Review session 1 notes

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1 Introduction

We covered a number of topics. I'll give you an overview here of what we covered.

2 Trigonometry and geometry

We discussed trigonometry quite a bit. You should spend some time reviewing basic trig. What do I mean by basic trig?

$$sin(\theta) = \frac{Opposite}{Hypotenuse} \tag{1}$$

and the same for cos and tan. Also, given something like

$$x = sin(\theta), \tag{2}$$

how would you solve for θ?

We also went through common triangles to know, such as 30-60-90 triangles, and 45-45-90, the fact that the three angles sum to 180 degrees around a triangle.

Similarity triangles are also useful to know. Plus know rules such as a small box between two lines representing a 90 degree angle, and

3 Vectors

We discussed vectors. Also, we recalled that vectors have a magnitude and direction, but that another way to consider is that they have magnitude, direction, and sense, where sense is whether the vector is positive or negative.

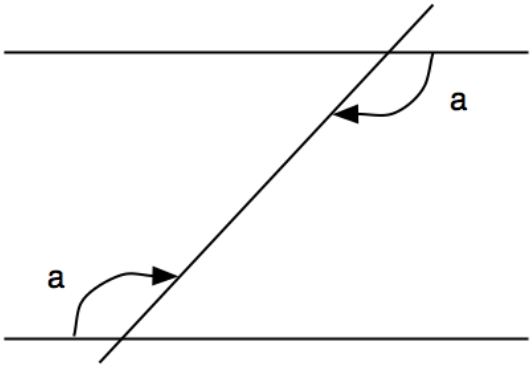

Figure 1: Similarity rules for lines and angles between parallel lines

4 Standard unit systems

Metric vs. english - think about three base units and one derived. The derived unit in the metric system is Newtons, while English's unit is slugs (mass). You can find the definition of slug from F=ma. For example,

$$[N] = [kg]\frac{[m]}{[sec]^2} \tag{3}$$

But for english units,

$$[lb] = [slug]\frac{[ft]}{[sec]^2} \tag{4}$$

We discussed prefixes. Remember that the standard way to present numbers is with a single prefix. So you should not write a value as $mN/\mu sec$, but rather as kN/sec.

We also discussed significant figures. Why is the standard engineering number of significant figures at least three?

5 Force vectors

We discussed pythagorean theorem,

$$C^2 = A^2 + B^2 \tag{5}$$

and how that relates to getting cartesian vector notation from a force vector given it's magnitude and angle.

We did some examples having to do with 2D force vector problems.

Remember to start with the problem, write

- What you are given and redraw the diagram
- What you are asked to find
- Steps to solve the problem

Then go ahead and solve it. Be sure to take it one step at a time. Save the actual calculation until the end, don't combine simplifications. In other words, don't go from $x = 10 * sin(30) + 5 * cos(90)$ to $x = 5$ immediately, write each calculation out instead.

We worked through problem 2.3 and 2.7. In the process we discussed why the parallelogram law is useful, and how in engineering we work on defining constraints, interrelationships, and unknowns. If we find enough interrelationships then we can determine unknowns.

In the process, we discussed adding many vectors together, breaking them down into x and y components and how convenient that is.

We went through several times how the parallelogram is constructed in 2D force vector problems, and then how to bisect that into two triangles and use the law of cosines and law of sines to determine the unknowns.

6 Conclusion

Well that's pretty much it. If you review class notes and examples, the little quizes we did in class, the book, example problems, and do the reading, you will have no trouble at all. This is a warm up quiz, and only consists of five questions. Good luck!