A message from L.W. Bruch, Chairman of the Physics Department to Students Enrolled in Undergraduate Physics Courses

WELCOME TO PHYSICS

The Department of Physics is committed to providing students enrolled in our physics courses with a good educational experience, one that will increase your understanding of the physical universe we share. Course work will be demanding, and we hope, rewarding.

Should you have concerns about your studies in the department, you should not hesitate to discuss them with the faculty member in charge of your course or with the teaching assistant who has responsibility for the discussion or laboratory section to which you are assigned.

We are interested in you and your well-being as a physics undergraduate student. Should you have a non-subject matter question or concerns of a more general or special nature, please contact Jean Buehlman, the Instructional Program Manager. Jean is available to meet with you afternoons in Room 2520 Sterling Hall. Her campus phone number is 262-2629.

Welcome to Physics! We are glad to have you with us.

NOW A MESSAGE FROM THE COURSE INSTRUCTORS

The message from the chairman gave you the good news: you can get a tremendous amount of help. Consultation hours with any of the teaching assistants, instructor office hours and review sessions are all available to you. Please take advantage of these opportunities, you paid for them!

Now for the bad news:
Knowledge in science is acquired sequentially: in order to understand principle **C** you must have understood principle **B** and its applications, and in order to understand principle **B** you must first master principle **A**. This means that you must keep up with the material in a regular way, the assigned homework will help you find out whether you are doing well.
A lot of homework is assigned for every week, this will take quite a few hours, but do it, and do it regularly, you can even try some non assigned problems. Do not try and cram all the material the week before an exam! It does not work, and you will get little sympathy from the teaching assistants and instructors.

In order to follow the course you should know:

- Scientific (exponent) notation.
- Algebra: solving one linear equation with one unknown, solving a system of two linear equations with two unknowns, and solving a quadratic equation.
- Elementary trigonometry: how to use sine, cosine, tangent and the corresponding inverse functions.
- Elementary geometry: areas and volumes of geometrical figures, properties of triangles.

Try to do the self-test, if you have trouble with it, do not despair, but get some help right away.

We want you to learn to visualize a problem, identify the principles involved, and solve the problem algebraically. The numerical answer is not as important.

An example problem:
The price of pizza is 0.25 $ per square inch, calculate the cost C of a 8" pizza.
First you list the data:
$p = 0.25 \ \ \$/sq\ in$
$d = 8 \ \ in$
Then you decide that you must find the area of a pizza with diameter d:

$$A = \pi r^2 = \pi(\frac{d}{2})^2 = \frac{\pi}{4}d^2$$

Then you calculate the cost:
Answer:

$$C = Ap = \frac{\pi}{4}d^2p$$

If the values of p and d are clearly shown (with their units), and if the formula for A is correct then this is a sufficient answer. Do not lose time "plugging in" the numbers to check the answer numerically, check instead with you TA whether the two equations you wrote are the right idea or not.

PHYSICS 103 SELF TEST

1) $1232.2 = 1.2322 \times 10^n$ $\quad n = ?$

2) $\frac{a^4}{a} = \frac{1}{a^n}$ $\quad n = ?$

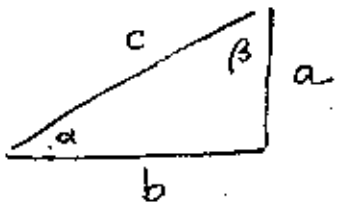
3) $ax + b = c$ $\quad x = ?$

4) $a + \frac{b}{x+c} = d$ $\quad x = ?$

5) $x - vt = 0$ $\quad x = ?$

$x = u(t - t_0)$ $\quad t = ?$

6) $ax^2 = bx$ $\quad x = ?$



7) given **a** and α $\quad c = ?$

8) given **a** and **b** $\quad \beta = ?$

1) You had to move the decimal point three positions to the left, that is the same as dividing by 1000; you now have to multply by $1000 = 10^3$. $n = 3$

2) $\frac{a^4}{a} = \frac{1}{a^n} = \frac{a^4}{a^1} = a^{4-1} = a^3 = \frac{1}{a^{-3}}$ $n = -3$

3) $ax = c - b; \rightarrow a = \frac{c-b}{a}$

4) $\frac{b}{x+c} = d - a; \rightarrow b = (d-a) \times (x+c); \rightarrow x + c = \frac{b}{d-a}; \rightarrow x = \frac{b}{d-a} - c$

5) $x = vt$ substituting in the second equation one gets:
$vt = u(t - t_0) \rightarrow vt - ut = ut_0 \rightarrow t = (ut_0)/(v-u)$; putting this value in the first equation: $x = (uvt_0)/(v-u)$

6) $ax^2 = bx \rightarrow ax^2 - bx = 0 \rightarrow x(ax - b) = 0$ if the product of two numbers is zero, then one of the two must be zero. $x = 0$ or $ax - b = 0 \rightarrow x = b/a$

7) $sin\alpha = \frac{a}{c} \rightarrow c = \frac{a}{sin\alpha}$

8) $tan\beta = \frac{b}{a} \rightarrow \beta = arctan(\frac{b}{a})$ or $\beta = tan^{-1}(\frac{b}{a})$