



# Commercial Truck Driver

Math Module



# + Managing schedules, Pay, and Overtime



Tom works for a trucking company. He mainly drives trucks. Because he is good at organizing data (numbers) and problem solving, the owner of the company has given him extra

responsibilities. In addition to driving, Tom also schedules drivers, calculates their hours worked and determines their pay. Tom loves the extra money he earns from having these extra responsibilities.

It's the end of the month and Tom needs to finalize the schedule for next month and get the employees' paycheck amounts ready for this month.



# + Think About It!



What pieces of information does Tom need to calculate each employee's pay?

He needs the number of hours worked and the employees pay per hour. He may also need to know about any overtime pay or deductions.



# + Focus

**The focus of this math strand is for you to be able to schedule drivers, determine the total time worked and calculate pay.**

In this math strand you'll be learning and/or reviewing the following math skills:

- 1) Adding hours and minutes
- 2) Converting hours and minutes into hours in decimal form
- 3) Converting hours in decimal form to hours and minutes
- 4) Adding decimals
- 5) Multiplying decimals
- 6) Rounding
- 7) Problem Solving
- 8) Dividing fractions and decimals
- 9) Working with percents
- 10) Converting fractions to decimals



# + Task One: Scheduling

When the company hires a new employee, the boss determines how many hours a week that employee will work. It is Tom's job to schedule the days and times each person works for his company.

The label "hours per day" is a rate. The word "per" tells you to divide. So to find the hours per day divide the number of hours by the number of days.

$$\text{hours} \div \text{days} = \text{hours per day}$$



# + Example

Here are examples of other rates you might know – miles per gallon and miles per hour.

$$\text{miles} \div \text{gallons} = \text{miles per gallon}$$

$$\text{miles} \div \text{hours} = \text{miles per hour}$$



# + Example

Bill is a new employee who was hired to work 35 hours a week, 4 days a week. Tom needs to determine the number of hours per day Bill will work.

Again, to find the hours per day, you divide the numbers of hours by the number of days.

Bill will work 35 hours per week over a period of 4 days. Write this division problem as a fraction by putting the 35 hours in the numerator (top number of the fraction) and the 4 days in the denominator (bottom number of the fraction).

$$\frac{\text{35 hours}}{\text{4 days}} \quad \begin{array}{l} \text{(numerator)} \\ \text{(denominator)} \end{array}$$



# + Stop!



Note that  $35/4$  is Bill's rate of work per week.  $35/4$  is also an improper fraction. An improper fraction is a fraction where the top number is bigger than the bottom number. You will figure out how many hours Bill works per day when you change  $35/4$  to a mixed number.

To figure out how many hours Bill will work per day, we need to convert (change) his rate of work, to a mixed number. A mixed number is a number that has a whole number and a fraction.





# + Steps

Here are the steps to convert an improper fraction to a mixed number:

- 1) Determine how many times the denominator (4) divides into the numerator (35). When we divide 35 by 4 we get 8 with 3 left over since  $4 \times 8 = 32$  and  $35 - 32 = 3$ . The 3 is called the remainder.
- 2) The 8 you got is the number of hours Bill will work. To write the improper fraction  $35/4$  as a mixed number, write 8 (the whole number of times that 4 divides into 35), then, next to it, write the fraction with the remainder (3) as the numerator and the divisor (4) as the denominator. The answer is  $8 \frac{3}{4}$ .



# + Steps

3) Therefore, the answer we get when we convert the improper fraction  $\frac{35}{4}$  to a mixed number is  $8 \frac{3}{4}$ .



This means that Bill will need to work  $8 \frac{3}{4}$  hours/day, 4 days a week. This will give him a total of 35 hours for the week.



# + Practice

**Find the hours per day each employee will need to work.  
Write your answer as a mixed numbers.**

Carlos works 24 hours a week, 5 days a week.

$$24/5 = 4 \frac{4}{5} \text{ hours per day}$$

1) Jack works 30 hours a week, 6 days a week.

5 hours per day

2) Julia works 41 hours a week, 6 days a week.

6  $\frac{5}{6}$  hours per day

3) Tran works 34 hours a week, 4 days a week.

8  $\frac{1}{2}$  hours per day



# + Practice

4) Tran works 37 hours a week, 5 days a week.

$7 \frac{2}{5}$  hours per day

5) Lisa worked 42 hours a week, 4 days a week.

$10 \frac{1}{2}$  hours per day

6) Jennifer worked 56 hours a week, 6 days a week.

$9 \frac{1}{3}$  hours per day

Now you know how to find the number of hours per day an employee is going to work by knowing how many total hours he has to work over a period of time. You also know how to write your answer as a mixed number.





# Converting Hours to Hours and Minutes



Remember that when Bill needed to work 35 hours a week, 4 days a week, we determined how many hours/day he needed to work.



In order to schedule Bill, we need to find out how many hours and minutes  $8 \frac{3}{4}$  hours is. Obviously 8 hours is 8 hours, but how many minutes is  $\frac{3}{4}$  hours?



# + Steps

Here are the steps to convert  $8 \frac{3}{4}$  hours/day to hours and minutes:

- 1) Take the fraction ( $\frac{3}{4}$ ) and multiply it by 60, because there are 60 minutes in an hour. Because 60 is a whole number, to change it into a fraction you put a 1 under it. (You get  $60/1$ .)

8 hours and  $\frac{3}{4} \times \frac{60}{1}$  minutes

- 2) Next multiply the numerators together and the denominators together:

8 hours and  $\frac{180}{4}$  minutes

- 3) Lastly divide 180 by 4. Your answer is

8 hours and 45 minutes



# + Example

Here's another example:

Lee is to work  $8 \frac{4}{5}$  hours per day. You know Lee will work 8 hours, but how many minutes will he work? Follow these steps to find the answer:

1) Set up the equation to multiply the fraction  $(\frac{4}{5})$  by  $60/1$ .

$$\frac{4}{5} \times 60/1 \text{ minutes}$$

2) Multiply the numerators and denominators.

$$240/5 \text{ minutes}$$

3) Divide 240 by 5.

$$240 \text{ divided by } 5 = 48 \text{ minutes}$$

Lee will need to work 8 hours and **48 minutes** per day.



# + Practice

**Change the following times given as mixed numbers into hours and minutes.**

1)  $8 \frac{1}{4}$

8 hours and 15 minutes

2)  $9 \frac{1}{2}$

9 hours and 30 minutes

3)  $8 \frac{1}{3}$

8 hours and 20 minutes

4)  $10 \frac{2}{3}$

10 hours and 40 minutes

5)  $7 \frac{3}{5}$

7 hours and 36 minutes





# + Multiplying Fractions Using Canceling

Canceling can help make multiplying fractions easier. Another word for canceling is reducing.

In the previous example we multiplied  $\frac{3}{4} \times \frac{60}{1}$  by multiplying the numerators and denominators and getting  $\frac{180}{4}$ . Then we divided 180 by 4 and got 45. Let's look at how you would do the same problem using canceling.





# Canceling

4 goes into 60 15 times and  
4 goes into 4 1 time

For  $\frac{3}{4} \times 60/1$ , after you cancel you get  $3/1 \times 15/1$ .

Notice how the 4 is replaced by a 1, and the 60 is replaced by a 15. Now the numbers are smaller so the multiplication is much easier.



Now multiply the numerators and denominators:

$$3/1 \times 15/1.$$

We get the same answer, 45 minutes, whether we use canceling or not.

When you do a multiplication problem like this, you are going to have to multiply and reduce (cancel). When using the canceling method, you are doing the canceling first.

You try a few!!



# + Practice

Find the product by canceling first. Remember to put a 1 under the whole number:

1)  $\frac{2}{3} \times 60 =$

40

2)  $\frac{1}{12} \times 60 =$

5

3)  $\frac{4}{5} \times \frac{3}{16} =$

$\frac{3}{20}$

4)  $\frac{7}{9} \times \frac{27}{10} =$

$2 \frac{1}{10}$

5)  $\frac{2}{5} \times \frac{15}{22} =$

$\frac{3}{11}$

For more practice multiplying fractions, click [here](#).

# + Stop!



Here again are the steps for finding the rate “hours per day.”

- 1) Divide the number of hours by the number of days.
- 2) Write your answer as a mixed number.
- 3) Convert your answer to hours and minutes by multiplying the fraction part by 60.



# + Review

Now we know how to find the number of hours per day an employee is to work by dividing and writing our answer as a mixed number. We also know how to convert that mixed number into hours and minutes. In the example below, Tom uses these skills to determine how many hours and minutes per day Jorge, a new employee, needs to work.

Jorge has been hired to work 41 hours per week and will work 4 days a week. If he works the same amount of time each day, how many hours and minutes should he work each day?

$$\begin{aligned}\frac{41 \text{ hours}}{4 \text{ days}} &= 10\frac{1}{4} \text{ hours/day} = 10 \text{ hours and } \frac{1}{4} \times \frac{60}{1} \text{ minutes} \\ &= 10 \text{ hours and } 15 \text{ minutes}\end{aligned}$$



# + Practice

**Find the hours per day each person will need to work. Write your answer in hours and minutes.**

1) Julio will work 42 hours a week, 5 days a week.

8 hours and 24 minutes

2) Derek will work 45 hours a week, 4 days a week.

11 hours and 15 minutes

3) Lorena was hired to work 25 hours a week, 4 days a week.

6 hours and 15 minutes

4) Ian will work 46 hours per week. She is not sure whether she will be working 5 or 6 days a week. Find the hours per day for both options.

9 hours and 12 minutes for 5 days/week, 7 hours and 40 minutes for 6 days a week

# + Think About It!



Scheduling an employee to work 8 hours and 24 minutes a day could be a problem in scheduling. How could you deal with this situation?

It is much easier to schedule to the nearest 15 minutes or 30 minutes. You could round to 8 hours and 30 minutes. Then figure out how much time the person would need to work on the last day of the week so that they get all their hours for the week.



# + Example

Jamie is hired to work for 32 hours a week, 5 days a week. When we find the number of hours per day we get:

$$\frac{32 \text{ hours}}{5 \text{ day}} = 6\frac{2}{5} \text{ hours/day} = 6 \text{ hours } \frac{2}{5}(60) \text{ minutes} = 6 \text{ hours } 24 \text{ minutes}$$

Mathematically we get 6 hours and 24 minutes a day, but realistically, Jamie is not going to work from 9:00 am – 3:24 pm. Generally people work to the half hour or possibly in 15-minute increments. (In this case, Jamie would say that she worked until 3:30.)





# + Listen



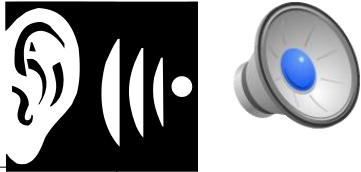
**Listen and follow along as Tom explains the different ways he could divide up Jamie's schedule.**

“I could round the 6 hours and 24 minutes to 6 hours and 30 minutes. If Jamie worked 6 hours and 30 minutes for 4 days that would give her 26 hours, which leaves 6 more hours to work to get to 32 hours for the week. So she could work for 6 hours and 30 minutes 4 days a week and then 6 hours one day a week.

I could also round the 6 hours and 24 minutes down to 6 hours 15 minutes. If she worked 6 hours and 15 minutes for 4 days that would give her 25 hours. So one day a week she would have to work 7 hours to get to 32 hours for the week.



# + Listen



If I round the 6 hours and 24 minutes all the way down to 6 hours, she could work 6 hours a day for 4 days a week. This would give her 24 hours. So one day a week she would have to work 8 hours to reach her 32 hours a week.

There are other possibilities as well. I'm going to talk with Jamie to see which schedule she'd prefer working."

Tom takes pride in creating a schedule for the employees that will work for both his boss and the employees, a schedule that makes everybody happy.



# + Practice

**Answer the following questions about scheduling.  
FEEL FREE TO USE YOUR CALCULATOR.**

- 1) Oscar has been hired to work part-time 5 days a week for 29 hours a week. Find the hours and minutes per day he would work if he worked the same amount of time each day.

5 hours and 48 minutes

- 2) Come up with 3 different possible options for Oscar's schedule. Keep in mind the boss wants the hours for the 5 days to be as close as possible. For example the boss doesn't want him for 7 hours a day for four days and only 1 hour on one day.

Possible Options:

6 hours 4 days a week and 5 hours 1 day a week

5 hours and 30 minutes 4 days a week and 7 hours 1 day a week

5 hours and 45 minutes 4 days a week and 6 hours 1 day a week

6 hours and 15 minutes 4 days a week and 4 hours 1 day a week

## + Task Two: Time Sheets



Some employee's schedules vary (change) depending on the amount of work that is available. These employees punch in and out of a machine (a time clock) each day. The time clock records the time an employee starts work and the time he finishes work. At the end of the week the employees turn in their time cards to Tom.



# + Time Sheets

First Tom figures out the amount of time an employee works each day. Then he adds those daily amounts of time together to figure out how much time an employee works for the week. To figure out the amount of time an employee worked each day, Tom needs the ability to determine the amount of time that elapsed (went by) between when an employee punched into work and when he punched out.

For example, Billy punched in at 6:08 a.m. and then punched out at 3:49 p.m. How much time did Billy work? There are two ways to figure out how much time Billy worked.





# Determine Time Worked: 24-Hour Time Format



One way to figure is to convert both times to 24-hour time.

Time in 24-hour format does not use a.m. or p.m. After 12 noon, the next hour is usually 1:00 p.m., but in 24-hour format you just add another hour and call it 1300 (thirteen-hundred).

- 2 p.m. would be 1400 (fourteen-hundred) in 24-hour format.
- 3 p.m. would be 1500 (fifteen-hundred) in 24-hour format.
- 4:30 p.m. would be 1630 (sixteen-thirty) in 24-hour format.

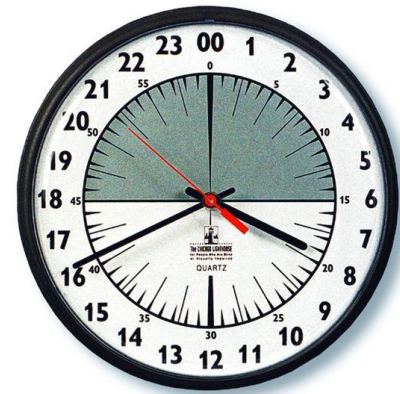
As you can see from the examples above, to convert p.m. times to 24-hour format you just add 12 to the hours.



# + 24-Hour Time Format

If the time is a.m. it just stays the same, 24-hour format always uses 4 digits. (At 10:00 a.m. all 4 digits are used so you don't have to put a 0 in front of the time.)

- 2:00 a.m. in 24-hour format is 0200. (o-two-hundred)
- 3:15 a.m. in 24-hour format is 0315
- 9:42 a.m. in 24-hour format is 0942
- 11:30 a.m. in 24-hour format is 1130



# + Practice



**Convert the following times into 24-hour format:**

8:30 a.m. = 0830

1:15 p.m. = 1315

1) 2:45 a.m. =

2) 5:00 p.m. =

3) 8:53 p.m. =

4) 10:15 p.m. =





# + Problem

Back to our problem: Billy punched in at 6:08 a.m. and then punched out at 3:49 p.m. How much time did Billy work?

The first step is to change the time to 24-hour time.

6:08 a.m. = 0608

3:49 p.m. = 1549

Next subtract 0608 from 1549.

$$\begin{array}{r} 1549 \\ - \underline{0608} \\ 0941 \end{array}$$

So Billy worked for 9 hours and 41 minutes.



# + Think About It!



Giorgio worked from 6:49 a.m. to 3:12 p.m. How long did he work as expressed in hours and minutes? The problem will be worked out on the next page but first answer these questions

What is 3:12 pm in 24-hour time?  
1512

What is 6:49 a.m. in 24-hour time?  
0649



# + Think About It!



$$\begin{array}{r} 15:12 \\ - 06:49 \\ \hline \end{array}$$

In this problem we can't subtract 49 from 12, so what do we do? We borrow from the hours, remembering that one-hour is 60 minutes; we subtract one hour from the hours and add the 60 to the minutes:

$$\begin{array}{r} 14:72 \leftarrow \text{was 15 hours and 12 minutes} \\ - 06:49 \\ \hline 08:23 \end{array}$$

So the amount of time Billy worked is 8 hours and 23 minutes.



# + Practice

**Find the total time Chinh worked each day using 24-hour time. Write your answer in the form hours:minutes.**

Chinh worked:

1) Monday from 9:30 a.m. – 6:30 p.m.

9:00

2) Tuesday from 9:20 a.m. – 6:50 p.m.

9:30

3) Wednesday from 9:15 a.m. – 6:05 p.m.

8:50

4) Thursday from 1:15 p.m. – 10:00 p.m.

8:45

5) Friday from 12:45 p.m. – 9:10 p.m.

8:25



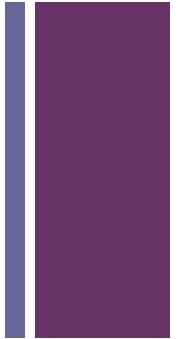
# + Determine Time Worked: Time Segments

The second way to determine time worked is to break the time interval you want to measure into segments, like these:

6:49 a.m.  $\longrightarrow$  7:00 a.m.  $\longrightarrow$  12:00 noon  $\longrightarrow$  3:00 p.m.  $\longrightarrow$  3:12 p.m.  
11 min                      5 hr                      3 hr                      12 min

To determine the total time worked, from the starting time count how many minutes there are until the next hour. Then count the number of hours there are until the ending time. Next determine the number of minutes until the ending time. Now you add up the times from the intervals. First add the hours; then add the minutes.

The total time elapsed is 8:23 or 8 hours and 23 minutes, as before.





# Listen



**Tom prefers to use the interval method. Listen and read along as he explains how he finds the elapsed time from 6:49 a.m. to 3:12 p.m. using the adding intervals method.**

“In order to find the total time worked from 6:49 a.m. to 3:12 p.m. using the interval method, the first thing I do is figure out how many minutes it is from 6:49 a.m. to 7:00 a.m., which is 11 minutes. I write that number down, because I will need it later. Next I figure out how many hours it is from 7:00 a.m. to 3 p.m. Since noon is between 7:00 a.m. and 3 p.m., it is easier for me to figure out how many hours from 7:00 a.m. to noon and from noon to 3:00 p.m. and then add them together. From 7:00 a.m. to noon is 5 hours and from noon to 3:00 p.m. is 3 hours. So from 7:00 a.m. to 3 p.m. is 8 hours. I write that number down next to my 11 minutes from earlier. The last thing I need to do is write down how many minutes it is from 3:00 p.m. to 3:12 p.m., which is 12 minutes. On my paper I have 11 minutes, 8 hours, and 12 minutes. I add those up and get 8 hours and 23 minutes.”

Decide which method you like better. Either way will work. The best way is the way that works best for you!



# + Practice

Now it's your turn. Find the elapsed time using either method you like. Write your answer in this form **hours:minutes**.

1) 11:00 a.m. – 2:25 p.m.

3:25

2) 1:20 p.m. – 4:00 p.m.

2:40

3) 9:30 a.m. – 3:15 p.m.

5:45

4) 8:02 a.m. – 5:47 p.m.

9:45

5) 10:47 a.m. – 3:13 p.m.

4:26





# Task Three: Hours Worked Per Week



Part of Tom's job is to calculate each employee's pay per week. In order to do this he needs to figure out how many hours each employee worked.

Once the number of hours worked each day is determined, Tom needs to find the sum of the hours and minutes. To do this he adds the hours and then adds the minutes. He makes sure to add the hours and minutes separately.

If the total of the minutes is over 60, then the minutes need to be converted into hours and added to the other hours.





# + Example

Here is an example:

Joe worked the following amount of time each day this week.  
Find the total number of hours and minutes Joe worked.  
(4:20 would mean 4 hours and 20 minutes worked)

Monday	=	4:20
Tuesday	=	3:45
Wednesday	=	4:05
Thursday	=	5:51
<u>Friday</u>	=	<u>4:32</u>
Total	=	20:153



# + Think About It!



How would you rewrite 20:153 so the minutes are less than 60?

Since the minutes are over 60, we need to change the 153 minutes to hours (and minutes). To do this we need to see how many 60's divide into 153.

How many 60's divide into 153?

2

How many minutes are left over?

33

What is the total time Joe worked this week?

22:33



# + Example

Let's look at another example. We want to convert 15 hours and 85 minutes, so that the number of minutes are less than 60.

First we divide 85 by 60 and we get 1 with a remainder of 25. Then we add 1 to the number of hours (15 hours + 1 hour = **16** Hours). The remainder of 25 is the minutes.

The answer is **16:25**.



# + Practice



Rewrite the following hours:minutes so that the minutes are less than 60.

1) 12:70

13:10

2) 48:140

50:20

3) 35:125

37:05

4) 52:100

53:40

5) 41:180

44:00



# + Practice

**Find the time worked each day in hours and minutes and then find the total time worked for the week.**

DAY	IN	OUT	TIME WORKED
Saturday	9:00 am	11:30 am	2:30
Sunday	7:45 am	1:10 pm	5:25
Tuesday	8:30 am	4:15 pm	7:45
Wednesday	8:15 am	4:10 pm	7:55
		<b>TOTAL:</b>	<b>23:35</b>

# + Practice



**Find the time worked each day in hours and minutes and then find the total time worked for the week.**

DAY	IN	OUT	TIME WORKED
Monday	1:00 pm	11:30 pm	10:30
Tuesday	2:05 pm	10:40 pm	8:35
Wednesday	2:15 pm	11:00 pm	8:45
		<b>TOTAL:</b>	<b>27:50</b>



# + Task Four: Calculating Pay

Once Tom determines the number of hours an employee worked for the week, he can find the employee's gross pay, the amount before taxes are taken out, by using the following formula:

$$\text{Gross Pay} = \text{Hourly Wage} \times \text{Hours Worked}$$

Doug, an entry-level truck driver at Tom's company, is paid \$14.50 per hour and worked 36 hours this week. What is his pay this week?

$$\text{Gross Pay} = \text{Hourly Wage} \times \text{Hours Worked.}$$

$$\text{Gross Pay} = \$14.50 \times 36$$

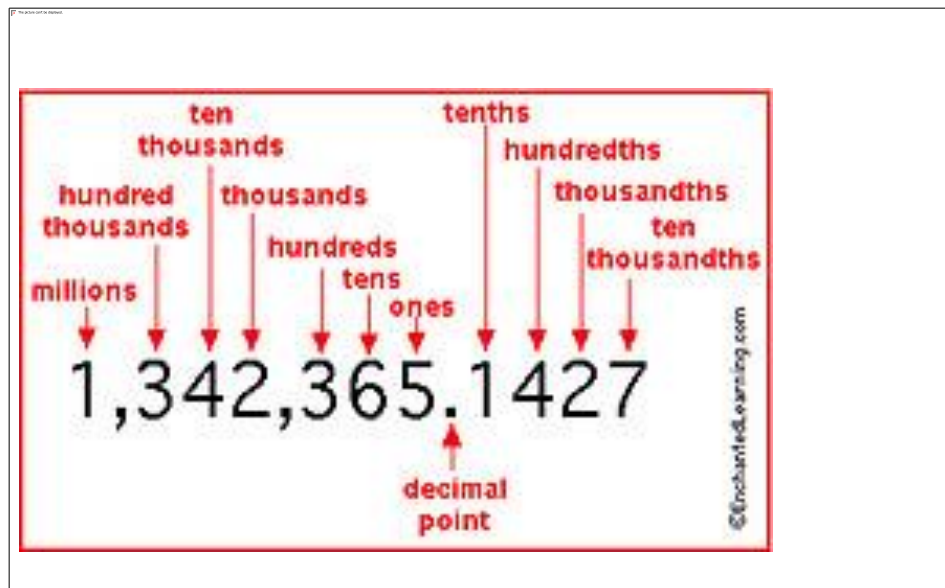
$$\text{Gross Pay} = \$522.00$$



# + Rounding Decimals

Since we are dealing with money, the gross pay needs to be rounded to the nearest penny or, in other words, the nearest hundredth.

To round to the nearest hundredth look at the number in the thousandth spot. If that number is 5 or greater, you round up. If not you keep the number in the hundredths place the same.





# + Rounding Decimals



For 169.725, the number in the thousandth spot is 5 so we round the 2 in the hundredths place up to a 3 and the gross pay is \$169.73.

Tom has been working on figuring out the gross pay for Beth. She worked 42 hours and 15 minutes last week and her pay is \$17.75 per hour.

To find her gross pay he multiplied  $42.25 \times \$17.75$  and got \$749.9375.





# Think About It!



If the gross pay comes out to be \$749.9375, how much does Beth get paid?

**\$749.94**



# + Practice



Round these values to the nearest hundredth.

1)      \$24.561      **\$24.56**

2)      \$1,903.535      **\$1,903.54**

3)      \$2,776.899      **\$2,776.90**

4)      \$35.0648      **\$35.06**

5)      \$0.0072      **\$0.01**



# + Practice

Find the gross pay using your calculator. Round your answer to the nearest penny (hundredth).

**Remember, Gross Pay = Hourly Wage x Hours Worked**

1) Julia worked 163.5 hours last month. Her hourly wage is \$17.45 per hour. What is her gross pay for the month?

\$2,853.08

2) Minh is paid \$12.87 per hour and he worked a total of 173.5 hours last month. What is his gross pay for the month?

\$2,232.95

3) Thao earns \$19.85 per hour. He worked 42.5 hours last week. What was his gross pay last week?

\$843.63

4) Alex works 35.5 hours per week and makes \$16.35 per hour. What is his gross pay per week?

\$580.43

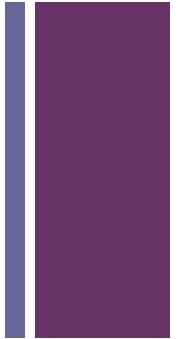


# Think About It!



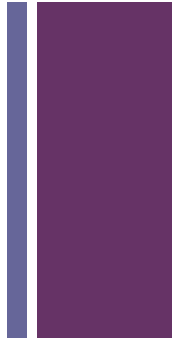
What if an employee worked 35 hours and 15 minutes? What number would you multiply by his hourly wage?

We need to change 35 hours and 15 minutes into a decimal value. In this case it would be 35.25 hours. In the next section you will learn how to change hours and minutes into a decimal number of hours.





# Converting Hours and Minutes Into A Decimal Number of Hours



Recall that Doug, the entry-level truck driver at Tom's company, worked a total of 36 hours a week. There were no minutes in the amount of time Doug worked.

However, in the case that the amount of time worked is in hours and minutes, like 38 hours and 45 minutes, the minutes need to be converted to a decimal in order to figure out a person's gross pay.

The easiest way to do this is to use a calculator and divide the number of minutes by 60. If you don't have a calculator, you will have to do long division. To make long division easier, write your division problem as a fraction, reduce the fraction and then do your dividing. This will make the numbers easier to work with because they are smaller.



# + Example

For example, converting 45 minutes to a decimal looks like this if you did not have a calculator:

First write  $45 \div 60$  as a fraction:  $\frac{45}{60}$

Next reduce the fraction:  $\frac{3}{4}$

Lastly do long division:  $4 \overline{)3.00}$

Since  $\frac{3}{4}$  is a common fraction you may already have the decimal for memorized. It is 0.75 (as shown previously).



# + Conversion Chart

Many of the common situations for time can be memorized.

Here is a chart showing some of the most common conversions.

<b>Minutes</b>	<b>Decimal Part of an Hour</b>
15 minutes	0.25
30 minutes	0.50
45 minutes	0.75

Remember why we needed to convert minutes to a decimal form of hours?

We need to convert the time worked to a decimal to multiply it by the hourly wage in order to find the gross pay.



# + Example

Here's an example of how to figure out an employee's gross pay when there are minutes in the amount of time they worked.

Sarah worked for 18 hours and 15 minutes and gets paid \$11.00 per hour. What is her gross pay?

The first thing that needs to be done is to convert 18 hours and 15 minutes to a decimal number of hours. To do this, take the number of minutes and divide by 60. What decimal do you get?

0.25

You can use long division or use your calculator and punch in 15/60. Your calculator will say 0.25. So her total time worked is 18.25 hours. Her hourly wage is \$11.00. How do we find the gross pay?

gross pay =  $18.25 \times \$11.00$ , which is \$200.75



# + Steps

Here's a review of all the steps we went through to find Sarah's gross pay:

18 hours and 15 minutes =  $18 \frac{1}{4}$  hours = 18.25 hours

**Gross Pay = Hours Worked  x Hourly Wage**

Gross Pay = 18.25 x \$11.00

Gross Pay = \$200.75



# + Practice

Find the **Gross Pay** using your calculator.

- 1) Juan worked 39 hours and 30 minutes last week. He makes \$14.45 per hour. What was his gross pay last week?

\$570.78

- 2) Zayden makes \$13.07 per hour. If he works 43 hours and 45 minutes last week, how much will his gross pay be?

\$571.81

- 3) Keegan worked 35 hours and 24 minutes and his hourly wage is \$19.65. What is his gross pay?

\$695.61

- 4) JoAnne works 45 hours and 45 minutes every week. Next week she will get a raise and her hourly pay will go from \$13.50 up to \$14.75. How much more will she make per week after her raise?

She will make \$57.19 more per week after her raise.

# + Multiplying Decimals

You may not have a calculator to multiply decimals. Let's review how to multiply decimals.

Here are the steps for multiplying decimals.

1) Multiply the numbers just as if they were whole numbers.

- Line up the numbers on the right - **do not align the decimal points.**
- Starting on the right, multiply each digit in the top number by each digit in the bottom number, just as with whole numbers.
- Add the products. You have an answer that looks like a whole number.



# + Multiplying Decimals

To place the decimal point in the answer, count how many numbers (places) are after the decimal points in the two numbers you multiplied. Move the decimal point to the left however many numbers (places) you counted. Here's an example:

$$3.77 \times 2.8 = ?$$

$$\begin{array}{r} 3.77 \text{ (2 decimal places)} \\ \times 2.8 \text{ (1 decimal place)} \\ \hline 3016 \\ +754 \\ \hline 10.556 \text{ (3 decimal places)} \end{array}$$

Your turn!



# + Practice

Find the product. These problems are not about money.  
Find the exact answer and do not round.

1)  $0.5 \times 23 =$

11.5

2)  $0.25 \times 16 =$

4

3)  $1.6 \times 3.4 =$

5.44

4)  $0.25 \times 150 =$

37.5

5)  $3.25 \times 1.75 =$

5.6875

For more practice multiplying decimals, click [1](#), [2](#), or [3](#).

# + Practice

Find the gross pay without using your calculator.

**Remember Gross Pay = Hourly Wage x Hours Worked**

- 1) Tran worked 25 hours and 30 minutes last week. Her hourly wage is \$15.50.

\$395.25

- 2) Philippe's hourly wage is \$13.00 and he worked 42 hours and 15 minutes last week.

\$549.25

- 3) Jonas put in 45 hours and 45 minutes last week. His hourly wage is \$16.60.

\$759.45

# + Repeating Decimals

Here's an example that brings up another issue, repeating decimals!

Bill hired Barney to work part time 6 days a week for 38 hours a week. How many hours and minutes per day will he work if he works the same amount of time each day?

**6 hours and 20 minutes**

To find the hours per day, you divide 38 by 6. When you punch that equation into your calculator you get the answer 6.333333... or 6.3 with a bar over the three. The bar over the 3 indicates that there are an infinite number of 3's. (The 6's will go on forever.)





# + Repeating Decimals

How are you supposed to multiply an infinite number of 3's by 60 to get your minutes? Good question! There are two answers. First, you could use your calculator and fill up the whole screen with 3's (0.333333333333333) and then multiply it by 60. In this case your calculator would probably display 19.999999999, which you would round up to 20 minutes.

The second way to do it is to use fractions. You should memorize the fractional equivalent of a couple of repeating decimals.

They are  $\frac{1}{3} = 0.\overline{3}$  and  $\frac{2}{3} = 0.\overline{6}$ .

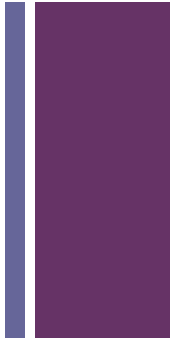


# + Pattern

**Find the decimals that are missing in the table.**

Actually there are some interesting patterns to some repeating decimals. Can you see the pattern in the table?

Fraction	Decimal
$\frac{1}{9}$	$0.\bar{1}$
$\frac{2}{9}$	$0.\bar{2}$
$\frac{3}{9} = \frac{1}{3}$	$0.\bar{3}$
$\frac{4}{9}$	$0.\bar{4}$
$\frac{5}{9}$	$0.\bar{5}$
$\frac{6}{9} = \frac{2}{3}$	$0.\bar{6}$
$\frac{7}{9}$	$0.\bar{7}$
$\frac{8}{9}$	$0.\bar{8}$
$\frac{9}{9} = 1$	$0.\bar{9}$



# + Pattern



Did you see the pattern? Whatever number was in the numerator is the decimal that repeats. This only works when there is a 9 in the denominator.

The fractions from the table you will use the most are  $1/3 = 0.333\dots$  and  $2/3 = 0.6666\dots$ . These fractions are common and you should memorize their decimal equivalents.

Let's work through an example together.



# + Example

Robert worked 35 hours and 20 minutes this week. His wage is \$12.95 per hour. What is his gross pay for the week?

First convert 20 minutes into a decimal:

$$20 \div 60 = 0.3333... \text{ or } 0.\overline{3}$$

Next find the hours worked as a decimal.

$$35 + 0.3333.... = 35.3333....$$

Lastly, find the gross pay by multiplying:

Hours Worked x Hourly Wage =

$$35.3333... \times \$12.95 = \$457.57$$



# + Practice

Find the gross pay in each of the following situations.

- 1) Abigail worked 24 hours and 20 minutes this week. Her hourly wage is \$15.25. What is her gross pay for the week?

\$371.08

- 2) Barney makes \$8.95 per hour and worked a long 52 hours and 40 minutes this week. What is his gross pay for the week?

\$471.37

- 3) Cameron worked this week on Monday for 9 hours and 40 minutes, Tuesday for 9 hours and 50 minutes, Wednesday for 8 hours and 30 minutes, and Thursday for 10 hours and 50 minutes. His hourly wage is \$16.20 per hour. What is his gross pay this week?

\$629.10



# + Task Five: Overtime Pay



At times there is more work to be done than can be accomplished with employees working only 40 hours per week. When this happens employers can ask employees to work overtime. Tom's boss wants to reward and motivate his employees who work overtime hours like the previous problem.



# + Overtime Pay

To do this, he pays them more than their usual hourly wage. Sometimes he pays double time (2x) and sometimes he pays them time and half (1.5x). Double time means he will pay them twice as much as the normal hourly wage. Time and half means he will pay them 1.5 times the normal hourly wage.

For example, here is how much Barney who makes \$8.95 per hour can make:

## Double Time

$$\text{\$ } 8.95 \times 2$$

\$17.90 per hour

## Time and Half

$$\text{\$ } 8.95 \times 1.5$$

\$13.42 per hour



# + Practice

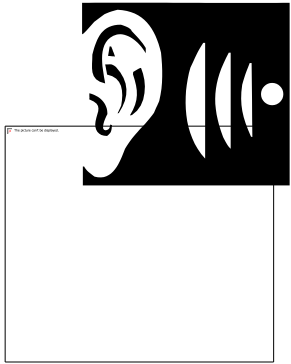
**Find the hourly wages for these employees working overtime.**

Remember to round your answers to the nearest penny. [Click here](#) to check your answers.

	<b>Hourly Wage</b>	<b>Time and a Half</b>	<b>Double Time</b>
Abigail	\$15.25	<b>\$22.88</b>	<b>\$30.50</b>
Barney	\$8.95	<b>\$13.43</b>	<b>\$17.90</b>
Cameron	\$15.20	<b>\$22.80</b>	<b>\$30.40</b>
Donald	\$12.50	<b>\$18.75</b>	<b>\$25.00</b>



# + Listen



Listen and follow along as Tom as explains how to find the amount of overtime pay.

“To find the overtime pay, you can calculate the regular time and the overtime pay and then add them together. To find the regular time pay, just multiply the hourly wage by 40. To find the overtime pay, multiply the hourly wage by 1.5 and then multiply that number by the number of hours worked over 40 hours. Add the regular time pay with the overtime pay and you have the total gross pay.”



# + Steps

To find the gross pay including overtime follow these steps:

- 1) Determine the number of overtime hours worked by subtracting 40 from the total hours worked.
- 2) Multiply 40 by the hourly wage.
- 3) Multiply the hourly wage by 1.5
- 4) Multiply the answer you got in step three by the number  
you found in step 1.
- 5) Add your answers from step 2 and step 3.

The formula for Gross Pay is:

$$\text{Gross Pay} = 40 \times \text{Hourly Wage} + \text{Overtime Hours} \times 1.5$$



# + Stop!



Employers have different rules about when they pay overtime. Some may pay when an employee goes over 10 hours a day or 40 hours per week. Others may pay only when an employee goes over a certain number of hours per month, and some may not offer any extra salary for overtime pay.



# + Practice

**Find the gross pay. Each employee is paid time and a half for all hours worked over 40 hours per week.**

- 1) Donald worked 51 hours this week. His wage is \$15.20 per hour. What is his gross pay this week?

\$858.80

- 2) Abigail's hourly wage is \$15.25, and she worked 42.75 hours this week. What is her gross pay this week?

\$672.91

- 3) Ramero worked a long 63 hours and 45 minutes this week. His hourly wage is \$15.20. What is his gross pay this week?

\$1,149.50



# + Practice

**Find the gross pay. Each employee is paid time and a half for all hours worked over 40 hours per week.**

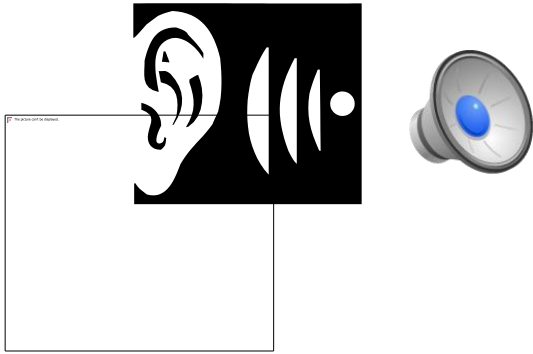
- 4) Barney's hourly wage is \$8.95 per hour. He worked the following hours this week: Monday = 7:40, Tuesday = 9:15, Wednesday = 8:30, Thursday = 7:15, Friday = 10:55, and Saturday = 4:10. (7:40 means 7 hours and 40 minutes) What is his gross pay this week?

\$462.04

- 5) In the month of June, Carlos worked 45 hours in week one, 38 hours 15 minutes in week two, 47 hours 30 minutes in week three, and 41 hours 45 minutes in week 4. His hourly wage is \$16.50. What is his gross pay for the month of June?

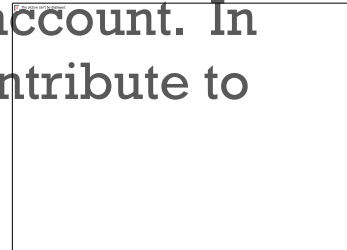
\$2,963.81

# + Task Five: Deductions



Listen to Tom and follow along as he explains deductions, which are what the employers take out of your paycheck.

There are many types of deductions or withholdings that are subtracted from an employee's gross pay. They include mandatory and necessary deductions like federal income tax and social security. Some deductions are optional, your choice, such as adding money to a retirement account. In fact, some companies require employees to contribute to retirement accounts.



# + Deductions



In my company an employee can contribute from 2% up to 25% of his or her paycheck to a retirement account. Our company will match an employee's contribution up to \$1,000 per year. For example, I have \$50 taken out of my paycheck and put it in a retirement account every two weeks and the company adds another \$50 to that.

That means \$100 is added to my retirement account every two weeks. This is an example of a benefit provided by the company.”

In order for Tom to determine how much to deduct from an employee's paycheck, he has to know how to work with percents.



# + Working With Percents



A percentage is a part of a whole. Percent means per hundred. For example, when an item is on sale for 20% off, it means you save \$20 for every \$100 the item costs. In a state with a 5% sales tax, it means you pay a 5-cent tax for every 100 cents you spend.

An employee determines how many dollars out of each \$100 they earn will go into their retirement account by choosing the percentage of their salary they want withheld (taken out).





# + Working With Percents

When doing math with a percentage, the percent must be changed into a decimal. To do this you move the decimal in the percent two places to the left. If you don't see a decimal, then it is at the far right (at the end) of the number. For example in 25%, the decimal is to the right of 5 and is not written. Even though it's invisible, it's there.

To change 25% to a decimal, move the decimal (that is not written) after the 5 two places to the left. This gives you 0.25.

Here are a few more examples of changing a percent to a decimal:

$$50\% = 0.5$$

$$43.4\% = 0.434$$

$$4\% = 0.04$$

$$125\% = 1.25$$

# + Practice

Convert these percents into decimals. Remember if you don't see a decimal in the percent it is at the far right of the number.

1)  $80\% =$

0.8

2)  $1\% =$

0.01

3)  $13.2\% =$

0.132

4)  $4.15\% =$

0.0415

5)  $250\% =$

2.5

6)  $8\frac{1}{2}\% =$

0.085, first turn  $8\frac{1}{2}\%$  into  $8.5\%$  and then move the decimal

Click [here](#) for more practice converting percents to decimals.





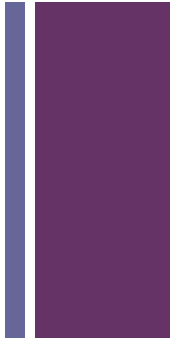
# Think About It!



Tom is working on paychecks. Juan is an employee who made \$1,500 gross pay this month and wants 15% of his gross pay withheld for his retirement account.

How will Tom figure out how much to withhold from Juan's paycheck for his retirement account?

First change 15% to 0.15 and then multiply  $1500 \times 0.15$ . You'll get 225. The amount taken out for retirement will be \$225.



# + Review

Again, to find 15% of 1,500:

Convert 15% to 0.15

Multiply  $0.15 \times 1,500 = 225$

The previous step means that 225 is 15% of 1,500.

In other words Juan wants \$225 withheld from his gross pay to be put into his retirement account.



# + Practice

Here is a table of employees and the percent of their paycheck they would like withheld for their retirement account. Fill in the missing values. [Click here](#) to check your answers.

	Gross Pay for January	% Retirement Account	Amount to be Deducted
Abigail	\$1425	12.5%	$1425 \times 0.125 = \mathbf{\$178.13}$
Barney	\$825.63	6%	$\mathbf{\$49.54}$
Cameron	\$1230.50	8.7%	$\mathbf{\$107.05}$
Donald	\$1880.41	2.25%	$\mathbf{\$42.31}$

Click [here](#) for more practice solving for percents.

# + Net Pay

Net pay is the actual amount of money you take home in your paycheck. Taking the gross pay and subtracting the deductions gives the net pay.

$$\text{Net Pay} = \text{Gross Pay} - \text{Deductions}$$

Deductions in the formula above include both mandatory and optional deductions. Remember that mandatory deductions include federal income tax and social security, while optional deductions include retirement accounts.



# + Example

Last month Tom's gross pay was \$2,275. He had mandatory deductions of \$384.30, and he put 8% of his gross pay into his retirement account. To find his net pay we first need to determine how much he wants put in his retirement account.

1) Amount in retirement account =  $\$2,275 \times 8\%$

2) Amount in retirement account =  $\$2,275 \times 0.08$

3) Amount in retirement account = \$182

Next we find his total deductions = \$182 (optional) + \$384.30 (mandatory)

Total Deductions = \$566.30



# + Example

Now we can find the Net Pay.

$$1) \text{ Net Pay} = \text{Gross Pay} - \text{Deductions}$$

$$2) \text{ Net Pay} = \$2,275 - \$566.30$$

$$3) \text{ Net Pay} = \$1,708.70$$

For more practice adding and subtracting decimals, click [1](#), [2](#), [3](#), or [4](#).





# + Practice

**Answer the following word problems about net pay.**

1) Tran's gross pay for July was \$1,620.50. For her retirement account, 5% of her gross pay was deducted. Her mandatory deductions were \$283. What was Tran's net pay in July?

\$1256.48

2) Barney had mandatory deductions of \$165.45 from his August paycheck. His gross pay for August was \$987.90. He didn't put any money in his retirement account and had no other deductions. What was his net pay?

\$822.45

3) In the month of December Cameron put 15% of his gross pay in his retirement account. Because of working overtime during the holidays his December gross pay was \$3,214.20. His mandatory deductions during the month were \$408.00. What was his net pay for December?

\$2324.07

# + Putting It All Together

With everything we have covered so far you can do the following:

- Create a schedule for a new employee
- Determine the total time worked from an employee's time card
- Calculate gross pay including over time pay
- Determine the amount of withholdings, including those for a retirement account
- Find the net pay

**Looks like you are ready for a quiz!**





# Quiz: Managing Schedules, Pay, and Overtime



**Part One: Answer the following computational questions.**

1) Write the following improper fractions as mixed numbers in simplest form.

$$\frac{41}{5} = 8 \frac{1}{5}$$

$$\frac{20}{6} = 3 \frac{1}{3}$$

2) Write the following improper fractions as decimals.

$$\frac{41}{5} = 8.2$$

$$\frac{20}{6} = 3.\overline{3}$$



# + Quiz:

3) Multiply the following numbers. Write your answer in simplest form.

$$\frac{2}{5} \times 35 = 14$$

$$\frac{3}{8} \times \frac{6}{11} = \frac{9}{44}$$

4) How much time has elapsed between 9:15 a.m. and 5:05 p.m.?

**7:50 or 7 hours and 50 minutes**

5) Add the following amounts of time. Time is expressed in hours:minutes.

$$5:40 + 3:30 + 6:25 = 15:35$$



# + Quiz:



6) Convert the following hours:minutes into hours using a decimal number.

$$3 \text{ hours } 45 \text{ minutes} = 3.75 \text{ hours}$$

$$7 \text{ hours } 20 \text{ minutes} = 7.3 \text{ hours}$$

7) Convert the following percents into decimals.

$$32\% = 0.32$$

$$4.7\% = 0.047$$

$$150\% = 1.5$$

$$10\% = 0.1$$



# + Quiz:

**Part Two: Solve the following application problems.**

8) Frank is scheduled to work 92 hours over the next two weeks, and he is to work 10 days. How many hours and minutes a day does he need to work if he worked the same amount of time each day?

**9 hours and 12 minutes**

9) Sam is paid double time for all hours he works over 40 hours a week. His hourly wage is \$14.50. Find his gross pay in a week he worked 57 hours.

**\$1,073**



# + Quiz:

10) By putting 18% of her gross pay into a retirement account Sandra hopes to retire early. On her last paycheck her gross pay was \$2315.18. How much of her gross pay did she put in her retirement account?

**\$416.73**



# + Quiz:

11) The company that Julie works for pays time a half for all hours worked over 40 hours a week. Julie wants to retire early and is putting as much away in retirement as she can, which is 23% of her gross pay. Her hourly wage is \$18.75.

Over the last 4 weeks she has put in the following hours, which will determine her next paycheck:

Week One = 45 hours

Week Two = 37.5 hours

Week Three = 52.25 hours

Week Four = 42.25 hours







# Quiz:



A) How many overtime hours has she put in over the last four weeks?

**19.5 hours or 19 hours and 30 minutes**

B) How many regular time hours has she worked over the last four week?

**157.5 hours**

C) What is her hourly overtime wage?

**\$28.13 per hour**

D) How much was her gross pay for the last four weeks of work?

**\$3,501.66**

E) How much did she put into her retirement account from this paycheck?

**\$805.38**

F) Her mandatory deductions total \$486.75. What is her net pay?

**\$2,209.53**



# + Quiz

12) Here is the time sheet Carlos turned in for this week. He is new on the job, and his hourly wage is \$9.80. Find the daily totals, the weekly total, and his gross pay for the week. He is going to put 5.5% of his gross pay into his retirement account, and he has \$63.70 in mandatory deductions. [Click here](#) to check your answers.

	In	Out	In	Out	Daily Total
Tues	3:00 PM	6:15 PM	7:00 PM	11:30 PM	(7:45)
Wed	2:45 PM	6:00 PM	6:50 PM	12:15 AM	(8:40)
Thurs	3:00 PM	5:50 PM	6:45 PM	11:15 PM	(7:20)
Fri	2:30 PM	6:05 PM	6:45 PM	1:10 AM	(10:00)
			Weekly Total:		<b>33:45</b>
			Gross Pay:		<b>\$330.75</b>
			Retirement:		<b>\$18.19</b>
			Total Deductions:		<b>\$81.89</b>
			Net Pay:		<b>\$248.86</b>

# + Key Math Concepts

Adding hours and minutes

Working with percents

Converting hours and minutes into hours in decimal form

Converting to 24-hour time

Adding times

Adding decimals

Writing an improper fraction as a mixed number

Multiplying decimals

Finding patterns

Rounding

Working with formulas

Problem Solving

Dividing fractions and decimals



# + Math Vocabulary

Rate

Product

Deductions

Ratio

Repeating Decimal

Withholdings

Fraction

24-hour time

Net Pay

Decimal

Borrow

Percent

Improper Fraction

Sum

Mixed Number

Carry

Multiply

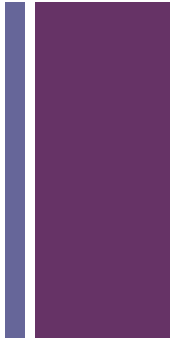
Gross Pay

Numerator

Double Time

Denominator

Time and Half



# + Congratulations!

You have completed the Math Module.



The  
end