



Aircraft Structural Technology

MAT 0090

Aircraft Structural Technology Program Chair:

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Dear MATH Student –

Welcome to Middle Georgia Tech if this is your first semester with us – we are happy that you are here. This workbook is intended to give you practice working problems in your math class but at the same time using words and situations you might have in your Aircraft Structural Technology courses or out there in the working world after graduation!

The workbook is built for you to read the problems and work them on another sheet. Word problems can be tricky and we hope that taking the problems and working them on another page will be helpful on your tests for each chapter!

We also have a great source of inspiration and help for folks who might struggle with math or honestly don't like math very much! This person is our Success Coach, Mr. Marcus Early, if you are not already in his COL 1000 course. His email is mearly@middlegatech.edu. You can stop by his office any day at any time or call him at 988-6800, extension 4069. He will be very happy to see you and talk about your career in Aircraft Structural Technology.

If you have not met the Aircraft Structural Technology Program Chair, Randy Rynders, you might take a minute one day to go by and meet him. He'll be glad to talk to you about the courses you might be taking in his program. He is located in C-108.

If you have any comments about this workbook and how we can make it better, please let your math teacher know! We would love to hear what you think --

Module 1, Whole Numbers

Matt and Jay assemble aircraft parts for American Aviation Industries. Total the parts assembled.

	Monday	Tuesday	Wednesday	Thursday	Friday
Matt	125	200	345	673	4,345
Jay	+ 95	+ 115	+ 550	+ 443	+ 5,334
TOTAL Parts					

Premier Aviation sells jet fuel at the airport. Calculate how much fuel is remaining.

	Monday	Tuesday	Wednesday	Thursday	Friday
Starting Gallons	127	600	845	673	4,363
Gallons used	- 25	- 250	- 550	- 443	- 2,334

Gallons Remaining

- ✓ Tony is a mechanic at Eastern Airlines. He worked 9 hours Monday, 11 hours Tuesday, 7 hours Wednesday, 9 hours Thursday, and 8 hours Friday. How many hours did he work for the week?
- ✓ Diana and Howard need 128 fasteners to complete their first job. Their second job requires them to use 59 fasteners. The third, and last, job of the day requires the use of 265 fasteners. What is the total number of fasteners Diana and Howard will use?
- ✓ Brian works in the supply department of Vans Aircraft parts. He had 349 spark plugs in stock Monday morning. By the end of the day, 29 of the spark plugs were sold. On Tuesday, another 34 were sold. A new shipment of 200 spark plugs arrived the following day. The total spark plug sales for the rest of the week were 187. How many spark plugs did Brian have left?
- ✓ Rhonda measured 32 inches from the nose of the airplane going back towards the tail. From that point, she measured an additional 117 inches in the same direction and marked an "X" at that spot. From the "X", Rhonda had to measure 67 inches towards the nose of the airplane and drill a hole. How far is the hole from the nose of the airplane?
- ✓ The training classroom has 228 square feet of aluminum, 56 square feet of titanium, and 73 square feet of magnesium to be used for new hire training. However, 36 square feet of the aluminum had to be discarded because it was damaged. What is the total amount of metal available for new hire training?

Module 1, Whole Numbers

You are the production supervisor for Robins Aviation, a small business that manufactures C-17 detail parts and small assemblies for Boeing of Macon. The production cost data is listed for each product. Multiply to determine the total production cost for each product.

	Product A	Product B	Product C	Product D	Product E
Items produced	125	200	345	6,373	4,434
Cost per item	X 10	X 29	X 32	X 110	X 239
TOTAL Cost					

Rosa Hernandez is trying to determine the number of fasteners that were used to manufacture each of the following assemblies. Use division to determine the number of fasteners per unit.

$1200 \div 12$

$550 \div 4$

$4563 \div 6$

$1,367 \div 52$

$28,332 \div 52$

- ✓ Robins Aviation has 15 employees. If each of the 15 employees produced 30 assemblies in a given week, how many total assemblies would be completed?
- ✓ If the employees of Robins Aviation earned \$23 per hour and worked a total of 246 hours, how much is the total payroll?
- ✓ If an aircraft window manufacturer produced 1,492 windows in an 8 hour shift. How many windows is that per hour?
- ✓ A small charter plane company logged over 24,921 miles in a six-day period. What was the average miles per day flown?
- ✓ Benton Aviation has 27 employees who work in 4 divisions. In a week, the 27 employees worked a total of 892 hours and were paid \$15 per hour. 1) What is the total payroll for the week?
2) What is the total payroll for each division?

Module 2, Fractions

Holly has to mix two-part adhesives using ounces as a unit of measure. Total the ounces used for each project.

	Project 1	Project 2	Project 3	Project 4	Project 5
Part A	$2/3$	$2/5$	$7/16$	$2 \frac{1}{4}$	$7 \frac{3}{8}$
Part B	$+ 1/3$	$+ 3/5$	$+ 5/8$	$+ \frac{3}{4}$	$+ 2 \frac{1}{8}$
TOTAL	<hr/>				

Dan has to paint the aircraft using several different colors. How much of each color does he have left when the job is done?

	Blue	Red	White	Yellow	Black
Paint Can Level	$2/3$	$4/5$	$9/16$	$2 \frac{1}{4}$	$7 \frac{3}{8}$
Amount Used	$- 1/3$	$- 3/5$	$- 1/16$	$- \frac{3}{4}$	$- 2 \frac{1}{4}$

TOTAL Remaining

- ✓ Bennie worked $2 \frac{1}{2}$ hours overtime on Thursday and $3 \frac{3}{4}$ hours overtime on Friday. How much total overtime did he work?
- ✓ At Acme Helicopter Rotors, $342 \frac{7}{8}$ units were produced on one production line and $412 \frac{1}{5}$ on the second line. How many total units were produced?
- ✓ The materials planners at Joe's Flying Machines allocated $500 \frac{3}{4}$ square feet of carbon fiber cloth for a fighter plane modification. $15 \frac{7}{8}$ square feet was waste. How many square feet of carbon fiber cloth were used?
- ✓ Mary Ann is sent out by her company to fix disabled aircraft. Her travel mileage is $23 \frac{1}{2}$ miles, $45 \frac{3}{4}$ miles, $11 \frac{2}{5}$ miles and $19 \frac{3}{16}$ miles. What are her total miles to be reimbursed?
- ✓ Dylan works at Delta Airlines and owns stock (DAL) which is trading at $14 \frac{1}{2}$. Southwest Airlines stock (LUV) is trading at $12 \frac{1}{4}$. How much more is the DAL stock than the LUV stock?

Module 2, Fractions

Bob owns an aerospace manufacturing business. On a series of jobs, he has allocated the costs of raw materials; some of the jobs are partially completed. Calculate the total job costs by multiplying the number of jobs completed by the amount of the total raw material costs allocated.

	Job A	Job B	Job C	Job D	Job E
Jobs completed	2/3	2/15	7/16	2	7
Raw Materials costs	X 1/3	X 4/15	X 5/9	X 3/4	X 2 1/5
TOTAL Costs					

As the accountant for Bob's propeller manufacturing business, you must allocate the costs of carbon fiber in tons by the predicted number of jobs (or parts of jobs) needing the carbon.

	Job A	Job B	Job C	Job D	Job E
Tons of carbon	2/3	3	17	1/4	7
Number of jobs	÷ 1/3	÷ 4/15	÷ 5/8	÷ 3/4	÷ 2 3/4
TOTAL tons per job					

- ✓ Sarah has a $7\frac{1}{2} \times 3$ foot piece of metal and needs to fabricate 800 brackets whose stock size total $4\frac{1}{2}$ in. How many brackets will she be able to make from the piece of metal?
- ✓ Gregory has been assigned the task of manufacturing 1500 brackets each bracket is $4\frac{3}{4}$ sq. in. How much metal will Gregory need?
- ✓ In Olivia's production line, she needs $7\frac{1}{8}$ feet of copper wiring per job. She has $4\frac{3}{4}$ jobs left to complete. How many feet of copper wiring does she need?
- ✓ Joan worked overtime this week! Her overtime is a time-and-a-half ($1\frac{1}{2}$) rate. Her normal pay rate is \$13. What is her overtime pay rate?
- ✓ Wyatt has $23\frac{1}{4}$ oz. of epoxy resin available to wet out some fiberglass laminate. This resin is applied at a $1\frac{1}{2}$ oz. per sq. ft. rate. How many feet can be covered?

Module 3, Decimals

Pam is an ASST student. She must calculate the total cost of her project using the information below for each item.

	Top	Bottom
Metal	\$ 114.50	\$ 211.25
Hardware	126.33	99.32
TOTAL	<hr/>	

Donna must deduct the total cost of her project from her budget to determine the amount left in her account.

	Project #1
Budget amount	\$ 1,234.50
Total cost	129.45
TOTAL	<hr/>

Jack is making a series of one-year loans. Calculate the total interest on these loans below based on interest rate and principle.

	Loan 1	Loan 2	Loan 3
Principle	\$ 5000.00	\$ 6571.25	\$ 10,278.33
Interest rate	.14	.12	.07
Total Interest	<hr/>		

Paul is determining the selling price of his sheet metal products. One of the costs is specialized rivets; determine the costs per unit from the information below:

$$\$4.50 \div 20$$

$$\$128.95 \div 125$$

- ✓ Devon has to weld three steel plates together. The plates are; .980", 4.50" and 2.5" thick. What is the total thickness of the three plates?
- ✓ Jillian is paid \$23.50 per hour and received 1.5 times that rate for overtime. She worked 3.5 hours of overtime. How much is her overtime pay?
- ✓ The delivery van for Bob's Sheet Metal went 340.40 miles on 17.5 gallons of gas. What is the gas mileage of the van?
- ✓ A load of steel costs \$21.60 per foot. The construction job required 55.75 feet. What is the cost?

The total overhead costs for the manufacturing jobs in January was \$45,221.22. There were 217.25 jobs completed in January. What is the cost per job?

Module 4, Percent and Ratio/Proportion

Mike has a series of markup amounts for the sheet metal he sells. Convert each markup percent below:

Percent	6%	78%	5.4%	117.45%
Decimal				
Fraction				

Jillian has started a new job at a metal sales store and there are several markup amounts that she has been given. To make calculations easier, she wants to convert them all to percents, decimals, and fractions.

Percent				
Decimal		.03		1.23
Fraction	$\frac{1}{2}$		$\frac{7}{16}$	

- ✓ An inventory had been completed at Miller's Metal Works and reveals that .02% of the \$523,993 amount of raw materials cannot be found. How much is the missing inventory worth?
- ✓ The selling price at Schwarts Fabrication is 23% over the cost of each item. One item costs \$442.33; what is the selling price?
- ✓ A drill press that lists for \$2500 has been reduced by 15%. What is the selling price now?
- ✓ Sam is taking out a \$128,332 loan for a house which requires a 3% down payment. He has \$3,850 available; will he be able to get the loan?
- ✓ Yolanda has \$5,000 available for a down payment on a house. The down payment required is 4.5% of the loan; how much of a loan will Yolanda be able to receive?
- ✓ Richard receives a commission on all the metal sales he makes over \$4500 and his commission rate is 2.5%. This week, he made \$5467.76 in sales – what is his commission?
- ✓ A shipment of \$25,932 to our store has a number of items that must be returned. If \$592.33 of the shipment is returned, what percent of the shipment are we keeping?

Module 5, Measurements

Bill is the accounting clerk for a supply company. The cost of a number of products is based on one measurement and sold based on a different measurement. What are amounts below:

Cost measurement	3 gal	157 cm	1600 g	2 T	7 ft
Sales measurement	pt	m	kg	Lb	In

Cost measurement	29 gal	357 cm	4512 g	17.5 T	18.75 ft
Sales measurement	pt	m	kg	Lb	In

Cost measurement	10 lb	257 cm	242 g	11 kg	18.75 ft
Sales measurement	kg	inches	oz	Lb	cm

Sheila works for two doctors. Unfortunately, one of the two wants all temperature readings to be in Fahrenheit and the other doctor wants the readings to be recorded as Celsius. Sheila has the following temperature readings; please record what the other doctor would want.

Doctor A	28 F	F	98.6F	F
Doctor B	C	45 C	C	49 C

Module 6, Geometry

Beeton's Development, Inc. is searching for a plot of land for a development project. Calculate each parcel of land below to determine the total square feet.

Length	120'	150'	85.5'
Width	80'	110'	90.35'
Square feet			

Adler Tanks builds cylinder-shaped tanks for propane gas companies. Calculate the volume of each tank below:

Diameter	6'	5'	12'
Height	6'	6'	8'

Bernard has a lawn service company and charges his customers \$2.00 per square yard. Calculate his fee for each of the following yards:

	Triangle	Triangle	Rectangle	Rectangle	Parallelogram	Parallelogram
Length			125'	53.5'		
Width			230'	300'		
Base	20'	120.5'			35'	110.34'
Height	55'	88.25'			50'	321.55'
Square Feet						
Total Fee						

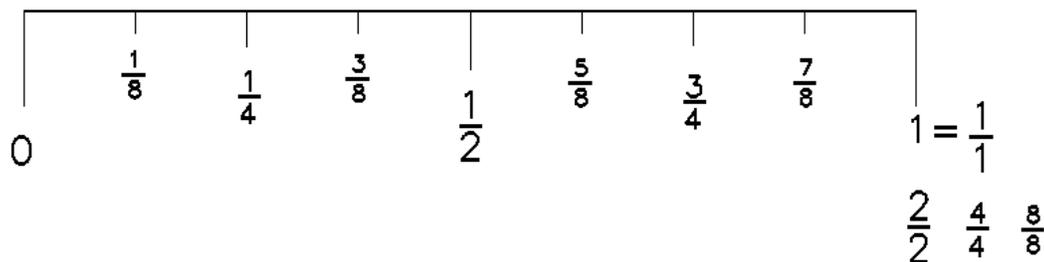
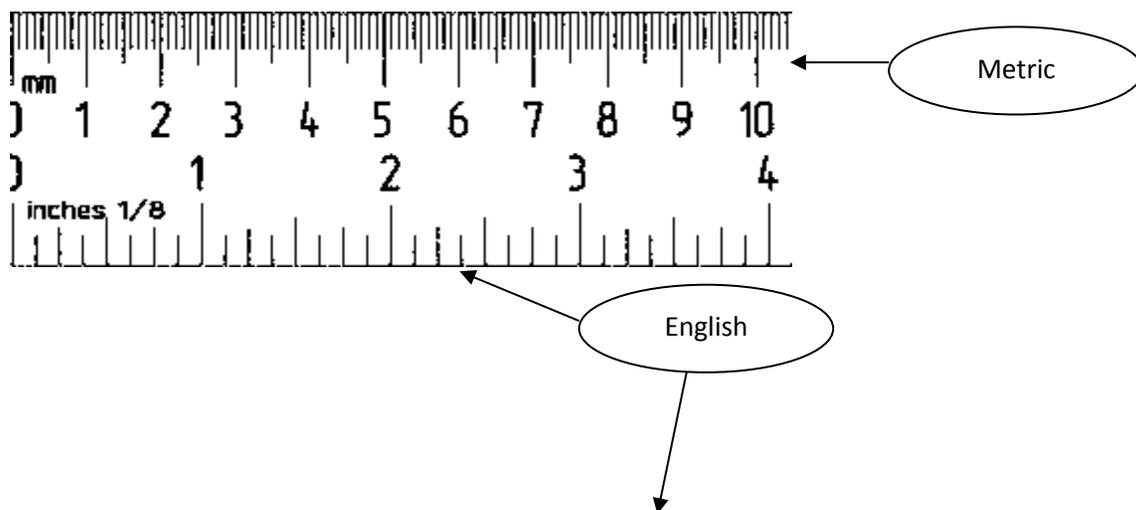
- ✓ Mullen, Inc. constructs and sells irrigations systems for farmers. In a particular field, the length of the irrigation system beginning at the center of the circle is 225 feet and it runs in a complete circle. What is the size of the watered area?
- ✓ Alan is establishing the costs of painting the office. One can of paint cover 56 square meters. The lobby of the office is circular and has a diameter of 32 feet. How many gallons of paint are needed for the floor?
- ✓ Fencing costs \$13.25 per foot. The office lot is circular and has a diameter of 413.25 feet. How much will the fence cost?

Reading a Ruler

Reading a ruler is a valuable skill that you will likely use in your program and on your job!

The standard English ruler is divided into inches. Each inch is divided in half. Each of those halves is divided in half to give you quarters. Each of those quarters is divided in half to give you eighths. And each of those eighths are divided in half to give you sixteenths.

The standard metric ruler is also divided but instead of fractions of an inch, metric ruler divides down from centimeters to millimeters. You won't have to worry much about fractions. The larger lines with numbers are centimeters, and the smallest lines are millimeters. Since millimeters are $\frac{1}{10}$ th of a centimeter, if you measure 3 marks after a centimeter, it is 1.3 centimeters long.



This is an English ruler, enlarged to show just one inch. Notice how it is divided by $\frac{1}{2}$, then that is divided into $\frac{1}{4}$, and $\frac{1}{8}$.

Although you are probably familiar with rulers, yard sticks, tape rules, folding rules, and tape measures, you will also find rulers on many machines that you use such as saws, sewing machines, photocopiers, and computer scanners. Computer programs like Microsoft Word and Adobe PhotoShop have electronic rulers that you can turn on to help you with the exact placement of items. As you can tell, reading a ruler is a valuable skill that you will use almost every day both on and off the job. Measurement is just one reason to learn fractions.

On the ruler below, find the following:

1 $\frac{1}{2}$ inches

2 $\frac{3}{4}$ inches

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

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

2 $\frac{5}{8}$ inches

3.5 inches

1 cm

2.3 cm

7.5 cm

5 mm

9.7 cm

10 cm

