TEACHING CHURCH SCHOOL SCIENCE

Study Pack 01

Mr. Joe Sortman

Teaching Church School Science

Study Pack 01 – Lecture 01

Overview

1) It is important that you understand the basics of the principles of how things work and have the mental framework in place so you can _____ the world and can figure out how to _____ problems and deal with situations that come up.

2) Science encourages students to develop _____ _____ _____, which can be applied to many other areas of life.

3) In teaching science, there are two great tools that should be used before answering a single question:

   a) The first tool is _____.

      i) This is the _____ and _____ of the PACE/Lesson/Course. (What it is that you're being taught.)

      ii) This will always be available to the _____; it may not always be available to the _____.

   b) The second tool is _____.

      i) Definitions are specifically tailored toward how these concepts are _____ in the course.

      ii) Correct _____ should be included.

      iii) Understanding the _____ that are used is job one in learning new skills.

4) Very often, questions students might have can be answered from the information on the _____ _____ of pages.

5) Science is about discovering the "_____" of the universe.

6) The fact that there are universal rules (scientific "_____") about how things work basically screams out that there is a _____.

7) Most of the scientists that we credit with discovering these laws were _____.

8) Johannes Kepler referred to his research as "Thinking God's _____ after Him."

9) Galileo, Faraday, Newton, Kepler, etc. regarded their _____ studies and publications as equal or greater in importance to whatever they accomplished in the scientific realm.

10) _____ is the study of matter and energy and the relationships between them.

11) A big part of physics is math. Most scientific laws can be summarized in _____.

12) _____ is very important in physics. This is where you get the numbers to put into those _____.

13) There are two kinds of quantities:
    a) _____
    b) _____.

14) These quantities can be measured and manipulated and, if you know the correct math to do, you can use them to describe things or even _____ the results when you perform an action.

15) Internationally, people have agreed on the definitions of _____ fundamental units of measurement.

16) Before people agreed on standards, we would base measurement on _____ _____.

    a) A _____ is the distance from your elbow to the tip of your finger.

    b) A _____ was literally the length of your _____.

17) The agreed upon fundamental units are used to measure are:
    a) _____
    b) _____
    c) _____
    d) _____
    e) _____
    f) _____
    g) _____

18) All other units of measurement are made up from some combination of these or other measurements, which is why we call them _____ _____.

19) _____ is the distance between two points.

a) We measure it by comparing the unknown distance with a _____ _____. (Like a cubit, foot, or meter)

b) The most common scientific standard for measuring length is the _____.

c) This uses the _____ system.

d) This is also referred to as the "_____ _____". "_____" is the initials for the French words "Le Système International d'Unités" translated as "System International". (International System of Units)

e) The current definition of a meter is the distance _____ travels in a vacuum during 1/299,782,458th of a second.

f) The important thing is that there is an agreed upon _____.

20) _____ is the amount of matter in an object.

a) It is not the same as _____.

b) The _____ is the fundamental unit for mass, but it is too small to use conveniently. We use _____ grams or _____ for most things.

c) A _____ is about 2.2 pounds.

d) The definition of the kilogram uses a measurement from another fixed value from nature, Planck's constant (h), which will be defined as 6.62607015×10^{-34} joule seconds. (No blanks)

e) Planck's constant can be found by dividing the electromagnetic frequency of a particle of light or "photon" by the amount of energy it carries. (No blanks)

a) The constant is usually measured in joule seconds but this can also be expressed as kilogram square meters per second. We know what a second and a meter is from the other definitions. So by adding these measurements, along with an exact knowledge of Planck's constant, we can get a new, very precise definition of the kilogram. (No blanks)

20) One _____ was defined as 1/86,400 of an average solar day.

a) This is the time it takes for the earth to _____ on its axis, averaged over a year.

b) The problem is that this _____ very slightly over time.

c) We still use this as "_____ _____".

d) The current and formal definition in the International System of Units is more precise: "The second [...] is defined by taking the fixed numerical value of the cesium frequency, $\Delta\nu_{Cs}$, the unperturbed ground-state hyperfine transition frequency of the cesium 133 atom, to be 9192631770 when expressed in the unit Hz, which is equal to s^{-1}." (No blanks)

e) This current definition was adopted in 1967 when it became feasible to define the second based on _____ properties of nature with cesium clocks. Because the speed of Earth's rotation varies and is slowing ever so slightly, a _____ _____ is added at irregular intervals to civil time to keep clocks in sync with Earth's rotation.

21) _____ is the degree of hotness or coldness measured on one of several arbitrary scales based on some observable phenomenon.

a) In scientific terms, _____ is the degree of a material substance that is a linear function of the _____ _____ of the random motion of its molecules.

b) The SI unit for temperature is the "_____ degree".

c) This is the same as the "_____ degree" but that scale was defined by finding the boiling point and the freezing point of water at sea level and dividing by 100.

i) This results in "0" and negative numbers that make calculations more complicated, so the Kelvin scale was developed.

22) The _____ is equivalent to a flow of one coulomb per second or to the steady current produced by one volt applied across a resistance of one ohm.

23) The _____ is the luminous intensity in a given direction of a source that emits monochromatic radiation of frequency 540×10^{12} hertz and has a radiant intensity in that same direction of $^{1}/_{683}$ watt per steradian.

24) The _____ is the quantity of a chemical substance that has a weight in grams numerically equal to the molecular weight or that in the case of a gas has a volume occupied by such a weight under specified conditions (as 22.4 liters at 0° C and a pressure of 760 millimeters of mercury).

Memorize for Test 1:
Table of Measurements and Units (See next page)

Memorize for Test 1:
Psalm 19:1 –
The heavens declare the glory of God; And the firmament sheweth his handywork.

For Test 1, be prepared to discuss why the study of science is necessary in any school curriculum.

Measurement	Unit	Abbreviation
Length	meter	m
Mass	kilogram	kg
Time	second	sec
Temperature	Kelvin degree	K
Electric Current	ampere	amp
Luminous Intensity	candela	cd
Particles of Matter	mole	mol

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