \frac{1}{1} \cdot \frac{3}{4} \Rightarrow \frac{3}{4}$$

- When dividing fractions, convert division to multiplication and then multiply.
- **Convert Division To Multiplication:**
  - o **<u>STEP 1 – Keep</u>:** "**K**eep" the *left* fraction the way it is.
  - o **<u>STEP 2 – Change</u>:** "**C**hange" the division sign to a multiplication sign.
  - o **<u>STEP 3 – Flip</u>:** "**F**lip" the *right* fraction so that you now have its reciprocal.
- After **KCF** is done, we are then multiplying fractions. See previous problems.
- <u>CAUTION</u>: You cannot reduce "up front" while still in 'division mode'. You can only reduce "up front" while in 'multiplication mode', after completing the KCF steps.
- Do you see how the answer was obtained? If not, review the previous problems again involving multiplying a fraction by a fraction.
- Enter: $\mathbf{\frac{3}{4}}$

❑ <u>SKILL</u>: *Divide and simplify.*

$$6 \div \frac{4}{5} \Rightarrow \frac{6}{\mathbf{1}} \div \frac{4}{5} \Rightarrow \frac{6}{1} \cdot \frac{5}{4} \Rightarrow \frac{\cancel{6}^{\,3}}{1} \cdot \frac{5}{\cancel{4}_{\,2}} \;(2) \Rightarrow \frac{3}{1} \cdot \frac{5}{2} \Rightarrow \frac{15}{2}$$

- First, put a 1 in denominator of whole number to make it a fraction.
- Perform the 3-step KCF process. See problem above.
- Then reduce "up front". See previous problems.
- Multiply the reduced fractions by multiplying across. See previous problems.
- Enter: $\mathbf{\frac{15}{2}}$

Assignment 6, Section 2.3 Addition and Subtraction

❑ SKILL: *Add and simplify.*

$$\frac{5}{9}+\frac{7}{9} \Rightarrow \frac{12}{9} \Rightarrow \frac{\overset{\mathbf{4}}{\cancel{12}}}{\underset{\mathbf{3}}{\cancel{9}}} \;☺ \cdots (3) \Rightarrow \frac{4}{3}$$

Add or Subtract Fractions:

- **STEP 1 – LCD:** Find the Lowest Common Denominator (LCD), which is the same concept as the Least Common Multiple (LCM) covered previously.
  - If denominators are already the same, do not find the LCD. Skip STEP 1.
- **STEP 2 – Multiply by *n* / *n*:** Multiply the fraction(s) not having the LCD by some number $\frac{n}{n}$ to give you the LCD for the fraction(s). But multiply numerator *and* denominator by that number *n*.
  - We do not do this here since the fractions have the same denominator. Skip STEP 2.
- **STEP 3 – Add / Subtract:** Add the numerators only. Leave the denominators the same.
- **STEP 4 – Reduce:** If possible, reduce (simplify) the result.
- CAUTION: Do not reduce "up front" when adding or subtracting fractions. Only reduce at the very last step.
- Enter: $\mathbf{\frac{4}{3}}$

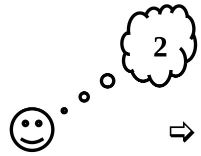
❑ SKILL: *Add and simplify.* $\frac{4}{5}+\frac{7}{10} \Rightarrow \frac{\mathbf{2}}{\mathbf{2}}\cdot\frac{4}{5}+\frac{7}{10} \Rightarrow \frac{8}{10}+\frac{7}{10} \Rightarrow \frac{15}{10} \Rightarrow$

$$\frac{\overset{\mathbf{3}}{\cancel{15}}}{\underset{\mathbf{2}}{\cancel{10}}} \;☺ \cdots (5) \Rightarrow \frac{3}{2}$$

- **STEP 1 – LCD:** The denominators are not the same so find LCD using either method:
  - **One List of Multiples:** If the denominators are small numbers, then use this method.
  - **Prime Factorizations:** If the denominators are larger numbers, then use this method (Factor Tree).
  - For this example, we'll use *One List of Multiples.*
  - Think to yourself, "Does the smaller denominator (5) divide evenly into the bigger denominator (10)?" For this problem the answer is "Yes". Therefore, the bigger denominator is the LCD, 10.
    - NOTE: The LCD is the smallest possible number that **both** denominators divide into evenly. Therefore the LCD can never be smaller than the bigger denominator, since the bigger denominator also has to divide into it. However, the LCD can be larger than both denominators, as you will see in an upcoming example.
- **STEP 2 – Multiply by *n* / *n*:** Since the LCD is 10, we need to make both denominators become 10.
  - The **left fraction** has a denominator of 5 and we need to make it 10. Think to yourself, "What number times 5 gives you 10?" The answer is **2.** We have to multiply that denominator (5) by **2** to make it 10. However, to maintain the ratio of the fraction, we must also multiply the *numerator* by **2.**
    - Multiply out the numerator by **2** and denominator by **2.**
  - The **right fraction** already has the LCD (10) so we do not need to do anything to this fraction.
- **STEP 3 – Add / Subtract:** Add the numerators only. Leave the denominators the same.
- **STEP 4 – Reduce:** If possible, reduce the result.
- Enter: $\mathbf{\frac{3}{2}}$

Assignment 6, Section 2.3 continued…

❑ <u>SKILL</u>: *Subtract and simplify.* $\frac{6}{12} - \frac{2}{9} \Rightarrow \frac{\mathbf{3}}{\mathbf{3}} \cdot \frac{6}{12} - \frac{\mathbf{4}}{\mathbf{4}} \cdot \frac{2}{9} \Rightarrow \frac{18}{36} - \frac{8}{36} \Rightarrow \frac{10}{36} \Rightarrow$

$\frac{\cancel{10}^{\mathbf{5}}}{\cancel{36}_{\mathbf{18}}}$ 

$\Rightarrow \frac{5}{18}$

- **<u>STEP 1 – LCD</u>:** The denominators are not the same so find the LCD.
  - **One List of Multiples:**
    - Use this method since the denominators are fairly small numbers.
    - Think to yourself, "Does the smaller denominator (9) divide evenly into the bigger denominator (12)?" For this problem the answer is "No".
    - Therefore, multiply the bigger denominator by 2 to obtain its 2nd multiple.
      - 2 • 12 = 24
      - Does the smaller denominator (9) divide evenly into the bigger denominator's 2nd multiple (24)? The answer is No.
    - Multiply the bigger denominator by 3 to obtain its 3rd multiple.
      - 3 • 12 = 36
      - Does the smaller denominator (9) divide evenly into the bigger denominator's 3rd multiple (36)? The answer is Yes.
      - The LCD is **36.**
    - <u>NOTE</u>: If the bigger denominator's 3rd multiple did not provide the LCD, then you would look at its 4th multiple, its 5th multiple, etc. until the smaller denominator (9) divides evenly into the bigger denominator's multiple.
- **<u>STEP 2 – Multiply by *n* / *n*</u>:** Since the LCD is 36, we need to make both denominators become 36.
  - The **left fraction** has a denominator of 12 and we need to make it 36. Think to yourself, "What number times 12 gives you 36?" The answer is **3.** We have to multiply that denominator (12) by **3** to make it 36. However, to maintain the ratio of the fraction, we must also multiply the *numerator* by **3.**
    - Multiply out the numerator by **3** and denominator by **3.**
  - The **right fraction** has a denominator of 9 and we need to make it 36. Think to yourself, "What number times 9 gives you 36?" The answer is **4.** We have to multiply that denominator (9) by **4** to make it 36. However, to maintain the ratio of the fraction, we must also multiply the *numerator* by **4.**
    - Multiply out the numerator by **4** and denominator by **4.**
- **<u>STEP 3 – Add / Subtract</u>:** Subtract the numerators only. Leave the denominators the same.
- **<u>STEP 4 – Reduce</u>:** If possible, reduce the result.
- Enter: $\frac{\mathbf{5}}{\mathbf{18}}$

❑ <u>SKILL</u>: *Subtract and simplify.* $\frac{8}{24} - \frac{2}{14}$ ⇨ $\frac{\mathbf{7}}{\mathbf{7}} \cdot \frac{8}{24} - \frac{\mathbf{12}}{\mathbf{12}} \cdot \frac{2}{14}$ ⇨ $\frac{56}{168} - \frac{24}{168}$ ⇨ $\frac{32}{168}$ ⇨

$\frac{32}{168}$ 

⇨ $\frac{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2}{2 \cdot 2 \cdot 2 \cdot 3 \cdot 7}$ ⇨ $\frac{\overset{\mathbf{1}}{\cancel{2}} \cdot \overset{\mathbf{1}}{\cancel{2}} \cdot \overset{\mathbf{1}}{\cancel{2}} \cdot 2 \cdot 2}{\underset{\mathbf{1}}{\cancel{2}} \cdot \underset{\mathbf{1}}{\cancel{2}} \cdot \underset{\mathbf{1}}{\cancel{2}} \cdot 3 \cdot 7}$ ⇨ $\frac{4}{21}$

- **<u>STEP 1 – LCD</u>:** The denominators are not the same so find the LCD. Use the **Prime Factorizations** method (Factor Tree) because the denominators are large numbers.
  - o See the prior section about Least Common Multiples and how to use the Factor Tree to find the LCM (called LC<u>D</u> when used to find <u>D</u>enominators, but it's the same process).
  - o Here, the LCD is **168.** Did you get the same number? If not, review Least Common Multiples section.
  - o <u>TIP</u>: Even if the denominators are large numbers, take a quick look to see if the smaller denominator divides into the bigger denominator. If not, check the bigger denominator's 2nd multiple. If still not, then switch to the *Factor Tree* method. You can sometimes find the LCD faster by checking first with the *One List of Multiples* method.
- **<u>STEP 2 – Multiply by *n / n*</u>:** Since the LCD is 168, we need to make both denominators become 168.
  - o For **left fraction,** multiply out the numerator by **7** and denominator by **7.**
  - o For **right fraction,** multiply out the numerator by **12** and denominator by **12.**
- **<u>STEP 3 – Add / Subtract</u>:** Subtract the numerators only. Leave the denominators the same.
- **<u>STEP 4 – Reduce</u>:** If possible, reduce the result.
  - o Think to yourself, "What is the *biggest* number that divides evenly (without a remainder) into both the numerator (32) and denominator (168)?"
  - o "I don't know", you say. Correct because the fraction has large numbers.
  - o Since when adding or subtracting fractions we cannot reduce "up front", we are stuck trying to reduce very large numbers at the very last step.
  - o We will use prime factorization (Factor Tree again) for the numerator and denominator to see if we can cancel common factors and therefore reduce the fraction.
    - ▪ <u>NOTE</u>: This prime factorization in STEP 4 is a different prime factorization from STEP 1. In STEP 1, we used prime factorization to find the LCD. In STEP 4, we will use prime factorization to see if we can cancel common factors between the numerator and denominator to reduce the fraction.
  - o Numerator: 32 = **2 • 2 • 2 • 2 • 2**
  - o Denominator: 168 = **2 • 2 • 2 • 3 • 7**
  - o <u>NOTE</u>: When "cancelling", the number that you crossed out does not actually go away. It is still present in the numerator and/or denominator but as a "1".

- Enter: $\mathbf{\frac{4}{21}}$

Assignment 7, Section 2.4 Mixed Numerals

❑ <u>SKILL</u>: *Convert to fractional notation.*

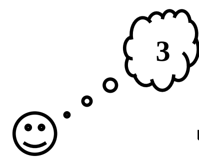
$$15\frac{3}{8} \Rightarrow \frac{\mathbf{120}+3}{8} \Rightarrow \frac{123}{8}$$

- **<u>STEP 1 – Multiply</u>:** Multiply denominator (8) and whole number (15) to get a temporary result of **120.**
- **<u>STEP 2 – Add</u>:** Add temporary result of 120 to numerator (3). That answer (**123**) becomes the *new* numerator. Keep denominator the same.

- Enter: $\mathbf{\frac{123}{8}}$

❑ <u>SKILL</u>: *Convert to a mixed numeral.*

$$\frac{87}{12} \Rightarrow \begin{array}{r} 7 \\ 12\overline{)\,87} \\ -\,84 \\ \hline 3 \end{array} \Rightarrow 7\frac{3}{12} \Rightarrow 7\frac{\cancel{3}^{\,\mathbf{1}}}{\cancel{12}_{\,\mathbf{4}}}$$



$$\Rightarrow 7\frac{1}{4}$$

- A fraction means division so divide denominator into numerator. However, first change format to *long division.*
- **<u>STEP 1 – Divide</u>:** Perform long division.
  - The whole number part of the answer (at the top) is called the quotient. Here, the **Q**uotient is **7.**
  - The remainder is how much is left over after the subtraction step. Here, the **R**emainder is **3.**
  - The divisor is the number you are using to divide into the other number. Here, the **D**ivisor is **12.**
- **<u>STEP 2 – Create Mixed Numeral</u>:** Use the numbers you obtained from long division to create a mixed numeral. This is the format of a mixed numeral:

$$\boldsymbol{Q}uotient\ (\mathbf{7})\ \frac{\boldsymbol{R}emainder\ (\mathbf{3})}{\boldsymbol{D}ivisor\ (\mathbf{12})}$$

- **<u>STEP 3 – Reduce</u>:** If possible, reduce the fraction part of the mixed numeral.

- Enter: $\mathbf{7\frac{1}{4}}$