I. Graph the following functions :

$y = e^{2x} - 3$ in the range $-2 < x < 2$

$y = \sqrt{x^2 - 4}$ in the range $2 < x < 8$

$y = e^{-3x}$ in the range $-2 < X < 2$

II. Solve for the following :

Find the distance an object travels if it starts from rest and accelerates at the rate of 3 m/s/s for 7 seven seconds.

Find the distance an obect travels if it starts with an initial speed of 10 m/s and accelerates at the rate of 3 m/s/s for 7 seconds.

What is the speed of an object that starts from rest and falls in the earth' s gravitational field for 7 seconds?

Assume the Earth has a circular orbit around the sun of 93 million miles (approximately 150, 000, 000 km). What is the speed of the Earth in m/s?

III. Optics Questions

Use the lens equation to determine the image distance for an object whose object distance equals the focal length of the lens.

The magnification of a lens tells you how much larger (or smaller) the image is compared to the original object. A magnification of 3 means the image is 3 times larger than the object; a magnification of 1/4 means the image is 4 times smaller than the object. A positive sign for the magnification means the image is upright, a negative sign means the image is inverted (upside - down).

  The equation for magnification is :

$$m = \frac{-i}{o}$$

where m is the magnification, i is the image distance and o is the object distance.

If an object is placed closer to the lens than the focal length, will you have an upright or inverted image?

If the focal length is 20 cm and an object 5 cm tall is placed 40 cm away from the lens, where is the image formed, what is the magnification of the image, and is the image inverted or upright?

IV. Lab Design

Suppose you have planned to teach a class on speed and acceleration using material you purhcased for this activity including ramps, carts, and stopwatches.

You come into class and find all the material is missing. There is no possibility of delaying the lab until another day or borrowing equipment from another classroom, you have to use materials commonly found in classrooms to conduct this activity. Describe the set up of your activity.

V. RAGS

Describe two places in RAGS where you believe the authors are wrong. Explain the position of the authors and cite evidence to build your case against their argument. Again, the key is using evidence to construct a logical counterargument.

VI. Exponential functions

You start with $1000 in a stock account on your 20 th birthday (and for purposes of specificity, let' s say this happens in the year 2010. The stock account increases value at a yearly rate of 10 %, however, inflation devalues your money at the rate of 2 % each year. On your 30 th birthday, how much money is in the stock account, and also what is its value in constant 2010 dollars?

Based on what you learned in class, answer this classic physics brain teaser. You have a very hot cup of hot chocolate on which you will put a layer of whipped cream. You want the hot chocolate to cool down to a certain temperature before you drink it. What should you do to make the chocolate cool down more rapidly : a) put the whipped cream on immediately and then let it cool? b) Let it cool and then put the whipped cream on?

Explain your reasoning.

VII. Volume/Area Ratios

Explain why polar animals tend to be more spherical in shape.

Explain why the Viking life scientists believed that if there was macro life on Mars, that it would be fairly large in size.