Chapter 3 – Formulas and Fractions

Introduction: If you asked students what topic they find the most difficult, they would probably say "fractions." Many students struggle with a good grasp of fractions. What is a fraction? A fraction in a general sense is a ratio of parts to total. For example the fraction 5/9 means 5 parts out of a total of 9 parts. Fractions are important as there are many formulas and applications that require a good understanding of fractions.

Section 3A – Fractions and Mixed Number Conversions

Fractions can be seen in a variety of places. For example if a pizza is cut up in 10 pieces and you eat 3 of the pieces, you have eaten 3/10 of the pizza. If you have $40 and you spend $27 you have spent 27/40 of your money. A good understanding of fractions stems from the idea of a parts out of the total. In the fraction 3/10, the number of parts (3) is the numerator and the total (10) is the denominator. One of the key ideas is that the denominator is the total parts in 1 whole. In the pizza example, each pizza is cut up into 10 total pieces so the denominator is 10. The denominator is key as it gives the size of the pieces of pizza. So each piece is 1/10 of a pizza. Notice if we cut up the pizza into 5 pieces, the pieces would each be larger. In fact each piece would be 1/5. From this example we can see that 1/10 is smaller than 1/5. Let's go back to the pizza cut up into 10 pieces. Suppose we buy a second pizza and cut it up into 10 pieces also. If we ate a total of 13 pieces, we would have eaten 13/10. A common mistake students make is they think it is 20 total pieces. But the denominator is how many total pieces in 1 whole. So eating 13 pieces when each pizza is cut into 10 slices is 13/10 or 1 whole pizza and 3/10. You can see why we say that $1\frac{3}{10}=\frac{13}{10}$. When the numerator (13) is greater than or equal to the denominator (10), the fraction is called an improper fraction. When the numerator (3) is less than the denominator (10) we call that a proper fraction. A mixed number is a whole number plus a proper fraction $\left(1\frac{3}{10}\right)$. So we see the improper fraction 13/10 can also be written as a mixed number $1\frac{3}{10}$. How do we convert improper fractions to mixed numbers and vice versa? Let's review.

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To convert a mixed number into an improper fraction we multiply the whole number times the denominator and add the numerator. This becomes the numerator of the improper fraction. The denominator of the improper fraction is the same as the denominator of the mixed number. Look at the mixed number $3\frac{1}{6}$. To convert this into an improper fraction we multiply the whole (3) times the denominator (6) and then add the numerator (1). Hence the improper fraction will be $\frac{3\times 6+1}{6}=\frac{18+1}{6}=\frac{19}{6}$.

To convert an improper fraction into a mixed number we need to do the opposite. All fractions are divisions, so to convert the improper fraction into a mixed number simply divide the numerator by the denominator. Careful, remember the numerator always goes on the inside of the division and the denominator goes on the outside. We also do not want to convert to decimal so just leave the division as quotient and remainder. The quotient is the whole part and the remainder is the numerator of the mixed number.

Look at the improper fraction $\frac{19}{6}$. To convert into a mixed number we divide 19 by 6.

$$\begin{array}{r} 3 \\ 6\overline{)\ 19} \\ \underline{-18} \\ 1 \end{array}$$

Since 3 is the quotient that is the whole part. Since 1 is the remainder that is the numerator. The denominator stays the same. Hence the mixed number is $3\frac{1}{6}$.

<u>Practice the following examples with your instructor.</u>

Example 1: Convert $2\frac{3}{4}$ into an improper fraction.

Example 2: Convert $5\frac{1}{7}$ into an improper fraction.

Example 3: Convert $\frac{37}{5}$ into a mixed number.

Example 4: Convert $\frac{28}{3}$ into a mixed number.

Practice Problems Section 3A

Convert the following mixed numbers into improper fractions.

1. $3\frac{1}{6}$
2. $3\frac{4}{5}$
3. $1\frac{5}{8}$
4. $4\frac{3}{7}$
5. $8\frac{1}{4}$
6. $6\frac{3}{5}$
7. $10\frac{4}{9}$
8. $2\frac{1}{9}$
9. $12\frac{9}{10}$
10. $14\frac{1}{6}$
11. $8\frac{1}{9}$
12. $14\frac{3}{11}$
13. $2\frac{11}{12}$
14. $9\frac{7}{10}$
15. $15\frac{2}{7}$
16. $20\frac{3}{13}$
17. $14\frac{2}{9}$
18. $5\frac{6}{17}$
19. $12\frac{7}{8}$
20. $19\frac{3}{4}$
21. $7\frac{19}{21}$

Convert the following improper fractions into mixed numbers.

22. $\frac{15}{7}$ 23. $\frac{13}{2}$ 24. $\frac{19}{5}$

25. $\frac{16}{3}$ 26. $\frac{47}{8}$ 27. $\frac{21}{4}$

28. $\frac{17}{2}$ 29. $\frac{85}{7}$ 30. $\frac{87}{11}$

31. $\frac{93}{12}$ 32. $\frac{61}{7}$ 33. $\frac{29}{4}$

34. $\frac{83}{10}$ 35. $\frac{47}{2}$ 36. $\frac{41}{3}$

37. $\frac{133}{11}$ 38. $\frac{25}{6}$ 39. $\frac{98}{9}$

40. $\frac{38}{23}$ 41. $\frac{91}{18}$ 42. $\frac{127}{60}$

Draw fraction diagrams and write a few sentences explaining why the following improper fractions and mixed numbers are equal.

43. $2\frac{3}{5}=\frac{13}{5}$ 44. $3\frac{5}{6}=\frac{23}{6}$ 45. $4\frac{3}{7}=\frac{31}{7}$

46. $6\frac{1}{8}=\frac{49}{8}$ 47. $9\frac{7}{10}=\frac{97}{10}$ 48. $5\frac{2}{11}=\frac{57}{11}$

Section 3B – Simplifying and Equivalent Fractions

Another idea we need to review is the idea of equivalent fractions. Suppose I have $40 total and I spend $20 of it. So I have spent 20/40 of my money. But isn't $20 half of $40? Of course it is. In fact $\frac{20}{40}=\frac{1}{2}$. This is an example of equivalent fractions (fractions that look different but are actually equal). If you recall, ½ is actually called "simplest form" or "lowest terms" because ½ is simpler than 20/40. Let's see if we can make sense of the relationship between equal fractions. Notice if you multiply the numerator and denominator of a fraction by the same number you get an equal fraction. So we can see why ½ is the same as 20/40.

$\frac{1}{2}=\frac{1\times 20}{2\times 20}=\frac{20}{40}$. You can convert any fraction to an equal fraction with this principle.

Let's convert $\frac{5}{6}$ into an equal fraction with a denominator of 54. The denominator is 6 so what do we have to multiply 6 by to get 54? 9 of course. The key is that if I multiply the denominator by 9, then we should also multiply the numerator by 9. So we will get our equal fraction.

$$\frac{5}{6}=\frac{5\times 9}{6\times 9}=\frac{45}{54}$$

This is an important skill when we add and subtract fractions.

Try a couple of examples with your instructor.

Example 1: Convert $\frac{3}{7}$ into an equal fraction with a denominator of 28.

Example 2: Convert $\frac{5}{8}$ into an equal fraction with a denominator of 56.

We saw above that $\frac{45}{54}=\frac{5}{6}$, but which is in simplest form? 5/6 of course, but if we are given a fraction like 45/54, how can we find the simplest form? The key is dividing (canceling) common factors. Notice the following. We divided out any numbers that go into both the numerator and denominator.

$$\frac{45}{54}=\frac{45\div 9}{54\div 9}=\frac{5}{6}$$

Look at the following example. Write the fraction $\frac{24}{72}$ in simplest form. Are there any numbers that go into both 24 and 72? These are called common factors. How about 8? So we can divide out the 8 and the fraction will be simpler. The key is that you have to divide the top and bottom by the same number.

$$\frac{24}{72}=\frac{24\div 8}{72\div 8}=\frac{3}{9}$$

Is this in simplest form though? The fraction left is 3/9. Can you think of any numbers that go into both 3 and 9? What about 3? Then we can divide out the 3 as well.

$\frac{3}{9}=\frac{3\div 3}{9\div 3}=\frac{1}{3}$. There are no numbers that go into 1 and 3 besides 1. So we are at the simplest form.

Try the following examples with your instructor.

Example 3: Convert the fraction $\frac{28}{42}$ into simplest form.

Example 4: Convert the fraction $\frac{64}{72}$ into simplest form.

Practice Problems Section 3B

1. Convert $\frac{3}{4}$ into an equal fraction with a denominator of 28.

2. Convert $\frac{3}{5}$ into an equal fraction with a denominator of 15.

3. Convert $\frac{2}{3}$ into an equal fraction with a denominator of 36.

4. Convert $\frac{5}{7}$ into an equal fraction with a denominator of 21.

5. Convert $\frac{3}{11}$ into an equal fraction with a denominator of 66.

6. Convert $\frac{7}{9}$ into an equal fraction with a denominator of 72.

7. Convert $\frac{6}{13}$ into an equal fraction with a denominator of 39.

8. Convert $\frac{4}{7}$ into an equal fraction with a denominator of 63.

9. Convert $\frac{5}{8}$ into an equal fraction with a denominator of 24.

10. Convert $\frac{8}{15}$ into an equal fraction with a denominator of 75.

11. Convert $\frac{11}{21}$ into an equal fraction with a denominator of 84.

12. Convert $\frac{20}{27}$ into an equal fraction with a denominator of 243.

13. Convert $\frac{1}{16}$ into an equal fraction with a denominator of 64.

14. Convert $\frac{4}{49}$ into an equal fraction with a denominator of 98.

15. Convert $\frac{5}{32}$ into an equal fraction with a denominator of 192.

16. Convert $\frac{2}{13}$ into an equal fraction with a denominator of 104.

17. Convert $\frac{12}{23}$ into an equal fraction with a denominator of 69.

18. Convert $\frac{17}{19}$ into an equal fraction with a denominator of 76.

19. Convert $\frac{1}{30}$ into an equal fraction with a denominator of 120.

20. Convert $\frac{5}{22}$ into an equal fraction with a denominator of 154.

21. Convert $\frac{1}{28}$ into an equal fraction with a denominator of 56.

22. Convert $\frac{14}{15}$ into an equal fraction with a denominator of 45.

23. Convert $\frac{25}{31}$ into an equal fraction with a denominator of 310.

24. Convert $\frac{16}{27}$ into an equal fraction with a denominator of 108.

Convert the following fractions into simplest form.

25. $\frac{5}{20}$ 26. $\frac{14}{21}$ 27. $\frac{12}{24}$

28. $\frac{25}{30}$ 29. $\frac{35}{40}$ 30. $\frac{49}{84}$

31. $\frac{24}{90}$ 32. $\frac{30}{120}$ 33. $\frac{126}{144}$

34. $\frac{96}{108}$ 35. $\frac{180}{240}$ 36. $\frac{320}{4000}$

37. $\frac{34}{85}$ 38. $\frac{16}{56}$ 39. $\frac{121}{132}$

40. $\frac{18}{36}$ 41. $\frac{15}{69}$ 42. $\frac{48}{144}$

43. $\frac{33}{220}$ 44. $\frac{75}{240}$ 45. $\frac{28}{112}$

Section 3C – Decimal and Fraction Conversions

How about fraction and decimal conversions? We saw in the last chapter that we can convert a fraction into a decimal just by dividing the numerator by the denominator. Remember the denominator is the divisor, so it must go on the outside of the long division.

Also remember that some fractions convert into a repeating decimals. Look at the example of 2/11. We just need to divide 2 by 11.

$$
\begin{array}{r}
0.181818 \\
11\overline{)\,2.000000} \\
\underline{-11} \\
\quad 90 \\
\underline{-88} \\
\quad\;\; 20 \\
\underline{-11} \\
\quad\;\; 90
\end{array}
$$

Notice 2/11 = 0.18181818… = $0.\overline{18}$ Remember to put a bar over the repeating part. Note: 2/11 is <u>not</u> 0.18 or 0.1818 since these are terminating decimals. 2/11 is equivalent to an infinitely repeating decimal. Similarly the fraction 1/3 is not 0.3, 0.33 or 0.333 . These decimals terminate. 1/3 = 0.333333333… = $0.\overline{3}$ Remember the bar over the number means that those digits continue forever.

Converting mixed numbers into decimals is not much more difficult than converting proper fractions into decimals. The whole part of a mixed number is the same as the digits to the left of the decimal point. So just convert the fraction part into a decimal and add it to the whole part.

For example suppose we want to convert the mixed number $9\frac{3}{5}$ into a decimal. Notice 3/5 means $3 \div 5$. If we divide 3 by 5, remember the number dividing by goes on the outside of the long division. So we get the following. Notice 3/5 is the same as 0.6 as a decimal.

$$
\begin{array}{r}
.6 \\
5\overline{)3.0} \\
\underline{-\,30} \\
\quad 0
\end{array}
$$

Now the whole part of the mixed number 9 is the same as the digit to the left of the decimal.

So $9\frac{3}{5} = 9 + \frac{3}{5} = 9 + 0.6 = 9.6$

Try the following examples with your instructor.

Example 1: Convert the fraction $\frac{1}{6}$ into a decimal. (Put a bar over any repeating digits.)

Example 2: Convert the fraction $\frac{7}{8}$ into a decimal.

Example 3: Convert the mixed number $7\frac{5}{33}$ into a decimal. Hint: Just convert the fraction 5/33 into a decimal and add it to the 7 by putting a 7 in the ones place. (Don't forget to put a bar over any repeating digits.)

What about converting a decimal into a fraction? Decimal to fraction conversions stem on the idea of understanding decimal places. Remember 0.7 means 7 tenths since it ends in the tenths place. So 0.7 = 7/10. When we write a fraction, we are often asked to write our answer in simplest form. Notice 7/10 is in simplest form since there are no numbers that go into 7 and 10 except the number 1. What about converting 0.024 into a fraction? The fraction ends in the thousandths place so 0.024 = 24/1000. Dividing the numerator and denominator by 8 gives us the simplest form of 3/125.

Try these examples with your instructor also.

Example 4: Convert the decimal 0.26 into a fraction in simplest form.

Example 5: Convert the decimal 0.044 into a fraction in simplest form.

Practice Problems Section 3C

Convert the following fractions and mixed numbers into decimals. Don't forget to put a bar over any repeating parts.

1. $\frac{3}{4}$
2. $\frac{7}{16}$
3. $\frac{2}{9}$
4. $\frac{1}{20}$
5. $\frac{5}{6}$
6. $\frac{7}{9}$
7. $\frac{7}{8}$
8. $\frac{3}{32}$
9. $\frac{5}{18}$
10. $\frac{7}{18}$
11. $\frac{11}{25}$
12. $\frac{13}{16}$
13. $\frac{5}{7}$
14. $\frac{16}{33}$
15. $\frac{7}{36}$
16. $\frac{17}{80}$
17. $\frac{17}{18}$
18. $\frac{11}{72}$
19. $9\frac{1}{2}$
20. $6\frac{1}{5}$
21. $9\frac{2}{3}$
22. $3\frac{1}{8}$
23. $5\frac{4}{15}$
24. $1\frac{5}{18}$
25. $14\frac{7}{32}$
26. $2\frac{1}{12}$
27. $20\frac{4}{7}$
28. $16\frac{3}{32}$
29. $11\frac{1}{15}$
30. $9\frac{32}{33}$

Convert the following decimals into fractions or mixed numbers in simplest form.

31. 0.75	32. 0.07	33. 0.6
34. 0.005	35. 0.24	36. 0.066
37. 0.13	38. 0.048	39. 0.35
40. 0.0018	41. 0.078	42. 0.42
43. 0.00026	44. 0.092	45. 0.85
46. 0.0054	47. 0.128	48. 0.032
49. 14.5	50. 8.25	51. 9.72
52. 6.084	53. 20.38	54. 13.8
55. 4.0002	56. 7.065	57. 5.44
58. 136.99	59. 2.0055	60. 14.828
61. 9.62	62. 44.076	63. 16.033

Section 3D – Formulas with Multiplying and Dividing Fractions

A common formula in geometry is the volume of a cone $V = \frac{1}{3}\pi r^2 h$ where *r* is the radius and *h* is the height. A common approximation is $\pi \approx \frac{22}{7}$. Suppose we want to find the volume of a cone with a radius of 5 in and a height of 21 inches. As you can see, to do this type of problem will require us to multiply fractions. Let's review multiplying and dividing fractions.

Remember, to multiply two fractions, simply multiply the numerators and multiply the denominators and simplify your answer.

For example look at $\frac{1}{5}\times\frac{2}{3}$. Multiplying the numerators and denominators gives us the following: $\frac{1}{5}\times\frac{2}{3}=\frac{1\times 2}{5\times 3}=\frac{2}{15}$ Notice the answer is already in simplest form since there are no common factors between 2 and 15.

Let's look at another example. $\frac{10}{27}\times\frac{9}{5}$. Multiplying the numerators and denominators gives us $\frac{10}{27}\times\frac{9}{5}=\frac{10\times 9}{27\times 5}=\frac{90}{135}$. This is not in simplest form since 9 and 5 both go into the numerator and denominator. So let's simplify the answer. $\frac{90\div 5}{135\div 5}=\frac{18}{27}=\frac{18\div 9}{27\div 9}=\frac{2}{3}$.

An easier way to do the problem would have been to cancel the common factors first. Here is how to do the problem by cancelling common factors.

$$\frac{10}{27}\times\frac{9}{5}=\frac{10\times 9}{27\times 5}=\frac{\cancel{5}^{1}\times 2\times\cancel{9}^{1}}{3\times\cancel{9}\times\cancel{5}}=\frac{2}{3}$$

The volume formula above had a square in it, but how do we square or cube a fraction? Remember exponents just mean repeat multiplication. Look at the following example:

$$\left(\frac{3}{5}\right)^2=\frac{3}{5}\times\frac{3}{5}=\frac{9}{25}$$

Try the following multiplication problems with your instructor and simplify your answers.

Example 1: $\frac{3}{16}\times\frac{8}{9}$

Example 2: $\frac{7}{30}\times\frac{12}{35}$

Example 3: Are we ready to try the formula problem from the beginning of the section? Use the formula $V=\frac{1}{3}\pi r^2 h$ and $\pi\approx\frac{22}{7}$ to find the volume of a cone with a radius of 5 inches and a height of 21 inches. Remember to do the exponent before multiplying.

A common application of multiplying fractions is when we need to find a fraction of a total. To find a fraction of a total, we simply multiply the fraction times the total and simplify.

For example suppose we want to find three-fourths of $3000. All we need to do is multiply the fraction 3/4 times 3000. Remember 3000 can be written as the fraction 3000/1. Multiplying the fractions, we get the following:

$$\frac{3}{4}\times 3000=\frac{3}{4}\times\frac{3000}{1}=\frac{9000}{4}=\$2250$$

So three-fourths of $3000 is $2,250.

Try the following example with your instructor.

Example 4: About three-fifths of all students at a college are said to have part-time employment. If the college has a total of 4800 students, approximately how many students have a part time job?

What about dividing fractions? To divide fractions we multiply by the reciprocal. If you remember, the reciprocal is flipping the fraction. So to divide fractions we flip the divisor (second fraction) and multiply. Look at the example.

$\frac{9}{10}\div\frac{3}{8}=\frac{9}{10}\times\frac{8}{3}=\frac{72}{30}$. This is not in simplest form since the numerator and denominator have a common factor of 6. Dividing the 6 gives us the answer in simplest form. $\frac{72\div6}{30\div6}=\frac{12}{5}=2\frac{2}{5}$.

Try a couple of division problems with your instructor.

Example 5: $\frac{4}{9}\div\frac{7}{3}$

Example 6: $\frac{9}{14}\div 18$

Practice Problems Section 3D

Multiply or divide the following fractions and put your answer in simplest form. If your answer is an improper fraction, convert that to a mixed number also.

1. $\frac{1}{5}\times\frac{3}{16}$
2. $\frac{2}{7}\times\frac{4}{9}$
3. $\frac{5}{13}\times\frac{1}{6}$
4. $\frac{11}{15}\div\frac{2}{9}$
5. $\frac{8}{15}\div\frac{7}{11}$
6. $\frac{3}{5}\div 14$
7. $\frac{4}{25}\times\frac{15}{16}$
8. $\frac{9}{22}\times\frac{6}{7}$
9. $\frac{3}{28}\times\frac{7}{12}$
10. $\frac{3}{4}\times\frac{8}{9}$
11. $\frac{3}{5}\times\frac{10}{9}$
12. $\frac{2}{3}\times\frac{3}{5}$
13. $\frac{4}{5}\div\frac{8}{15}$
14. $\frac{10}{21}\div\frac{5}{7}$
15. $\frac{5}{6}\div 10$
16. $\frac{2}{5}\times\frac{7}{9}$
17. $\frac{8}{21}\times\frac{7}{4}$
18. $\frac{1}{7}\times\frac{5}{6}$
19. $\frac{6}{17}\div\frac{4}{51}$
20. $\frac{7}{13}\div\frac{21}{26}$
21. $27\div\frac{9}{10}$

22. $\frac{3}{4}\times\frac{20}{27}$

23. $\frac{7}{16}\times\frac{8}{9}$

24. $\frac{2}{9}\times\frac{3}{16}$

25. $\frac{7}{18}\div\frac{14}{9}$

26. $\frac{11}{25}\div\frac{22}{125}$

27. $\frac{12}{25}\div 6$

28. $\frac{6}{49}\times\frac{7}{9}$

29. $\frac{16}{27}\times\frac{18}{8}$

30. $\frac{2}{21}\times\frac{14}{8}$

31. $\frac{13}{17}\div\frac{39}{85}$

32. $\frac{15}{28}\div 30$

33. $18\div\frac{27}{40}$

The following problems involve taking a fraction of a total. Remember, just multiply the fraction times the total and simplify.

34. Maria owed a total of $12,000 in student loans. She has paid two-thirds of the loan. How much has she paid? How much is left?

35. It is estimated that 9/10 of children in the U.S. have had their vaccinations. If there are a total of 23,400 children in a small town, how many of them are estimated to have had their vaccinations? How many have not had their vaccinations?

36. Ricky is a boy scout and is selling popcorn to raise money. It has been his experience that about $\frac{2}{5}$ of the people he talks to will buy popcorn. If Ricky talks to 140 people on Saturday, how many does he expect to buy popcorn?

37. Trevor wants to purchase a car for $24,600 , but the car company wants one-twelfth of the money up front. How much money will Trevor need to pay up front?

Use the formula for the volume of a cone $V=\frac{1}{3}\pi r^2 h$ and the approximation $\pi\approx\frac{22}{7}$ to find the following. Don't forget to do exponents before multiplication. Simplify your answers.

38. Find the volume of a cone with a radius of 7 in and a height of 12 in.

39. Find the volume of a cone with a radius of 24 cm and a height of 14 cm.

40. Find the volume of a cone with a radius of 10 feet and a height of 21 feet.

41. The distance around a circle is called the circumference and is given by the formula $C=2\pi r$ where *r* is the radius. A track is in the shape of a circle with a radius of 98 feet. Find the distance around the circle. Use the approximation $\pi\approx\frac{22}{7}$.

Section 3E – Formulas with Multiplying and Dividing Mixed Numbers

A recipe calls for $5\frac{3}{4}$ cups of flour, but Julie wants to make only half of the recipe. We learned in the last section that to take a fraction of a number, we need to multiply the fraction by the number. So it stands to reason that Julie will need to multiply 1/2 times the mixed number $5\frac{3}{4}$. We see that to figure out how much flour Julie needs, we will need to review multiplying and dividing mixed numbers.

To multiply or divide mixed numbers, we need to first convert them to improper fractions. Multiply or divide the fractions, simplify, and then if needed convert your answer back into a mixed number.

Look at the problem $5\frac{5}{8} \div 6\frac{2}{3}$. We first convert the mixed numbers into fractions. Remember we multiply the whole part times the denominator and then add the numerator. So $5\frac{5}{8} = \frac{5\times 8+5}{8} = \frac{45}{8}$ and $6\frac{2}{3} = \frac{6\times 3+2}{3} = \frac{20}{3}$. Hence $5\frac{5}{8} \div 6\frac{2}{3} = \frac{45}{8} \div \frac{20}{3}$.

Now we multiply by the reciprocal of the divisor and simplify.

$$\frac{45}{8} \div \frac{20}{3} = \frac{45}{8} \times \frac{3}{20} = \frac{\cancel{5}^{1} \times 9 \times 3}{8 \times \cancel{5} \times 4} = \frac{27}{32}.$$

<u>Try the following examples with your instructor</u>.

Example 1: $2\frac{5}{8} \times 7\frac{1}{3}$

Example 2: $1\frac{7}{9} \div 4\frac{2}{3}$

Practice Problems Section 3E

Multiply or divide the following mixed numbers. Write answers as a simplified proper fraction or as a mixed number.

1. $6\frac{1}{8}\times 2\frac{2}{7}$
2. $3\frac{1}{6}\div 6\frac{1}{3}$
3. $10\frac{1}{2}\times 3\frac{5}{14}$
4. $8\frac{2}{5}\div 2\frac{1}{10}$
5. $6\frac{1}{4}\div 9\frac{3}{8}$
6. $1\frac{5}{16}\div 4\frac{1}{12}$
7. $10\frac{2}{5}\times 3\frac{1}{10}$
8. $7\frac{3}{14}\div 1\frac{1}{21}$
9. $8\frac{1}{15}\times 2\frac{2}{9}$
10. $2\frac{5}{8}\times 7\frac{1}{3}$
11. $1\frac{7}{9}\div 4\frac{2}{3}$
12. $7\frac{1}{5}\times 6\frac{1}{9}$
13. $3\frac{3}{5}\div 2\frac{1}{10}$
14. $5\frac{5}{6}\div 12\frac{2}{3}$
15. $3\frac{3}{4}\div 5\frac{1}{15}$
16. $4\frac{3}{8}\times 2\frac{2}{7}$
17. $9\frac{1}{6}\times 11\frac{2}{5}$
18. $7\frac{3}{5}\times 2\frac{2}{19}$
19. $3\frac{1}{4}\times 1\frac{3}{13}$
20. $5\frac{2}{11}\div 4\frac{3}{4}$
21. $11\frac{1}{4}\div 6\frac{2}{3}$
22. $6\frac{1}{8}\times 12\frac{4}{7}$
23. $6\frac{1}{9}\div 7\frac{1}{3}$
24. $9\frac{5}{8}\div 2\frac{3}{4}$
25. $2\frac{5}{8}\times 13\frac{1}{3}$
26. $3\frac{1}{12}\div 5\frac{1}{6}$
27. $10\frac{1}{8}\div 18$

Are you ready to help Julie? Remember Julie needs to figure out half of the amounts in her recipe. Multiply all of the recipe amounts by 1/2.

28. Help Julie find $\frac{1}{2}$ of $5\frac{3}{4}$ cups of flour.

29. Help Julie find $\frac{1}{2}$ of $2\frac{1}{4}$ cups of sugar.

30. Help Julie find $\frac{1}{2}$ of $3\frac{1}{4}$ teaspoons of nutmeg.

Tyra owns a cupcake shop. Tyra has a great recipe for double chocolate cupcakes. Tyra need to make 4 times the number of cupcakes that the recipe makes. Her cupcake shop is busy. Help Tyra by multiplying all of the recipe amounts by 4.

31. Help Tyra by finding 4 times $2\frac{2}{3}$ cups of sugar.

32. Help Tyra by finding 4 times $4\frac{1}{5}$ cups of flour.

33. Help Tyra by finding 4 times $1\frac{3}{4}$ cups of cocoa powder.

34. The distance around a circle is called the circumference and is given by the formula $C = 2\pi r$. Juan raises horses and is building a fence around a circular region on his property with a radius of $30\frac{5}{8}$ meters. Find the distance around the circle. Use the approximation $\pi \approx \frac{22}{7}$. Write your answer as a mixed number.

35. The volume of a square based pyramid is given by the formula $V = \frac{1}{3}s^2h$ where *s* is the side of the base and *h* is the height of the pyramid. Find the volume of a pyramid if one of the sides is 100 feet long and the pyramid is 36 feet tall.

Section 3F – Unit Conversions

If you talked to most science teachers, one of the things they need their students to do is to be able to convert from one unit of measurement to another. For example, in a physics class, it is common to need to convert from miles per hour (mph) to feet per second (fps). How do we convert units? If you know about fractions, you can convert to any unit you need to.

To convert units, take two quantities that are equal and make a fraction out of them. This is sometimes called a unit fraction because it equals one. The key is you can use the unit fraction to convert units. Let's look at an example.

Suppose we want to convert 34 feet into inches. Start with the two equal quantities. How many inches in a foot? 12. So we know that 1 ft = 12 in. We can make two unit fractions out of the equal quantities $\frac{1\ ft}{12\ in}$ or $\frac{12\ in}{1\ ft}$. Now start with the quantity we want to convert (34 ft). We want to multiply 34 ft by one of the two unit fractions. <u>The key though is we need the units to cancel.</u> So we need to pick the unit fraction that has feet in the denominator. Now multiply by the unit fraction and simplify. Your conversion is complete.

$$34\ ft \times \frac{12\ in}{1\ ft} = 34\ \cancel{ft} \times \frac{12\ in}{1\ \cancel{ft}} = \frac{34}{1} \times \frac{12\ in}{1} = \frac{34 \times 12\ in}{1 \times 1} = \frac{408}{1}\ in = 408\ in$$

Notice that the key was to cancel the feet and be left with inches. This process of cancelling units is often called dimensional analysis. Once we cancelled the units, we just needed to multiply the fractions and simplify. Remember if you are multiplying a whole number, such as 34, times a fraction, we can rewrite the 34 as a fraction $\frac{34}{1}$. This is also a common technique when converting units.

Let's look at a second example: Suppose we have 10.5 cups of solution in our chemistry class. How many liters is this? To convert the units, we need to know how many cups are in 1 Liter. You can often look these quantities up in a book or online. We found that $1\ Liter \approx 4.2\ cups$. Let's use this to make the conversion.

Again, first use the equal quantities to make a unit fraction. Since we are trying to convert cups to something else, we need a unit fraction with cups in the denominator. $\left(\frac{1\ Liter}{4.2\ cups}\right)$

Now all we have to do is multiply the 10.5 cups by our unit fraction.

$$10.5\ cups \times \frac{1\ L}{4.2 cups} = 10.5\ \cancel{cups} \times \frac{1\ L}{4.2\ \cancel{cups}} = \frac{10.5}{1} \times \frac{1}{4.2}\ L = \frac{10.5 \times 1}{1 \times 4.2}\ L = \frac{10.5}{4.2}\ L = 2.5\ L$$

Notice again, we cancelled the cups and were left with units. We wrote the decimal 10.5 as a fraction $\frac{10.5}{1}$ and then multiplied the fractions. Notice to simplify at the end we needed to divide decimals.

Now you try a few examples with your instructor.

Example 1: 1 cup = 8 fluid ounces. Use this information to convert 140 fluid ounces into cups. Write your answer as a mixed number.

Example 2: 1 mile = 5280 feet. Use this information to convert $5\frac{3}{4}$ miles into feet.

Example 3: Are you ready to do the physics conversion in the beginning of this section? A car is driving 60 mph down the freeway. How fast is this in feet per second (fps)? We looked up the conversion online and found that 1 mph = 1.47 fps. Write your answer as a decimal.

Practice Problems Section 3F

1. Convert $3\frac{1}{4}$ feet into inches. (1 ft = 12 in)

2. Convert 54 inches into feet. Write your answer as a mixed number. (1 ft = 12 in)

3. Convert 3.2 kilograms into grams. (1 kg = 1000 g)

4. Convert 4600 grams into kilograms. (1 kg = 1000 g)

5. Convert 22 quarts into gallons. Write your answer as a mixed number. (1 gal = 4 qt)

6. Convert $4\frac{3}{4}$ gallons into quarts. (1 gal = 4 qt)

7. Convert $3\frac{3}{4}$ tons into pounds. (1 ton = 2000 pounds)

8. Convert 3500 pounds into tons. Write your answer as a mixed number.
(1 ton = 2000 pounds)

9. Convert 10.5 inches into centimeters. $(1\ in \approx 2.54\ cm)$ Write your answer as a decimal.

10. Convert 41.91 centimeters into inches. $(1\ in \approx 2.54\ cm)$ Write your answer as a decimal.

11. Convert 58.8 feet per second into miles per hour. (1 mph = 1.47 fps)

12. Convert 65 miles per hour into feet per second. Write your answer as a decimal
(1 mph = 1.47 fps)

13. Convert 2.468 grams into milligrams. (1 g = 1000 mg)

14. Convert 759 milligrams into grams. Write your answer as a decimal. (1 g = 1000 mg)

15. Convert 15.4 pounds into kilograms. (1 kg = 2.2 pounds)

16. Convert 25 kilograms into pounds. (1 kg = 2.2 pounds)

17. Convert 80 kilometers per hour into miles per hour. (1 kph = 0.62 mph)

18. Convert 31 miles per hour into kilometers per hour. (1 kph = 0.62 mph)

19. Convert $7\frac{2}{3}$ feet into yards. Write your answer as a mixed number. (3 ft = 1 yd)

20. Convert $4\frac{1}{3}$ yards into feet. (3 ft = 1 yd)

21. Convert 5,600 milliLiters into Liters. Write your answer as a decimal. (1 L = 1000 mL)

22. Convert 8.25 Liters into milliLiters. (1 L = 1000 mL)

23. Convert $7\frac{1}{4}$ quarts into cups. (1 quart = 4 cups)

24. Convert $13\frac{1}{2}$ cups into quarts. Write your answer as a mixed number. (1 quart = 4 cups)

25. Convert 3,500 pounds into tons. (1 ton = 2000 pounds)
Write your answer as a mixed number.

26. Convert 2.75 tons into pounds. (1 ton = 2000 pounds)
Write your answer as a mixed number.

27. Convert 21.59 centimeters into meters. Write your answer as a decimal. (1 m = 100 cm)

28. Convert 3.6 meters into centimeters. (1 m = 100 cm)

29. Convert 65 miles per hour into feet per second. (1 mph = 1.47 fps)

30. Convert 3450.8 milligrams into grams. (1 g = 1000 mg)

31. Convert 10.6 kilograms into pounds. (1 kg = 2.2 pounds) Write your answer as a decimal.

32. Convert 52.7 miles per hour into kilometers per hour. (1 kph = 0.62 mph)

33. Convert $5\frac{3}{4}$ yards into inches. (1 yard = 36 inches)

34. Convert 126 inches into yards. Write your answer as a mixed number. (1 yard = 36 inches)

35. Convert 80 kilometers per hour into feet per second. Write your answer as a decimal. $(1\ kph \approx 0.911\ fps)$

36. Convert 25 meters into feet. Write your answer as a decimal. $(1\ m \approx 3.28\ ft)$

37. Convert 175 meters into feet. Write your answer as a decimal. $(1\ m \approx 3.28\ ft)$

38. Convert 150.88 feet into meters. $(1\ m \approx 3.28\ ft)$

39. In hospitals, another name for a milliliter is a "CC" (cubic centimeter). A nurse gives fluid to a patient at the rate of 1.5 Liters per hour. How many CC's per minute is this? To set this up, complete the following fraction problem. Make sure to cancel the units.

$$\frac{1.5\text{ L}}{1\text{ hour}} \times \frac{1000\text{ CC}}{1\text{ L}} \times \frac{1\text{ hour}}{60\text{ min}} = ??$$

40. Let's try another hospital problem. A nurse needs to give a patient 4.5 Liters of fluid in 6 hours. How many CC's per minute is this? To set this up, complete the following fraction problem. Make sure to cancel the units. Write your answer as a decimal.

$$\frac{4.5\text{ L}}{6\text{ hour}} \times \frac{1000\text{ CC}}{1\text{ L}} \times \frac{1\text{ hour}}{60\text{ min}} = ??$$

Section 3G – Adding and Subtracting Fractions

Lizzy has $\frac{1}{4}$ pound of sugar left in one bag and $\frac{2}{3}$ pound of sugar in another bag. How much total sugar does she have? Questions like this are why we need to know how to add and subtract fractions.

Let's review. Remember the denominator of a fraction is how many parts one whole is cut up into and the numerator is the number of parts you have. So if a pizza is cut up into 10 pieces and we now have 3 pieces left, then we have 3/10 of the pizza left. So suppose two medium pizzas were each cut into 10 pieces. We have 3 pieces left in the first pizza and 2 pieces left from the second pizza. How much pizza do we have left total?

$$\frac{3}{10}+\frac{2}{10}$$

First of all notice that the pieces are the same size. That is critical. We would not want to have 1 giant piece of pizza and 1 tiny small piece of pizza and say we have 2 pieces. To add the pieces we need to have the same size piece. In fractions, that means the fractions need to have the same denominator. This problem does. How many total pieces do we have? 3+2=5.

$$\frac{3}{10}+\frac{2}{10}=\frac{3+2}{10}=\frac{5}{10}=\frac{1}{2}$$

The first key is that we do not add the denominators. The denominator is how many pieces 1 piece is cut up into. We did not cut the pizza into 20 pieces, it was cut up into 10 pieces. So the denominator stays the same. We add the numerators and keep the denominator the same. At the end we put the answer in simplest form (1/2).

What do we do if the pizzas are not cut into the same number of pieces? Suppose one pizza was cut into 10 pieces and the other was cut into 4 pieces. We cannot add the pieces because they are not the same size. To make them the same size we can take the 10 piece pizza and cut all of the pieces in half (20 total pieces). We can take the 4 piece pizza and cut all those pieces into 5 pieces each. (That also gives 20 pieces). This is the concept behind getting a common denominator. Let's look at an example. Let's suppose we have 3/10 of the pizza left, but now we want to eat ¼ of the pizza. How much will be left?

$\frac{3}{10}-\frac{1}{4}$. We first find the common denominator. This is the Least Common Multiple of the denominators. So we need the smallest number that 4 and 10 divide evenly into. We see from the last example that this is 20. Now we convert both fractions into equal fractions with 20 as the denominator.

$$\frac{3\times 2}{10\times 2}-\frac{1\times 5}{4\times 5}=\frac{6}{20}-\frac{5}{20}$$

Now that they have the same denominator (each piece is 1/20 of the pizza), we can subtract. Remember we keep the denominator the same.

$\frac{6}{20}-\frac{5}{20}=\frac{1}{20}$. There will be 1 piece left.

Try a couple examples with your instructor.

Example 1: $\frac{3}{5}+\frac{4}{7}$ (Write your answer as a mixed number and simplify if needed.)

Example 2: $\frac{7}{12}-\frac{1}{8}$ (Simplify your answer if needed.)

Practice Problems Section 3G

For #1-24, perform the indicated operation and write your answers in simplest form. If an answer is improper, convert it into a mixed number.

1. $\frac{5}{8}+\frac{3}{8}$
2. $\frac{5}{14}+\frac{1}{14}$
3. $\frac{5}{18}+\frac{7}{18}$
4. $\frac{7}{12}-\frac{1}{12}$
5. $\frac{5}{6}-\frac{1}{6}$
6. $\frac{17}{30}-\frac{7}{30}$
7. $\frac{1}{3}+\frac{4}{5}$
8. $\frac{1}{2}+\frac{3}{11}$
9. $\frac{5}{8}+\frac{2}{7}$
10. $\frac{9}{10}-\frac{5}{12}$
11. $\frac{11}{12}-\frac{1}{3}$
12. $\frac{13}{20}-\frac{2}{15}$
13. $\frac{2}{11}+\frac{3}{7}$
14. $\frac{5}{6}+\frac{2}{3}$
15. $\frac{3}{5}+\frac{2}{9}$
16. $\frac{7}{18}-\frac{1}{4}$
17. $\frac{5}{9}-\frac{1}{6}$
18. $\frac{7}{10}-\frac{3}{14}$

19. $\frac{5}{8}+\frac{3}{5}$

20. $\frac{5}{12}+\frac{4}{9}$

21. $\frac{5}{14}+\frac{3}{10}$

22. $\frac{10}{21}-\frac{5}{12}$

23. $\frac{9}{11}+\frac{1}{4}$

24. $\frac{9}{14}-\frac{1}{16}$

25. $\frac{5}{8}+\frac{2}{5}$

26. $\frac{1}{9}+\frac{3}{4}$

27. $\frac{6}{35}+\frac{2}{14}$

28. $\frac{5}{12}-\frac{1}{21}$

29. $\frac{7}{24}-\frac{5}{36}$

30. $\frac{17}{22}-\frac{4}{33}$

31. $\frac{8}{25}+\frac{3}{10}$

32. $\frac{9}{13}+\frac{1}{6}$

33. $\frac{4}{9}-\frac{5}{72}$

34. $\frac{15}{16}-\frac{3}{32}$

35. $\frac{17}{19}-\frac{1}{2}$

36. $\frac{17}{18}-\frac{14}{27}$

37. $\frac{13}{80}+\frac{33}{50}-\frac{3}{40}$

38. $\frac{99}{100}-\frac{4}{25}-\frac{3}{10}$

39. $\frac{64}{77}+\frac{2}{11}-\frac{3}{7}$

40. $\frac{19}{21}-\frac{7}{12}+\frac{2}{3}$

41. $\frac{2}{15}+\frac{11}{24}-\frac{1}{18}$

42. $\frac{7}{8}-\frac{3}{16}-\frac{1}{24}$

43. Are you ready to help Lizzy? Remember she has $\frac{1}{4}$ pound of sugar left in one bag and $\frac{2}{3}$ pound of sugar in another bag. How much total sugar does she have?

44. Jim ran 3/4 of a mile on Monday but only 1/5 of a mile on Tuesday. How much farther did he run on Monday than Tuesday?

45. Three boards are nailed together when making a cabinet. The first board has a width of $\frac{3}{8}$ inch, the second board has a width of $\frac{1}{2}$ inch and the third board has a width of $\frac{1}{4}$ inch. What is the total width of the three boards nailed together? Write your answer as a mixed number.

Section 3H – Adding and Subtracting Mixed Numbers

A chef has $3\frac{1}{4}$ pounds of custard. If she uses $1\frac{4}{5}$ pounds of custard in making deserts, how many pounds of custard does she have left? Applications like this are why we need to review how to add and subtract mixed numbers.

Remember, a mixed number is whole number added to a fraction. So when we add or subtract mixed numbers, we need to add or subtract the fraction parts and add or subtract the whole parts.

For example look at the following example.

$6\frac{4}{5}+2\frac{2}{3}$. To add the fraction parts we are going to need a common denominator. The smallest number that 3 and 5 divide evenly is 15. Converting both fractions into equal fractions with a common denominator of 15 gives the following.

$6\frac{4}{5}+2\frac{2}{3}=6\frac{12}{15}+2\frac{10}{15}$. Now add the whole parts and the fraction parts. Remember when adding fractions, add the numerators and keeping the denominator the same.

$6\frac{4}{5}+2\frac{2}{3}=6\frac{12}{15}+2\frac{10}{15}=8\frac{22}{15}$. We are almost done. The answer is not a mixed number since the fraction part is improper. We can fix this by converting the improper fraction 22/15 back into a mixed number and then adding the 8.

$8\frac{22}{15}=8+1\frac{7}{15}=8+1+\frac{7}{15}=9\frac{7}{15}$.

Let's look at the custard example from the beginning of this section. Since she used up some custard, the problem is subtraction.

$3\frac{1}{4}-1\frac{4}{5}$. Again, we need a common denominator in order to subtract the fraction parts. The smallest number that 4 and 5 divide evenly is 20, so let's make the fractions into equal fractions with a denominator of 20. We can multiply the ¼ top and bottom by 5. We can multiply the 4/5 top and bottom by 4.

$3\frac{1}{4}-1\frac{4}{5}=3\frac{5}{20}-1\frac{16}{20}$. Now we have a problem. Did you notice? We cannot take 16/20 away if we only have 5/20. We will need to borrow. Borrow one from the 3 and add it to the ¼. Then convert into an improper fraction. Now we can subtract.

$3\frac{5}{20}-1\frac{16}{20}=\left(2+1\frac{5}{20}\right)-1\frac{16}{20}=2\frac{25}{20}-1\frac{16}{20}=1\frac{9}{20}$

Try a few examples with your instructor.

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

Example 2: $8\frac{2}{7}-3\frac{5}{14}$

Example 3: $9-4\frac{3}{5}$ (Borrow 1 from the 9 and change the 1 to 5/5)

Practice Problems Section 3H

For #1-21, perform the indicated operation and write your answers in simplest form. If an answer is improper, convert it into a mixed number.

1. $3\frac{2}{5}+7\frac{1}{5}$
2. $8\frac{1}{7}+3\frac{6}{7}$
3. $4\frac{1}{5}-3\frac{8}{15}$
4. $4\frac{11}{12}-1\frac{1}{4}$
5. $7\frac{8}{13}-5\frac{1}{2}$
6. $4\frac{1}{5}-1\frac{3}{5}$
7. $10\frac{1}{3}+6\frac{4}{5}$
8. $4+8\frac{4}{13}$
9. $7\frac{5}{6}+\frac{3}{4}$
10. $8\frac{2}{5}+9\frac{3}{4}$
11. $4\frac{1}{6}-3\frac{2}{7}$
12. $6\frac{3}{5}+7\frac{13}{15}$
13. $6\frac{7}{18}-2\frac{1}{2}$
14. $8\frac{5}{9}-7\frac{5}{6}$
15. $4\frac{7}{10}-1\frac{3}{14}$
16. $12\frac{4}{7}+3\frac{2}{3}$
17. $16+8\frac{3}{11}$
18. $5\frac{5}{6}+\frac{5}{7}$

19. $5\frac{3}{11}-1\frac{7}{12}$

20. $8-3\frac{1}{5}$

21. $9-7\frac{2}{15}$

22. $2\frac{3}{8}+7\frac{11}{12}$

23. $12-3\frac{5}{11}$

24. $16\frac{1}{6}-7\frac{14}{15}$

25. $10\frac{4}{13}+\frac{9}{10}$

26. $14\frac{7}{15}-3\frac{5}{6}$

27. $24-18\frac{7}{16}$

28. $1\frac{19}{20}+15\frac{7}{18}$

29. $35+21\frac{13}{17}$

30. $\frac{15}{16}+9\frac{2}{5}$

31. $5\frac{1}{10}-2\frac{13}{15}$

32. $17-4\frac{3}{13}$

33. $14-9\frac{1}{6}$

34. During a triathlon, Jeremy swam $2\frac{1}{3}$ miles, biked $97\frac{1}{4}$ miles, and ran $22\frac{1}{2}$ miles. What was the total distance he traveled swimming, biking and running? Write your answer as a mixed number.

35. In chemistry class, Lacy has a bottle of $2\frac{1}{4}$ Liters of hydrochloric acid. If she used $1\frac{1}{3}$ Liters in a chemical reaction experiment, how much is left in the bottle?

36. Marcy is a pastry chef at a restaurant. At the start of the day, Marcy had $45\frac{1}{3}$ cups of flour. While baking, she has used $18\frac{3}{4}$ cups of flour. How much flour is left?

Chapter 3 Review

In chapter 3 we reviewed fraction and mixed number conversions. We also reviewed how to add, subtract, multiply and divide fractions and mixed numbers. We learned that to multiply or divide fractions, we did not need a common denominator, but to add or subtract fractions, we did. We learned about equivalent fractions and how to find the simplest form. We also looked at several applications of fractions and mixed numbers.

Chapter 3 Review Problems

Convert the following mixed numbers into improper fractions:

1. $5\frac{4}{9}$ 2. $6\frac{2}{7}$ 3. $8\frac{7}{11}$ 4. $5\frac{15}{16}$

Convert the following improper fractions into mixed numbers.

5. $\frac{47}{6}$ 6. $\frac{85}{9}$ 7. $\frac{93}{7}$ 8. $\frac{124}{11}$

9. Convert $\frac{5}{12}$ into an equal fraction with a denominator of 96.

10. Convert $\frac{5}{8}$ into an equal fraction with a denominator of 120.

11. Convert $\frac{13}{21}$ into an equal fraction with a denominator of 63.

12. Convert $\frac{10}{27}$ into an equal fraction with a denominator of 162.

Convert the following fractions into simplest form.

13. $\frac{75}{90}$ 14. $\frac{48}{108}$ 15. $\frac{64}{112}$ 16. $\frac{28}{126}$

Convert the following fractions and mixed numbers into a decimal. (Don't forget to put a bar over any repeating parts.)

17. $\frac{3}{16}$ 18. $\frac{17}{33}$ 19. $4\frac{17}{25}$ 20. $9\frac{7}{18}$

Perform the following operations. Convert any improper fraction answers into mixed numbers and write all fraction answers in simplest form.

21. $\frac{8}{11}\times\frac{33}{32}$

22. $\frac{7}{15}\times\frac{20}{49}$

23. $\frac{6}{25}\times\frac{15}{18}$

24. $\frac{8}{21}\times\frac{30}{44}$

25. $\frac{25}{18}\div\frac{5}{9}$

26. $\frac{12}{25}\div\frac{27}{20}$

27. $\frac{45}{26}\div\frac{35}{14}$

28. $\frac{50}{81}\div\frac{22}{63}$

29. $4\frac{2}{3}\times5\frac{1}{7}$

30. $1\frac{7}{9}\div5\frac{1}{3}$

31. $9\frac{2}{6}\times6\frac{3}{8}$

32. $10\frac{1}{12}\div5\frac{1}{2}$

33. $\frac{1}{2}+\frac{4}{5}$

34. $\frac{13}{20}+\frac{4}{18}$

35. $\frac{3}{14}+\frac{4}{49}$

36. $\frac{8}{55}+\frac{17}{22}$

37. $\frac{9}{10}-\frac{7}{15}$

38. $\frac{11}{12}-\frac{3}{8}$

39. $\frac{11}{15}-\frac{1}{18}$

40. $\frac{6}{25}-\frac{3}{20}$

41. $6\frac{4}{7}+2\frac{2}{3}$

42. $9\frac{1}{4}-6\frac{2}{5}$

43. $4\frac{7}{9}+8\frac{3}{4}$

44. $10\frac{1}{6}-7\frac{5}{8}$

45. Convert 15.24 centimeters into inches. $(1\ in \approx 2.54\ cm)$

46. Convert 7.5 kilograms into pounds. (1 kg = 2.2 pounds) Write your answer as a decimal.

47. Convert 49.6 miles per hour into kilometers per hour. (1 kph = 0.62 mph)

48. Convert $14\frac{1}{2}$ yards into inches. (1 yd = 36 inches)

49. Convert 564.5 mg into grams. (1 g = 1000 mg)

50. Larry ran 5/7 of a mile on Monday but only 2/5 of a mile on Tuesday. How much farther did he run on Monday than Tuesday?

51. A used car salesman told Jessica that her car payment will be reduced to $\frac{2}{3}$ of her current car payment. If her current car payment is $276, what will her new car payment be?

52. When visiting New York City, many travelers are amazed at how much walking they do to get around. Jesse's family walked $4\frac{2}{3}$ miles on their first day, $3\frac{3}{4}$ miles on their second day and $5\frac{1}{2}$ miles on their third day. What is the total amount they walked over their 3 day visit?

53. Ray is making a batch of brownies that calls for $2\frac{1}{3}$ cups of flour. If he is making 6 batches of brownies, how much total flour will he need?