

This is an assessment, not a test: it is meant to help me understand your background and current reading level. You should take about 20 minutes to look at each part. If you can't answer a question, leave it blank and don't worry about it!

## READING 1

Some of our summer reading includes Michael Faraday's "The Forces of Matter", which are lectures that Faraday gave in 1859 in London. These can be difficult for modern readers, even adults, because Faraday uses terms that have been replaced by modern physics concepts, and because he is actively talking about the demonstrations he performs for his audience, which of course, we can't see.

Here is a typical paragraph from Faraday's work. Read through it and answer the questions below.

Let us now consider, for a little while, how wonderfully we stand upon this world. Here it is we are born, bred, and live, and yet we view these things with an almost entire absence of wonder to ourselves respecting the way in which all this happens. So small, indeed, is our wonder, that we are never taken by surprise; and I do think that, to a young person of ten, fifteen, or twenty years of age, perhaps the first sight of a cataract or a mountain would occasion him more surprise than he had ever felt concerning the means of his own existence; how he came here; how he lives; by what means he stands upright; and through what means he moves about from place to place. Hence, we come into this world, we live, and depart from it, without our thoughts being called specifically to consider how all this takes place; and were it not for the exertions of some few inquiring minds, who have looked into these things, and ascertained the very beautiful laws and conditions by which we do live and stand upon the earth, we should hardly be aware that there was any thing wonderful in it. These inquiries, which have occupied philosophers from the earliest days, when they first began to find out the laws by which we grow, and exist, and enjoy ourselves, up to the present time, have shown us that all this was effected in consequence of the existence of certain forces, or abilities to do things, or powers, that are so common that nothing can be more so; for nothing is commoner than the wonderful powers by which we are enabled to stand upright: they are essential to our existence every moment.

1. Are there any words in this paragraph that you don't know, or phrases that don't make sense to you? Which ones? (make a note of words you don't know as you read, so that you can look them up, or ask about them in class).
2. Faraday thinks people have an "absence of wonder" about some kinds of things. What kinds of things does he think cause people to feel wonder or surprise? What kinds of things don't cause this wonder?
3. What kind of force or power do you think Faraday means when he talks about the laws and conditions by which we "stand upright on the earth"?
4. Who has found out details about these forces and powers?
5. What does Faraday think causes us to grow and exist (and stand up)? Are these causes common or unusual and rare?
6. Try to summarize this paragraph in a few sentences?

Most of our attention, however, will focus on Breithaupt's book, *Teach Yourself Physics*, which (while it has some problems especially in the introduction) gives a good summary with examples of the major principles of physics.

Here's an example of a more technical part of his book:

#### MOTION IN A STRAIGHT LINE AT CONSTANT SPEED

Speed is defined as distance travelled per unit of time. The scientific unit of speed is the metre per second (abbreviated as m/s or  $\text{ms}^{-1}$ ). For an object moving at constant speed, the distance travelled by the object in a certain time can be calculated by multiplying the speed by the time taken.

Distance = speed \* time taken

For example, suppose a car is traveling at a constant speed of 12 m/s. The car therefore travels a distance of 12 metres each second and would travel a distance of 720 metres in 60 seconds (= 12 m/s \* 60 seconds). In 1 hour, which is 3600 seconds, the car would travel a distance of 43 200 metres (= 12 m/s \* 3600 seconds), or 43.2 kilometers.

*This text was published in England, so the British spelling "metres" is used instead of "meters". A kilometre is 1000 metres.*

1. What is speed? What are the units of speed?
2. What is the constraint or condition for using his definition of speed (distance = speed \* time taken) ?
3. Can you write an equation or formula for this definition of speed?
4. Using your equation in #3, can you solve for speed to get a formula you can use for calculating the average speed of an object if you know the distance it travels in a given time?