Final Project

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Final Project Part 1

Complete Part 1 of the Final Project - Goals, Academic Standards, Instructional Activities and Learning Targets

Identifying information

Includes five elements: Title Page, Course Name, Grade level, textbook and other related materials.

Final Project – Fundamentals of Science Unit

Honors Earth Science

9th grade

Textbook: Earth Science, Holt Publishing; 2008.

Goals and Academic Standards

Includes the unit goals aligned to the academic standards, including full standard statements and descriptors in addition to numbers.

Earth Science -Students will understand and apply scientific concepts, principles, and theories pertaining to Earth Science.

ES 1- Students will use mathematical analysis, scientific inquiry, and engineering design, as appropriate, to pose questions,
seek answers, and develop solutions

ES 1.1 Understand that science uses both qualitative and quantitative observations as a means to study the natural world.
ES 1.2 Use process skills to make inferences and predictions using collected information by means of a lab report.
ES 1.3 Use process skills to collect, organize, and show metric measurements.
ES 1.4 Use deductive and inductive reasoning to reach mathematical conclusions including abstract and symbolic representation to communicate mathematically.
ES 1.4 (A): Honors: Understand and use dimensional analysis/factor label
ES 1.4 (B): Honors: Metric to English Conversions
ES 1.5 Apply process knowledge and organize scientific and technological phenomena in varied ways.

ES 1.6 Develop appropriate scientific experiments by raising questions, formulating hypotheses, testing, controlled experiments, recognizing variables, manipulating variables, interpreting data, and producing solutions.

Major Instructional Activities
Includes a detailed description of the major instructional and learning activities, with evidence of differentiated instruction that is necessary to achieve the unit goals, academic standards and learning targets.

Major Instructional and Learning Activities	**Evidence of Differentiated Instruction (if applicable)**
1. Observations and Inferences Lab Activity After students have taken down some notes on the differences between qualitative observations, quantitative observations, and inferences as well as watching some videos from YouTube they are asked to show that they understand the difference between the three in a quick and simple lab activity. There are six different stations set up in the back of the room (3 versions of this to help spread the students out) with different objects at each where students will need to make observations about how they look, feel, smell, etc. They then will make several inferences based off the different objects. During this time I will be circulating around the lab station making sure materials are at the right stations, answering student questions and making sure students are staying on task. Students through this assignment should be able to properly identify whether their observation is qualitative or quantitative with 100% accuracy as well as be able to make inferences that make sense to the materials used. This lab activity will be graded based on total completion and accuracy.	1. Students are allowed to work individually or in pairs so they can discuss their thoughts and ask questions. They are also allowed to use their notes in Notability on their iPad for reference. My student with Autism who has some sensory sensitivity was only asked to complete three of the six stations to demonstrate his knowledge of the concept taught
2. Metric Mania Worksheet Students first will learn how to convert metric-to-metric conversions like millimeters to centimeters or kilograms to grams. Students will learn how to do this through a video from YouTube and taking down notes as we watch together as a class. Then we will do several examples together as a class to make sure students understand how to use the "King Henry Died By Drinking Chocolate Milk" saying. Next students will work on a worksheet called "Metric Mania" for extra practice. Students will work on this in their group pairs and then afterwards the worksheet is graded for accuracy and completion using a key. Some students may need to finish this worksheet as homework if not finished in class and should be able to utilize the metric ladder with 100% accuracy. While students are working I will be walking around making sure students are staying on task, answering questions and giving extra practice problems to those who are struggling.	2. Students can work individually if they desire but working in their group pairs allows them to help each other. Students have the option to complete on paper or submit via Schoology on their iPad Graded for accuracy with a key but differentiated for IEP students by grading on a range scale as opposed to needing to have all correct to receive a 100%
3. Factor Label Method Worksheet Once students have mastered how to convert metric-to-metric conversions they next will learn how to convert metric to English conversions through the method of Factor Label Method. They will	3. Students are allowed to use a graphing or scientific calculator for computation Students can reference their tri-fold

make conversions like pounds to grams, miles to meters or feet/hour to millimeters/second where they need to convert both the numerator and denominator. Students first need to learn some basic conversion factors that are provided to them in their note packet. After that, students will create a tri-fold where we do five examples together as a class. After that, students are able to work with another person and complete the factor label method worksheet for extra practice. Students should be able to set up each problem with 100% accuracy. This worksheet is checked for completion and then as a class we put the problems on the board and students check to make sure each question was done properly as I check them with my key.	activity as they set up their problems Students are allowed to use a conversion factor reference sheet so they know how many miles are in a foot or how many centimeters to an inch, etc. I don't require them to memorize these factors. Students can work individually or in pairs for collaboration Extra practice sheet for students who are still struggling to complete during FLEX office hours
4. Density Lab Students will first take some notes on the density equation and how to properly find the density of different objects that are either irregular or regular. We will also watch several videos on the density equation and on the concept of density to learn about the different relationships of density such as size, temperature, pressure, and state of matter. After this as a class we practice finding the density of some objects such as a wood block, dice, and different rocks/minerals. This is all in preparation for the density lab. For the density lab students will work in pairs or triplets and have to find the density of the following objects: wood block, ball bearing, sponge and nail. After finding the density the students will calculate their percent error and make a graph comparing the object's density to the density of water. Based off their graph they will need to say whether or not the object would float or sink. They have several questions to answer as post lab questions once their data table and graph is completed. This lab is collected and graded for accuracy as well as proper grammar used within a lab report (students know they must use complete sentences, fully explain their answer, and no texting language is allowed) using a key.	4. Any student who doesn't want to work in a small group may work individually. Students may reference their notes at any time during the lab as a resource Practice worksheet on percent error given prior to the lab so they have this as a reference Students need to have a percent error under 20% or need to go back and find the density again. IEP students in the class may have up to 30% error due to certain impairments that may make their measurements inaccurate making their percent error higher than it should be.
5. Density Project The density project will require students to apply the skills they have learned so far through the notes and lab activity. Students will need to create their own density problem that also has a minimum of one factor label method problem within it. They then will create a video presentation through either ExplainEverything, ShowMe or Educreations on the iPad showing step by step how to solve the problem as well as explaining how one uses factor label method.	5. Some students asked to use iMovie instead of the options mentioned on the project worksheet. Students just need prior approval to use another application besides the one mentioned on the project rubric. Students in the general class do not

Throughout the project, students will have specific benchmarks they must meet like writing out a script, creating a flow chart of their presentation and also getting approval for their created problem. This project will be graded based off a rubric that students receive at the very beginning of the project so they are aware of all requirements and expectations. I also have shown them some student examples at the beginning when explaining the project so they can see the different components mentioned in the project rubric. Students will submit their project to our LMS system called Schoology or Google Drive. Once finished these videos will be used with the general earth science classes as review before the unit test.	need to include a factor label conversion in their project. Honors students do need to include a factor label method conversion.
6. Graphing Lab Activity Prior to starting this lab activity students will have taken down some notes on the different types of graphs, the different relationships that can be represented in a graph, corrected several graphs that were incorrect and also have made several practice graphs including the one in their density lab. We will have also watched a Bozeman Science Video on the different types of graphs and how to graph by hand since in this lab activity students will have to make one graph by hand and one on their iPad device. The graphing lab although each student needs to turn in a lab, they are allowed to work with another person. The first graph by hand they are graphing a multi-line graph that will require a key and all the necessary components to make a complete graph. The second graph they will do on their iPad either through the Data Analysis application, Desmos, or OnlineChart Tool. They will need to graph data from 1925-2007 on the number of sunspots on the Sun. After each graph they will answer post lab questions based off their data tables and graphs. This lab will be collected and graded on accuracy based off a key.	6. Students may work individually if they desire. Students with IEP's will be not required to graph all 83 points but rather nearly half of that, 42 points from 1925-1966 where they will still see the cyclic pattern that students who are graphing all 83 points. Different size graph paper available for part I of the graph for those students who have visual impairments and require larger print. Any other graphing application for part II that wasn't mentioned in the lab may be used as long as it is approved by the teacher.
7. Graphing Project After students have completed their graphing lab they will be given another opportunity to show mastery and growth on graphing by collecting data on anything of their choice. They must create their own data table (20 points minimum), decide what type of graph to create based off their data, create their graph either by hand or by their iPad, and then finally answer four questions based off their graph. I have provided several resources in Schoology on different places they could collect data such as the Weather Channel to plot weather data, tide data, population data or shark attack data to name a few of the different examples. Students who have created their report on their iPad will	7. Students have voice and choice as to whether they want to complete their project on their device or by hand. Students have voice and choice as to what they want to collect data on and what type of graph they want to make.

submit it entirely to Schoology as one complete science lab write-up. Students who created their graph by hand and also the rest of their report by hand will turn this into their class period bin by the due date. This project will be graded based off a rubric that students receive day one of the assignment.	
8. Quizzes on Observations, Inferences & Measurement, Vocabulary Quiz, & Density Students throughout the unit will take several quizzes in our LMS system called Schoology. These are a mix of multiple choice, true and false, matching, and fill in the blank. These different assessments will check for understanding as we proceed through the unit and to also catch any student who is struggling with the concepts found within this unit. The Schoology system is capable of grading the quizzes directly for me and providing me with each student's score. I also have it randomize the order of the questions and the selection choices so no two students can try to copy off each other. I also set the resume option to off so students can't try to multi-task between windows and cheat.	8. Schoology allows me to create groups for each class so I can still assign a modified quiz or test to my IEP/504/ELL students. They are put into a group together and only the modified quiz will show up in their account as opposed to the regular assessment.
9. Fundamentals of Science Unit Exam After all items #1-8 are complete, the students will take the unit exam to assess their knowledge, skills and mastery of the unit. The exam is a mix of multiple-choice, short answer, binary choice as well as having to create a graph at the very end. This unit exam will be graded based off a key.	9. Students are allowed to use the following materials as they feel needed on the exam: A ruler, calculator, and their resource folder which contains the conversion factors necessary for factor label method. Modified exam for those who qualify for this accommodation. Less multiple-choice answers to choose from. Chunking of the exam. Extended time.
10. Unit Reflection After completing this unit that takes roughly about 6-7 weeks, students after taking their unit exam will reflect on the entire unit. They will mention their areas of strength, areas of weakness that they may have struggled with, and areas of recommendation for the teacher. This short essay will be graded on completion and how much effort and thought they put into it. This will be set-up in the format of a Collins Type 1 writing, so students must skip lines, meet a minimum of ten complete lines and write in complete sentences.	10. Students may wish to either hand write their reflection using a Collins Type 1 writing template or they may choose to type their reflection on their device making sure to double space.

Learning Targets
Includes at least one of each type of Learning Target: knowledge and simple understanding, deep understanding and reasoning, skills, products and affective, including those that support self-assessment and peer- assessment. Learning targets include both elements: what students should know, understand and do as well as the criteria for judging the level of performance. (see page 39 – 43)

1. Knowledge and Simple Understanding
    a. Students will be able to demonstrate their knowledge with 100% accuracy on metric-metric conversions, metric to English conversions, and observations worksheets/lab activities.
    b. Students will be able to demonstrate their mastery of knowledge and skills through different quizzes throughout the unit in Schoology.
2. Deep Understanding and Reasoning
    a. Students will work in pairs on the density and graphing lab activities to demonstrate their skills learned through the notes, show their computations step-by-step, and to answer post lab questions in complete sentences.
    b. Students will show their growth and mastery of the unit on a final exam that will have different types of questions (multiple choice, binary choice, short answer) to assess their skills.
3. Skills
    a. Students will be able to show how to solve for area, volume, and density through lab activities as well as practice problems in instruction.
    b. Students will be able to show their knowledge of graphing by using their skills to create several graphs by hand and on their iPad on their lab activity.

c. Students will demonstrate their knowledge and skill of one of the following applications: ShowMe, Educreations, or ExplainEverything through two different projects and their rubric requirements.

4. Products

a. Students will be able to demonstrate their knowledge of density and graphing by creating a final product at the end of each theme by creating a screencast in either ShowMe, Educreations or ExplainEverything using the provided project rubric in order to meet all expectations of the assignment.

5. Affect

a. Students will reflect on their growth and mastery of the unit after taking the unit exam to discuss their strengths, weakness and suggestions for improvement for the teacher in a Collins Type 1 writing assignment which students will need to skip lines, write a minimum of ten complete lines and write in complete sentences, using proper grammar in order to receive full credit.

Final Project Part 2

In the Assessment Plan the instructor identifies the assessments that will be utilized to measure the learning targets established in Part 1. The Plan should include a timeline with a sequence of instructional activities and assessments. The Plan must include a variety of types of assessments and also must include student self-assessment and peer assessment.

Assessment Alignment

All assessments are appropriately aligned to type of Learning Targets (see page 61 of text)

Assessment Tool - Learning Target

1. Observation and Inference Lab Activity

Students will be able to identify qualitative, quantitative observations and make inferences off of objects not seen prior to the activity in class with 100% accuracy.

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2. Metric Mania Worksheet

Students will be able to demonstrate their knowledge of metric-to-metric conversions using the King Henry Died by Drinking Chocolate Milk saying. They will be able to properly convert with 100% accuracy.

3. Factor Label Method

Students will be able to demonstrate their knowledge of English-to-metric or metric-to-English conversions by using the factor label method and conversion factors. Students will show step by step how to set up the equation and solve with 80% accuracy as there are varying levels of difficulty on the worksheet and this is a newly learned skill that is not review from a previous science course.

4. Density Lab

Students will be able to demonstrate their knowledge of the density equation and be able to manipulate the equation with 100% accuracy in order to find the density of both regular and irregular objects showing step by step their work.

Students will be able to demonstrate their knowledge of the percent error equation and be able to compute and solve for the percent error of their measurements for each object within the lab with 100% accuracy making sure that their percent error is $\leq 20\%$ showing step by step their work.

5. Density Project

Students will demonstrate their growth and mastery of the density theme by creating their own density problem using a rubric, solving it step-by-step and explaining how a student should convert from English-to-metric. Student examples will then be used with the general earth science class as extra review videos.

6. Graphing Lab Activity

Students will demonstrate their knowledge of multi line graphs by both hand and on their electronic device making sure that their graph contains all the necessary components discussed in class.

7. Graphing Project

Students will demonstrate their growth and mastery of graphing by collecting data of their choice, creating a graph of their choice either by hand or on their device and answering questions about their graph using a rubric to check for all necessary components and expectations of the project.

8. Unit Quizzes

Students will demonstrate their knowledge of the different concepts learned throughout the unit by being able to answer different questions in the format of multiple-choice, binary choice, and matching.

9. Unit Exam

Students will demonstrate their knowledge of the different concepts learned throughout the unit on a final assessment where they will be required to answer different questions in the format of multiple-choice, binary choice, and short answer.

10. Unit Reflection

Students will reflect on the unit as they write about their strengths, weaknesses, and suggestions for the teacher. Students will pay close attention to their grammar and meeting all requirements of the Collins Type 1 writing activity.

Assessment Timeline
The Assessment Plan includes complete information about the sequence of instruction and assessment with a timeline of events.

Classes are in 75 min. block schedule: Assessments are underlined (predicted schedule for fall semester of 2015)

Week 1:

Wednesday: Focus, Begin Notes
-Introduction Vocab in Notability
-Write down 5 observations (come back to this after we do some notes)
-Begin Observation Notes and Inferences
-Go back and decide what their 5 observations are
-Begin Observation Activity

Thursday: Focus, Finish Observation Activity & Begin Measurements
-Bell Ringer
-Finish Observation Activity (Vocab Quiz tomorrow?)
-Continue with notes
-Measurement examples
-Area and Volume
-Practice Problems

Friday: Focus, Measurement Scavenger Hunt & Conversions
-Vocab Quiz (?)
-Bell Ringer
-Begin Measurement Scavenger Hunt

Week 2

Monday: Focus, No School! (holiday)

Tuesday: Focus, Measurement Scavenger Hunt
-Bell Ringer
-Finish Volume notes
-Measurement Lab

Wednesday: Focus, Conversions
-Bell Ringer
-Metric Conversions Notes and Videos
-Metric Conversion Worksheet
-Metric Mania Worksheet (being graded)
-If time begin Factor Label Method

Thursday: Focus, Quiz and Factor Label Method
-Take Observation/Inference/Measurement Quiz in Schoology

-Factor Label Method Notes and Practice Worksheet

Friday: Focus, Significant Figures Practice
-Bell Ringer Activity (yellow measurement conversion task cards)
-Significant Figures practice worksheets
-If time begin density notes & videos

Week 3

Monday: Focus, Factor Label Method
-Bell Ringer (measurement task cards, metric to metric) *handout answer packet for students
- Significant Figures practice

Tuesday: Focus, Significant Figures Practice
-Bell Ringer Activity (yellow measurement conversion task cards)
-Continue with density notes & videos
-Percent Error notes and practice problems

Wednesday: Focus, Density
-Mass/Volume/Density worksheet in Notability
-Density Task Cards as review and warm up

Thursday: Focus, Continue with Density
-Density Task Cards as warm up
- Density practice problems with wood blocks, dice, etc. before beginning lab

Friday: Focus, Density (Mini work stations) (1/2 Inservice Day)
-Continue with density task cards
-Density Lab

Week 4

- Monday-Friday students will be working at their own pace on both their density project and density lab
-Benchmarks will be set for each day as well as a set number of task cards that must be done each day.

Week 5

Monday: Focus, Density PBA Project
-Density Task Cards (3 blue)
-Students who need to wrap up their lab may (labs due by the end of the period)
-Students should be working on their PBA Density Project (flow chart and begin to record)

Tuesday: Focus, Substitute Teacher
-Science Article Worksheet

Wednesday: Focus, Density PBA Project
-Students should be wrapping up their project with recording and getting it ready to submit
*Projects will be due tomorrow by the end of the day

Thursday: Focus, Graphing
-Graphing Notes
-Graphing Videos
-Graphing Task Cards
-Practice Graphs

Friday: Focus, Graphing
-Graphing Task Cards
-Graphing Lab

Week 6

Monday: Focus, Graphing (Get Real Day #1)
-Graphing Task Cards (2)
-Graphing Lab

Tuesday: Focus, Graphing (Get Real Day #2)
-Graphing Task Cards (2)
-Graphing Lab
-Graphing Project

Wednesday: Focus, Graphing (Get Real Day #3)
-Graphing Task Cards (2)
-Graphing Lab
-Graphing Project

Thursday: Focus, Graphing (Get Real Day #4)
-Graphing Task Cards (2)
-Graphing Lab
-Graphing Project

Friday: Focus, prepare for Exam #1 (1/2 Day for Students)
-Work on Study Guide and Extra Practice Sheets
*Exam on Tuesday

Week 7

Monday: Focus, No School! (holiday)

Tuesday: Focus, Unit 1 Exam
-students will take the unit 1 exam
-when finished students will answer a reflection Collins type 1

Assessment Type
The Assessment Plan includes all at least one of each type of assessments (e.g. selected response, constructed response, performance-based, essay, etc.)

Selected Response:
-Vocabulary Quiz
-Measurements and Density Quiz
-Observation Quiz

Constructed Response:
-Metric Mania Worksheet
-Factor Label Method Worksheet
-Density Lab
-Density Project
-Graphing Lab
-Graphing Project
-Unit Exam

Performance Based:
-Density Lab
-Density Project
-Graphing Lab
-Graphing Project
-Unit Exam

Essay:
-Self-Reflection Collins Type 1 Essay

Self and Peer Assessment
The Assessment Plan includes a complete description of the types of self (and peer assessment - optional) to be used and the rationale for the use of self-assessment (and peer assessment – optional) (see page 281- 285, 308- 312, 320.)

Unit Reflection:

-Students in the format of a Collins Type 1 Essay will reflect on the unit primarily focusing on their strengths, weaknesses, and areas of improvement for the teacher as we move on through the semester. The reflection activity serves two primary purposes: 1. So students can practice and become more comfortable with self-reflecting on them and 2. So students can have an opportunity to express to the teacher what they may need individually as a student or as a whole entire class in the upcoming unit.

Final Project Part 3

In part 3 the instructor designs and develops the assessments that were described in Part 2. This section must include the actual assessments with student directions, scoring criteria, scoring rubrics and answer keys.

Student Instructions / Assessment Design / Answer Keys & Rubrics / References

All of the assessments below are created based off the curriculum standards and use the textbook as a reference. Instructions are at the beginning of each assessment. Rubrics were created through Rubistar as a template for both the graphing and density project.

Grading

Below is the breakdown of how much each assignment is worth and how each student's overall unit grade will be determined.

1. Observation and Inference Lab Activity	10 points
2. Metric Mania Worksheet	15 points
3. Factor Label Method Worksheet	10 points
4. Density Lab	28 points
5. Density Project	43 points
6. Graphing Lab	38 points
7. Graphing project	26 points
8. Unit Quizzes	
-Vocab Quiz	10 Points
-Observation/Measurement Quiz	16 points
-Conversions/Density Quiz	9 points
9. Unit Exam	65 points
10. Unit Reflection	10 points
	280 points

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Qualitative and Quantitative Observations Activity

Name:

Date:

Pd:

Directions: To be successful in the activity you first need to be able to answer questions 1-5. Please use complete sentences for questions 1-4.

1. What five senses are used to make observations?

2. What is the difference between a qualitative and a quantitative observation?

3. Does qualitative have to do with words that give general worth or numbers with a label?

4. Does quantitative have to do with words that give general worth or numbers with a label?

5. Identify each of the following observations as either qualitative (L) or quantitative (N).

30 g _____ large _____ blue _____ 115 pounds _____

small _____ 78°C _____ long _____ 3.4 cm _____

Directions: In pairs or individually, identify qualitative and quantitative observations about the following objects. Record the object's name and your qualitative and quantitative observations on this paper. Your goal is to have as many observations as possible.

Station #1 Object Name:

Qualitative Observations:

Quantitative Observations:

Total Qualitative observations:

Total Quantitative observations:

Station #2 Object Name:

Qualitative Observations:

Quantitative Observations:

Total Qualitative Observations:

Total Quantitative Observations:

Station #3 Object Name:

Qualitative Observations:

Quantitative Observations:

Total Qualitative Observations:

Total Quantitative Observations:

Station #4 Object Name:

Qualitative Observations:

Quantitative Observations:

Total Qualitative Observations:

Total Quantitative Observations:

Station #5 Object Name:

Qualitative Observations:

Quantitative Observations:

Total Qualitative Observations:

Total Quantitative Observations:

Station #6 Object Name:

Qualitative Observations:

Quantitative Observations:

Total Qualitative Observations:

Total Quantitative Observations:

Directions: Now make 1 inference for each station based off your observations

Station #1:

Station #2:

Station #3:

Station #4:

Station #5:

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Qualitative and Quantitative Observations Activity

Name: Key

Date:

Pd:

Directions: To be successful in the activity you first need to be able to answer questions 1-5. Please use complete sentences for questions 1-4.

1. What five senses are used to make observations?
The five senses used are smell, hearing, taste, touch, and seeing.

2. What is the difference between a qualitative and a quantitative observation?
Qualitative Observations give general worth of something like small, rough, or many.

Quantitative Observations give an exact quantity of something. For example, instead of saying small a student could say 4 foot, 5 inches giving an exact measurement.

3. Does qualitative have to do with words that give general worth or numbers with a label?
Qualitative has to do with words that give general worth

4. Does quantitative have to do with words that give general worth or numbers with a label?
Quantitative has to do with numbers that are associated with a label so another person knows how it was measured.

5. Identify each of the following observations as either qualitative (L) or quantitative (N).

30 g ____N____ large ____L_____ blue ____L_____ 115 pounds _____N_____

small ___L____ 78°C ____N_____ long _____L_____ 3.4 cm ____N_____

Directions: In pairs or individually, identify qualitative and quantitative observations about the following objects. Record the object's name and your qualitative and quantitative observations on this paper. Your goal is to have as many observations as possible.

*** Student answers will very for this section of the lab and will need to be graded on an

individual basis per student ***

Station #1 Object Name:

Qualitative Observations:

Quantitative Observations:

Total Qualitative observations:

Total Quantitative observations:

Station #2 Object Name:

Qualitative Observations:

Quantitative Observations:

Total Qualitative Observations:

Total Quantitative Observations:

Station #3 Object Name:

Qualitative Observations:

Quantitative Observations:

Total Qualitative Observations:

Total Quantitative Observations:

Station #4 Object Name:

Qualitative Observations:

Quantitative Observations:

Total Qualitative Observations:

Total Quantitative Observations:

Station #5 Object Name:

Qualitative Observations:

Quantitative Observations:

Total Qualitative Observations:

Total Quantitative Observations:

Station #6 Object Name:

Qualitative Observations:

Quantitative Observations:

Total Qualitative Observations:

Total Quantitative Observations:

Directions: Now make 1 inference for each station based off your observations

Station #1:

Station #2:

Station #3:

Station #4:

Station #5:

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Name_____ Metric Mania Conversion Practice

Part I Conversion Practice:

Directions: Using the ladder method of "King Henry Died by Drinking Chocolate Milk" please convert the following measurements.

1000 mg = _____ g

1 L = _____ mL

160 cm = _____ mm

14 km = _____ m

109 g = _____ kg

250 m = _____ km

Directions: Please compare the following measurements by using <, >, or =.

56 cm ____ 6m

7g ____ 698 mg

Part II: Conversion Challenge

Directions: Write the correct abbreviation for each metric unit:

Kilogram _____ Milliliter _____ Kilometer _____

Meter _____ Millimeter _____ Centimeter _____

Gram _____ Liter _____ Milligram _____

Directions: Try these additional conversions, using the ladder method.

2000 mg = _____ g 5 L = _____ mL 16 cm = _____ mm

104 km = _____ m 198 g = _____ kg 2500 m = _____ km

480 cm = _____ m 75 mL = _____ L 65 g = _____ mg

5.6 kg = _____ g 50 cm = _____ m 6.3 cm = _____ mm

8 mm = _____ cm 5.6 m = _____ cm 120 mg = _____ g

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Directions: Try these additional comparison measurements using <, >, or =.

63 cm ____ 6 m 5 g ____ 508 mg 1,500 ml ____ 1.5 L

536 cm ____ 53.6 dm 43 mg ____ 5g 3.6 m ____ 36 cm

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Metric Mania Key:

Part I Conversion Practice:

1000 mg = 1 g
160 cm = 1600 mm
109 g = 0.109 kg
1 l = 1000 ml
14 km = 14000 m
250 m = .250 km
56 cm < 6 m
7 g > 698 mg

Part II Conversion Challenge:

1. kg
2. m
3. g
4. ml
5. mm
6. l
7. km
8. cm
9. mg

1. 2 g
2. 104000 m
3. 4.8 m
4. 5600 g
5. .8 cm
6. 5000 ml
7. 0.198 kg
8. 0.075 l
9. 0.5 m
10. 560 cm
11. 160 mm
12. 2.5 km
13. 65000 mg
14. 63 mm
15. 0.12 g
16. <
17. >
18. =
19. =
20. <
21. >

Factor Label Method

Why do we use the factor label method? Factor Label is a method for solving problems. It gives us a neat and organized method to solve problems. You can use this method in chemistry, math, shopping, building, cooking and home improvement/maintenance.

1. How to Factor Label by Example
Problem: Convert 30 cm to inches.
1. Start with given → 30cm

2. Multiply by conversion factor (conversion factor in bold)

$$30\text{cm} \times \frac{\mathbf{1\,in}}{\mathbf{2.54\ cm}}$$

3. Cancel units

$$30\ \mathbf{cm} \times \frac{1}{2.54\ \mathbf{cm}}$$

4. Solve

$$30\text{ cm} \times \frac{1}{2.54\text{ cm}} = \mathbf{11.8\ in}$$

5. Box answer

$$30\text{cm} \times \frac{1}{2.54\text{ cm}} = \boxed{\mathbf{11.8\ in}}$$

Practice:

Convert the following using the factor label method and box in final answer.

Length Conversion Factors:
1 mi. = 1.609 km
1 in. = 2.54 cm
1 mi. = 5 280 ft.
1 yd. = 36 in.
1 ft. = 12 in.
1 m = 1 000 mm
1 km = 1 000 m

1. 235 feet to inches

2. 47.0 miles to feet

3. 12 feet to centimeters

4. 5.00 kilometers to miles

Mass and Weight Conversion Factors
1 lb. = 453.6 g
1 ton = 2 000 lb.
1 lb. = 16 oz.
1 kg = 9.8 N1
1 slug = 32.2 lb. ^{2}
1 kg = 1 000 g
1 g= 1 000 mg

5. 5.00 pounds to kilograms

6. 1.00 ounce to pounds

7. 3.02 grams to ounces

Volume Conversion Factors

1 L = 1.057 qt.	1 cup = 8 uid oz.
1 cm^3 = 1 mL	1 $ft.^3$ = 28.32 L
1 m^3 = 1 kL	1 gal. = 4 qt.
1 $ft.^3$ = $(12\ in.)^3$	2 pt. = 1 qt.
1 $in.^3$ = $(2.54\ cm)^3$	2 cups = 1 pt.
1L = 1 000 mL	

8. 22 cubic centimeters to liters

9. 54.5 gallons to cups

10. 100 milliliters to cubic feet

Assorted Unit Conversion

11. 18.0 km to mi

12. 45 mi. to cm

*13. 194 kg/yr. to lb./day

Earth Science Honors
Factor Label Method

Name:_____

Factor Label Method

Why do we use the factor label method? Factor Label is a method for solving problems. It gives us a neat and organized method to solve problems. You can use this method in chemistry, math, shopping, building, cooking and home improvement/maintenance.

1. How to Factor Label by Example
Problem: Convert 30 cm to inches.
1. Start with given → 30cm

2. Multiply by conversion factor (conversion factor in bold)

$$30\text{cm} \times \frac{\mathbf{1\,in}}{\mathbf{2.54\ cm}}$$

3. Cancel units

$$30\ \cancel{\text{cm}} \times \frac{1}{2.54\ \cancel{\text{cm}}}$$

4. Solve

$$30\ \cancel{\text{cm}} \times \frac{1}{2.54\ \cancel{\text{cm}}} = \mathbf{11.8\ in}$$

5. Box answer

$$30\ \cancel{\text{cm}} \times \frac{1}{2.54\ \cancel{\text{cm}}} = \boxed{\mathbf{11.8\ in}}$$

Practice:

Convert the following using the factor label method and box in final answer.

Length Conversion Factors:
1 mi. = 1.609 km
1 in. = 2.54 cm
1 mi. = 5 280 ft.
1 yd. = 36 in.
1 ft. = 12 in.
1 m = 1 000 mm
1 km = 1 000 m

1. 235 feet to inches

$$235\ \cancel{\text{ft}} \times \frac{12\ \text{in}}{1\ \cancel{\text{ft}}} = \boxed{2820\ \text{in}}$$

Earth Science Honors
Factor Label Method

Name:_____

2. 47.0 miles to feet

$$47.0\ \text{mi} \times \frac{5280\ \text{ft}}{1\ \text{mi}} = \boxed{248{,}160\ \text{ft}}$$

*3. 12 feet to centimeters

$$12\ \text{ft} \times \frac{12\ \text{in}}{1\ \text{ft}} \times \frac{2.54\ \text{cm}}{1\ \text{in}} = \boxed{365.76\ \text{cm}}$$

4. 5.00 kilometers to miles

$$5.00\ \text{km} \times \frac{1\ \text{mi}}{1.609\ \text{km}} = \boxed{3.11\ \text{mi}}$$

Mass and Weight Conversion Factors

1 lb. = 453.6 g
1 ton = 2 000 lb.
1 lb. = 16 oz.
1 kg = 9.8 N1
1 slug = 32.2 lb. [2]
1 kg = 1 000 g
1 g= 1 000 mg

5. 5.00 pounds to kilograms

$$5.00\ \text{lbs} \times \frac{453.6\ \text{g}}{1\ \text{lb}} \times \frac{1\ \text{kg}}{1000\ \text{g}} = \boxed{2.268\ \text{kg}}$$

6. 1.00 ounce to pounds

$$1\ \text{oz} \times \frac{1\ \text{lb}}{16\ \text{oz}} = \boxed{0.0625\ \text{lb}}$$

7. 3.02 grams to ounces

$$3.02\ \text{g} \times \frac{1\ \text{lb}}{453.6\ \text{g}} \times \frac{16\ \text{oz}}{1\ \text{lb}} = \boxed{0.107\ \text{oz}}$$

Volume Conversion Factors

1 L = 1.057 qt.
1 cm^3 = 1 mL
1 m^3 = 1 kL
1 $ft.^3$ = (12 in.)^3
1 $in.^3$ = (2.54 cm)^3
1L = 1 000 mL

1 cup = 8 uid oz.
1 $ft.^3$ = 28.32 L
1 gal. = 4 qt.
2 pt. = 1 qt.
2 cups = 1 pt.

8. 22 cubic centimeters to liters

$$22\ \text{cm}^3 \times \frac{1\ \text{mL}}{1\ \text{cm}^3} \times \frac{1\ \text{L}}{1000\ \text{mL}} = \boxed{0.022\ \text{L}}$$

Earth Science Honors
Factor Label Method

Name:_____

* 9. 54.5 gallons to cups

$$54.5\,\text{gal} \times \frac{4\,\text{qt}}{1\,\text{gal}} \times \frac{2\,\text{pt}}{1\,\text{qt}} \times \frac{2\,\text{cups}}{1\,\text{pt}} = \boxed{872\ \text{cups}}$$

*10. 100 milliliters to cubic feet

$$100\,\text{mL} \times \frac{1\,\text{L}}{1000\,\text{mL}} \times \frac{1\,\text{ft}^3}{28.32\,\text{L}} = \boxed{0.00353\,\text{ft}^3}$$

Assorted Unit Conversion

11. 18.0 km to mi

$$18.0\,\text{km} \times \frac{1\,\text{mi}}{1.609\,\text{km}} = \boxed{11.19\,\text{mi}}$$

* 12. 45 mi. to cm

$$45\,\text{mi} \times \frac{5280\,\text{ft}}{1\,\text{mi}} \times \frac{12\,\text{in}}{1\,\text{ft}} \times \frac{2.54\,\text{cm}}{1\,\text{in}} = \boxed{7,242,048\ \text{cm}}$$

*13. 194 kg/yr. to lb./day

$$\frac{194\,\text{kg}}{\text{yr}} \times \frac{1000\,\text{g}}{1\,\text{kg}} \times \frac{1\,\text{lb}}{453.6\,\text{g}} \times \frac{1\,\text{yr}}{365\,\text{day}} = \frac{194,000}{165,564} = \boxed{1.17\,\frac{\text{lb}}{\text{day}}}$$

UNIT 14 FINAL PROJECT

Earth Science
Density of Solids Lab

Name: _____

Group : _____

Materials:

Unknown solids
Electronic Balance
Ruler with centimeters
Graduated cylinders
Water
Calculator

Procedure:

1. Determine the mass of an unknown solid using the electronic balance
2. Measure the volume of regular shaped objects with the ruler (Wood Block & Sponge)
3. Measure the volume of irregular shaped objects using water displacement method (Ball Bearing & Nail)
4. Determine the density of the unknown using the formula $d = \frac{m}{v}$
5. Determine the % Error of each: % Error = $\frac{\text{Difference from Accepted Value}}{\text{Accepted Value}} \times 100$

UNIT 14 FINAL PROJECT
Data Table:

Object	Material	Mass (grams)	Volume Give units	Density give units	Accepted density (Given by Teacher)	% error
Ball Bearing	Steel					
Wood Block	Different types of Wood		L = W = H =			
Sponge	Polymer		L = W = H =			
Nail	Iron					

Application: **USE SENTENCES OR YOU WILL LOSE POINTS!!!!!!!!!**

1. Compare your calculated density of the wood block with another group (tell whose group you compared it to) was your density similar to or different from that groups density for the wood block.

   _____
   _____

   Write a statement as to why they were similar or why they were different.

   _____
   _____

2. Calculate the density of your sponge in the space below. Show all work, your measurements for volume and your measurements for mass.

   a. Cut your sponge in half. Recalculate the density of the sponge. Again be sure to show me all of your work.

b. What effect did cutting the sponge in half have on its density?

_____

_____

c. What does this say about sample size in calculating density?

_____

_____

3. If you were measuring the mass of a substance and there was some water on the scale, how would this affect the mass? How would it affect the density?

_____

_____

_____

4. Give me the % error in you measurement for the density of the Ball Bearing. Provide a reasonable inference as to why there was error in your measurement.

_____

_____

_____

_____

Going Further

Honors: Complete a graph showing the density of the objects that you measured. Mass is on the y-axis and volume is on the x-axis. Graph paper provided on the last page of this lab packet.

1. You will graph the mass and the volume of the Ball Bearing. (will only be one point) Line up that point with the origin (0,0). Draw a line that goes from the origin through the point and extends off of the graph.

2. Complete the above step for the wood block, sponge, nail, and Ball Bearing.

3. Graph a line for the density of water. Water has a density of one. So think what your points would have to be in order to get this line. Label this line.

Question:
By looking at the graph how can you determine which materials float or sink in water?

_____

_____

_____

_____

UNIT 14 FINAL PROJECT

Calculations Page: **Show your work for determining the density for all of the objects below. Points are given for showing work and will be deducted if work is not shown!**

Object 1 (Ball Bearing)

Mass	Volume	Density	% Error

Object 2 (Wood Block)

Mass	Volume	Density	% Error

Object 3 (Sponge)

Mass	Volume	Density	% Error

Object 4 (Nail)

Mass	Volume	Density	% Error

Earth Science
Density of Solids Lab

Name: Key (Honors)

Group: 28 points total

Materials:

Unknown solids
Electronic Balance
Ruler with centimeters
Graduated cylinders
Water
Calculator

Procedure:

1. Determine the mass of an unknown solid using the electronic balance
2. Measure the volume of regular shaped objects with the ruler (Wood Block & Sponge)
3. Measure the volume of irregular shaped objects using water displacement method (Ball Bearing & Nail)
4. Determine the density of the unknown using the formula $d = \frac{m}{v}$
5. Determine the % Error of each: % Error = Difference from Accepted Value / Accepted Value x 100

½ pt Each (4 pts)

½ pt Each (4 pts)

Data Table:

Object	Material	Mass (grams)	Volume Give units	Density give units	Accepted density (Given by Teacher)	% error
Ball Bearing	Steel	~8.3-8.4g	1mL		8.12 g/cm³	
Wood Block	Different types of Wood	Answer will vary	L = W = Answer will vary H =			
Sponge	Polymer	Answer will vary	L = W = Answer will vary H =		Cellulose -0.120 g/cm³ Poly... -0.013 g/cm³	
Nail	Iron	~7.8g	1mL		7.86 g/cm³	

Application: **USE SENTENCES OR YOU WILL LOSE POINTS!!!!!!!!!**

1. Compare your calculated density of the wood block with another group (tell whose group you compared it to) was your density similar to or different from that groups density for the wood block. ('/2 pt)

   Answers may vary depending on type of wood and accuracy with measuring

   Write a statement as to way they were similar or why they were different. ('/2 pt)

   If similar, groups shared same wood type. If different, could be due to different wood type or error in calculation. Or, differences due wet/dry wood or where it came from in the tree.

2. Calculate the density of your sponge in the space below. Show all work, your measurements for volume and your measurements for mass.

   a. Cut your sponge in half. Recalculate the density of the sponge. Again be sure to show me all of your work. (1 pt, work, answer/units)

('/2 pt) b. What effect did cutting the sponge in half have on its density? The density should remain same(close to) as prior to cutting it in half

('/2 pt) c. What does this say about sample size in calculating density? That changing the size of the object (either smaller or larger) does not change the density of the object (still the same).

3. If you were measuring the mass of a substance and there was some water on the scale, how would this affect the mass? How would it affect the density? (1 pt)

   Mass: This would falsely increase the mass of the substance. Density: Therefore when I go to calculate $D = \frac{m}{v}$, the mass will be higher than it should be, making it appear to be more dense.

4. Give me the % error in you measurement for the density of the Ball Bearing. Provide a reasonable inference as to why there was error in your measurement. (1 pt)

   % error = answers will vary by group

   Inferences: ① read scale incorrectly

   ② Read the graduated cylinder incorrectly for the volume

Going Further Graph (10 pts) *Graphs will vary due to calculations*

Honors: Complete a graph showing the density of the objects that you measured. Mass is on the y-axis and volume is on the x-axis.

1. You will graph the mass and the volume of the Ball Bearing. (will only be one point) Line up that point with the origin (0,0). Draw a line that goes from the origin through the point and extends off of the graph.

2. Complete the above step for the wood block, sponge, nail, and Ball Bearing.

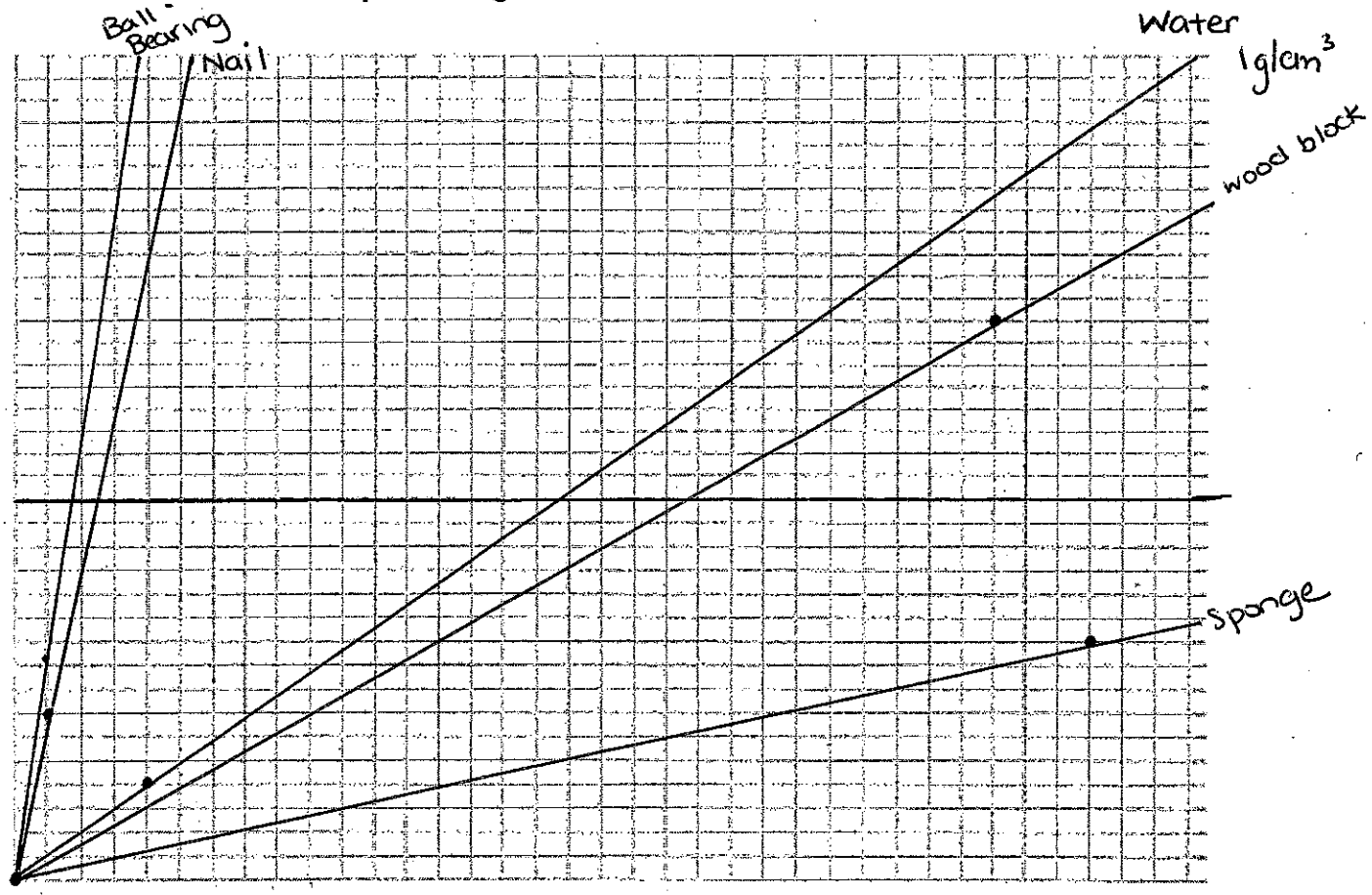
3. Graph a line for the density of water. Water has a density of one. So think what your points would have to be in order to get this line. Label this line.

Question:

By looking at the graph how can you determine which materials float or sink in water? (1 pt)

If the line is above my water density line, than the density is greater than 1 g/cm^3, so therefore the Ball Bearing and Nail will sink. Line below the water density line, than the density is less than 1 g/cm^3 therefore wood block and sponge will float.

Density of objects compared to the density of water



Calculations Page: **Show your work for determining the density for all of the objects below. Points are given for showing work and will be deducted if work is not shown!** (4 pts) ½ pt each

Object 1 (Ball Bearing)

Mass **Volume** **Density** **% Error**

Object 2 (Wood Block)

Mass **Volume** **Density** **% Error**

Object 3 (Sponge)

Mass **Volume** **Density** **% Error**

Object 4 (Nail)

Mass **Volume** **Density** **% Error**

UNIT 14 FINAL PROJECT

Name:_____ PD: _____

Purpose: After demonstrating your skills on density and how to manipulate the density equation in multiple assessments (Density Task Cards, Density Mini Stations, & the Density Lab), it is now time to apply all that knowledge into a final assessment.

Final Assessment: Using one of the following applications on your iPad (ShowMe ExplainEverything or Educreations) you are going to create a video that shows step by step how one would solve for a density problem but also provide explanation within your presentation of each step (voice recorded and added to presentation).

You must do the following prior to creating your presentation:

1.) Create your own density problem. (come up with the wording, variables, what you are solving for etc.)
Yes: _____ No:_____

2.) Your problem must contain at least one factor label method conversion within it.
Yes: _____ No:_____

3.) Solve the problem on paper showing each step and the final answer.
Yes: _____ No:_____

4.) Write out your script for each step so you know what you want to say when recording.
Yes: _____ No:_____

5.) Create your presentation in either ShowMe, ExplainEverything or Educreations making sure #1-4 above are included.
Yes: _____ No:_____

I should be able to show your presentation to any student who has yet to learn density and they should be able to understand what density is, how to obtain the mass/volume, how to convert, and how you arrived at your final answer. Keep that in mind when creating your presentation. When I grade them I am going to pretend I know nothing about density and the formula.

Graded Presentation Item	**Item met and/or correct**		**Item missing or not met**
Pre-Approval of Density Problem by Teacher	1	N/A	0
Density problem contains one factor label method conversion within it	1	N/A	0
Density Problem solution shown step-by-step submitted in Schoology assignment for approval and check	6 All steps are shown clearly of the density problem and final answer is corect	3 Some steps left out of the density problem or final answer may not be correct	0
Created flowchart to show progression of presentation and organization (what will be in each frame)	10 Flowchart is detailed, shows what presentation will contain and is organized	5 Flowchart is lacking detail and not very organized	0
Video Presentation contains a title	1	N/A	0
Video Presentation clearly demonstrates the relationship between density, mass and volume	2 Student explains the equation, manipulation of the equation and how the three relate to each other	1 Student shows the equation but fails to full explain the manipulation of the equation or how they relate to each other	0
Video Presentation shows step by step how to solve the problem	3	N/A	0
Final Answer is correct	2	1 Student may have made a minor error but all steps are correct	0
Numbers are accompanied by proper units at all times	5 As student explains problem, all numbers have appropriate units	2.5 Student misses 3 or less numbers without appropriate units	0 Student misses 4 or more numbers

Numbers are accompanied by proper units at all times	5 As student explains problem, all numbers have appropriate units and final answer is accompanied by correct units	2.5 Student misses 3 or less numbers without appropriate units	0 Student misses 4 or more numbers without appropriate units
Factor Label Method conversion is correct and clearly explained	4 Factor label method is done correctly, uses conversion factors, and shows students how to set up the problem correctly	2 Factor label method is either not fully explained showing step by step how to set up the problem or set up is correct but final answer is wrong	0 Problem does not have a factor label method conversion within it
Video presentation is free of grammatical errors	1	N/A	0
Narration has appropriate use of volume, speed, and clear dictation	3 Speed is paced well, volume isn't too loud or too soft, can be heard easily and student is comfortable with their script	1.5 One of the factors mentioned was not met	0 Two or more of the factors mentioned was not met
Student is meeting daily benchmarks set by teacher (approximately 2 or 3)	4 points Both benchmarks set by the teacher	2 points Met 1 of 2 benchmarks set by	0 Missed both benchmark

Graphing Lab Directions for Part A and Part B

Introduction: Constructing and interpreting graphs are integral parts of any science course. This section presents a review of graphing with emphasis on rate of change.

Objective: You will review graph construction and interpretation in this lab. You construct graphs both by paper and pencil and through the use of an excel worksheet. You will be able to recognize relationships among variables that exist on both single and multiple line graphs. You will identify the type of relationships that exist on the graphs along with being able to calculate the rate of change between two variables.

Part A:

1. Make a graph of the following information in the Data Table 1. This should be a two-line graph that shows the rate of increase in two weather balloons as they lift off from **two different locations**. **(note the altitude that each balloon starts with when answering your questions).**

2. Complete the graph on the graph paper provided.

3. Label correctly all aspects of your graph.

4. Once the graph is complete answer the questions based on the information in the data table and the graph of you information.

Data Table Part A

Time in Minutes	Balloon A (height in meters)	Balloon B (height in meters)
0	400	0
2	600	200
4	800	400
6	1000	500
8	1200	600
10	1400	650
12	1600	700
14	1800	750

Part B Sunspot Analysis

Introduction: Photographs of the sun show dark areas on its surface. These spots are believed to be due to solar storms, areas of cooler gases on the surface. The number and patterns of these spots change with time. When the data is collected over many years and graphed, a pattern emerges. You must use your book as a reference for a little background information on sunspots.

Objective: You will be able to through graphing recognize the pattern that exists with regard to the sunspot cycle on the sun. From the data you will be able to make predictions about sunspots into the future.

Procedure:
1.Looking at the data chart below **Graph data from the years 1925-2007** using suggested online and iPad applications (choose one).

2. Follow the steps as modeled by your teacher to create a graph of the data that was entered.

3. When finished with your graph take a screen shot and save your graph as a PDF if you can. Make sure your name is somewhere on the graph if you are able to add it (Can do this in Notability). **Submit screen shot in Schoology in the appropriate assignment folder.**

4. Use your graph to answer the following questions. Make sure that you use your notes to help you when answering your questions based on the graph.

DATA TABLE (sunspots per year, 1925-2007+)

YEAR	# sunspots	YEAR	# sunspots	YEAR	# sunspots	YEAR	# sunspots	YEAR	# sunspots
1925	44.3	**1945**	33.2	**1965**	15.1	**1985**	17.9	**2005**	30.2
1926	63.9	1946	92.6	1966	47.0	1986	13.4	2006	15.4
1927	69.0	1947	151.6	1967	93.7	1987	29.2	2007	7.9
1928	77.8	1948	136.3	1968	105.9	1988	100.2	2008	*
1929	64.9	1949	134.7	1969	105.5	1989	157.6	2009	*
1930	35.7	**1950**	83.9	**1970**	104.5	**1990**	142.6	**2010**	*
1931	21.2	1951	69.4	1971	66.6	1991	145.7	2011	*
1932	11.1	1952	31.5	1972	68.9	1992	94.3	2012	*
1933	5.7	1953	13.9	1973	38.0	1993	54.6	2013	*
1934	8.7	1954	4.4	1974	34.5	1994	29.9	2014	*
1935	36.1	**1955**	38.0	**1975**	15.5	**1995**	17.5	**2015**	*
1936	79.7	1956	141.7	1976	12.6	1996	8.6	2016	*
1937	114.4	1957	190.2	1977	27.5	1997	21.5	2017	*
1938	109.6	1958	184.8	1978	92.5	1998	64.3	2018	*
1939	88.8	1959	159.0	1979	155.4	1999	93.3	2019	*
1940	67.8	**1960**	112.3	**1980**	154.6	**2000**	119.6	**2020**	*
1941	47.5	1961	53.9	1981	140.5	2001	111.0	2021	*
1942	30.6	1962	37.6	1982	115.9	2002	104.0	2022	*
1943	16.3	1963	27.9	1983	66.6	2003	65.9	2023	*
1944	9.6	1964	10.2	1984	45.9	2004	43.3	2024	*

Name: _____ Partner: _____

Questions/Analysis/Extensions

Questions for Part A (Be sure to include proper units on all measurements or you will loose points)

Rate of Change Formula = $\frac{\text{Change in the field value}}{\text{Change in time}}$

1. Was the altitude of the balloons **increasing or decreasing** as shown by line A and B?

_____

2. During **the first 4 minutes** (time 0 and time 4), how many **meters** did **balloon A rise**?

_____

3. During **the first 4 minutes** (time 0 and time 4), how many **meters** did **balloon B rise**?

_____

4. During **the first 4 minutes** (time 0 and time 4), what was the **rate of change** for **balloon A**? **Use the formula above!**

Show work here:

_____

5. During **the first 4 minutes** (time 0 and time 4), what was the **rate of change** for **balloon B**? **Use the formula above!**

Show work here:

_____

6. What was the **rate of change** for balloon **A** from **4 minutes to 8 minutes**? **Use the formula above!**

_____ **Show work here:**

7. What was the **rate of change** for balloon **B** from **4 minutes to 8 minutes**?
Use the formula above!

_____ **Show work here:**

8. What is the **name** for the type of relationship that is taking place on the graph?

_____

9. Describe in a sentence or statement what happened to the **rate of change** for balloon B?

_____

_____

10. What is the dependent variable from the balloon graph? _____

What is the independent variable from the balloon graph? _____

11. Describe in a sentence the appearance of a graph in which the dependent variable does not change with time? **Imagine that for this graph the dependent variable measurements did not change for the entire 14 minutes for balloon A.**

_____

_____

12. Make an extrapolation for balloon A's height in meters at 16 minutes? _____

13. Make an interpolation for balloon B's height in meters at 7 minutes? _____

14. Make an inference as to why balloon A is rising faster than balloon B?

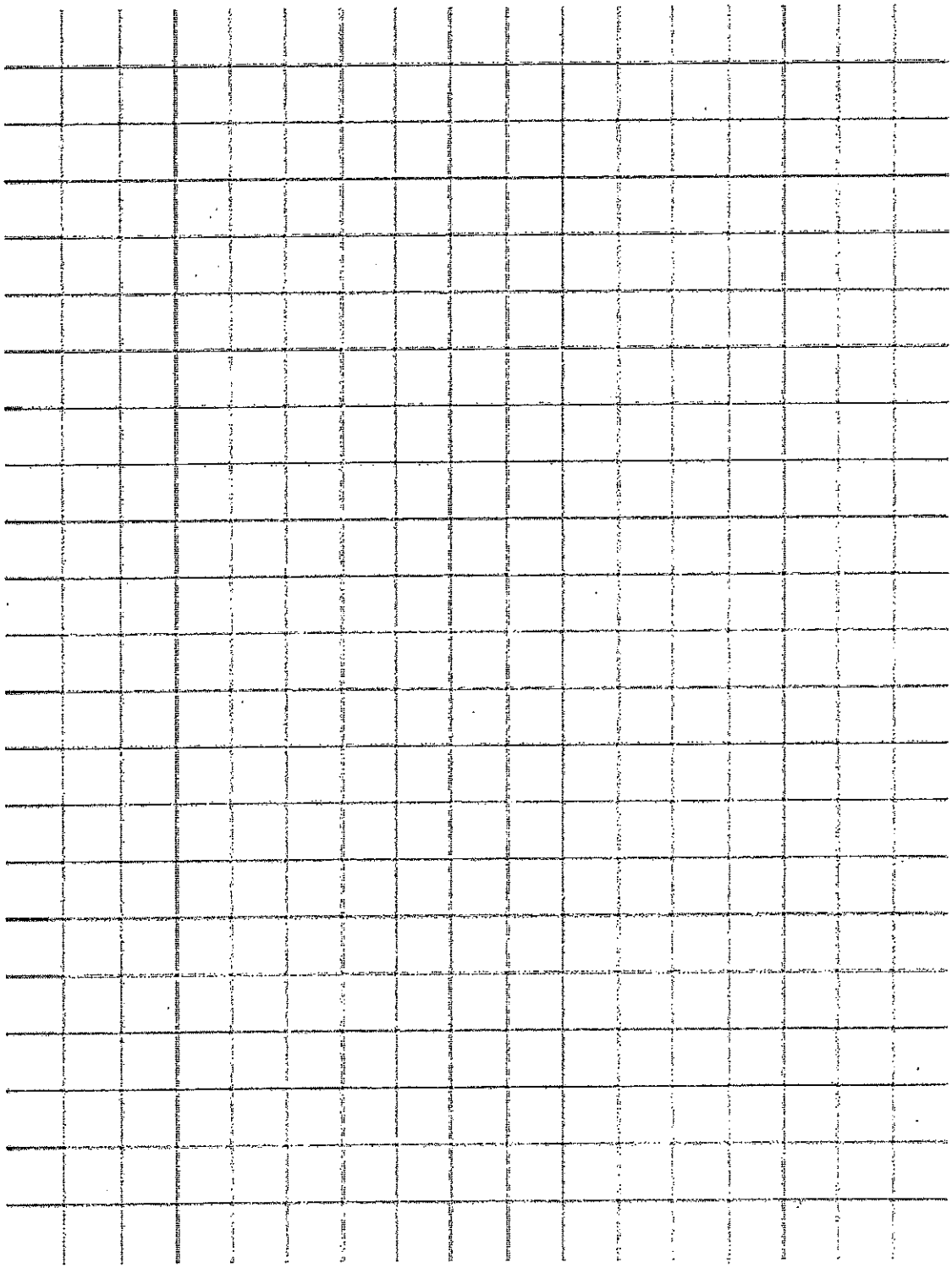
_____

_____

15. The measurements of the balloon's height at different times were examples of what type of observations, qualitative or quantitative? _____

Graph for Part A

Miss Godziejewski's Signature for graph completion: _____ **(10 points)**



Questions: Part B Sunspot Graph

1. Name the type of pattern produced on your graph. _____
   By looking at the graph how were you able to determine it was that type of graph.

_____

2. Which quantity on the graph is the independent variable _____
   Which is the dependent variable _____

(look in your notes from our first section on graphing)

3. What year marks the beginning of a sunspot cycle? _____
Here is where you must use your book to find out when the beginning of a sunspot cycle occurs.

4. Determine Sunspot Cycle Length
   Give me a start year what you choose from 3_____
   Determine the end year (where would the cycle stop) _____

So, about how many years is it to complete the above cycle? _____

5. In what year on your graph did the **last maximum** occur? _____
   (not any particular maximum just the last one you see on the graph)

6. **Predict** about when the next maximum in the sunspot cycle would occur? What year? You must use your answer to question 4 to help you extrapolate your answer. This answer should be based on **your information.**
_____ **based on your data and your table.**

7. In what year did **the last minimum** number of sunspots occurs on your graph? _____
   (not any particular minimum just the last one you see on the graph)

8. **Predict** when the **next minimum** in the sunspot cycle would occur? What year? You must use your answer to question 4 to help you extrapolate your answer. This answer should be based on **your information.**
_____**based on your data and your table.**

9. Based on your data **extrapolate** out even further and in a sentence state whether we currently in the year 2016 are in the maximum part of the cycle, the minimum part of the cycle, or if we are approaching a maximum or we are approaching a minimum.

_____

_____

10. Based on your data **extrapolate** out even further and in a sentence state whether when **you** graduate we will be in the maximum part of the cycle, or the minimum part of the cycle, or if we are approaching a maximum or we are approaching a minimum.

_____

_____

11. In a sentence describe **another** event that occurs in a cyclic manner, where there is a regular repeating pattern and can be used to make predictions.

_____

_____

Miss Godziejewski's signature for graph completion: _____ (10 points)

updated Key

Lab 1 Graphing Lab

Name: 09/13 (34 pts)

Introduction: Constructing and interpreting graphs are integral parts of any science course. This section presents a review of graphing with emphasis on rate of change.

Objective: You will review graph construction and interpretation in this lab. You construct graphs both by paper and pencil and through the use of an excel worksheet. You will be able to recognize relationships among variables that exist on both single and multiple line graphs. You will identify the type of relationships that exist on the graphs along with being able to calculate the rate of change between two variables.

Part A:

1. Make a graph of the following information in the Data Table 1. This should be a two-line graph that shows the rate of increase in two weather balloons as they lift off from **two different locations**. **(note the altitude that each balloon starts with when answering your questions).**

2. Complete the graph on the graph paper provided.

3. Label correctly all aspects of your graph. Keep in mind all aspects to make a complete graph.

4. Once the graph is complete answer the questions based on the information in the data table and the graph of you information.

Data Table 1

Time in (Minutes)	Balloon A (height in meters)	Balloon B (height in meters)
0	400	0
2	600	200
4	800	400
6	1000	500
8	1200	600
10	1400	650
12	1600	700
14	1800	750

9. Sp8 questions

Questions for Part A (Be sure to include proper units on all measurements or you will loose points)

Rate of Change Formula = $\frac{\text{Change in the field value}}{\text{Change in time}}$

1. Was the altitude of the balloons **increasing or decreasing** as shown by line A and B?

Increasing

2. During **the first 4 minutes** (time 0 and time 4), how many **meters** did **balloon A rise**?

400 meters

time 0 → 400 m
time 4 → 800 m

3. During **the first 4 minutes** (time 0 and time 4), how many **meters** did **balloon B rise**?

400 meters

time 0 → 0 m
time 4 → 400 m

4. During **the first 4 minutes** (time 0 and time 4), what was the **rate of change** for **balloon A?**

100 m/min

Show work here:

$ROC = \frac{800-400}{4\,min} = \frac{400m}{4min}$

5. During **the first 4 minutes** (time 0 and time 4), what was the **rate of change** for **balloon B?**

100 m/min

Show work here:

$ROC = \frac{400-0}{4min} = \frac{400\,m}{4min}$

6. What was the **rate of change** for balloon **A** from **4 minutes to 8 minutes**?

100 m/min

Show work here:

$ROC = \frac{1200-800}{4min} = \frac{400m}{4min}$

7. What was the **rate of change** for balloon **B** from **4 minutes to 8 minutes**?

50 m/min

Show work here:

$ROC = \frac{600-400}{4\,min} = \frac{200}{4min}$

8. What is the **name** for the type of relationship that is taking place on the graph?

direct Relationship

9. Describe in a sentence or statement what happened to the **rate of change** for balloon B?

It shows that while balloon A increased @ a constant speed, balloon B slowly increased and began to level out.

10. What is the dependent variable from the balloon graph? balloon height

What is the independent variable from the balloon graph? Time

11. Describe in a sentence the appearance of a graph in which the dependent variable does not change with time? Imagine that for this graph the dependent variable measurements did not change for the entire 14 minutes for balloon A.

you would have a straight horizontal line across the graph because the height remained constant for the 14 minutes.

12. Make an extrapolation for balloon A's height in meters at 16 minutes? 2,000 m

13. Make an interpolation for balloon B's height in meters at 7 minutes? ~550m

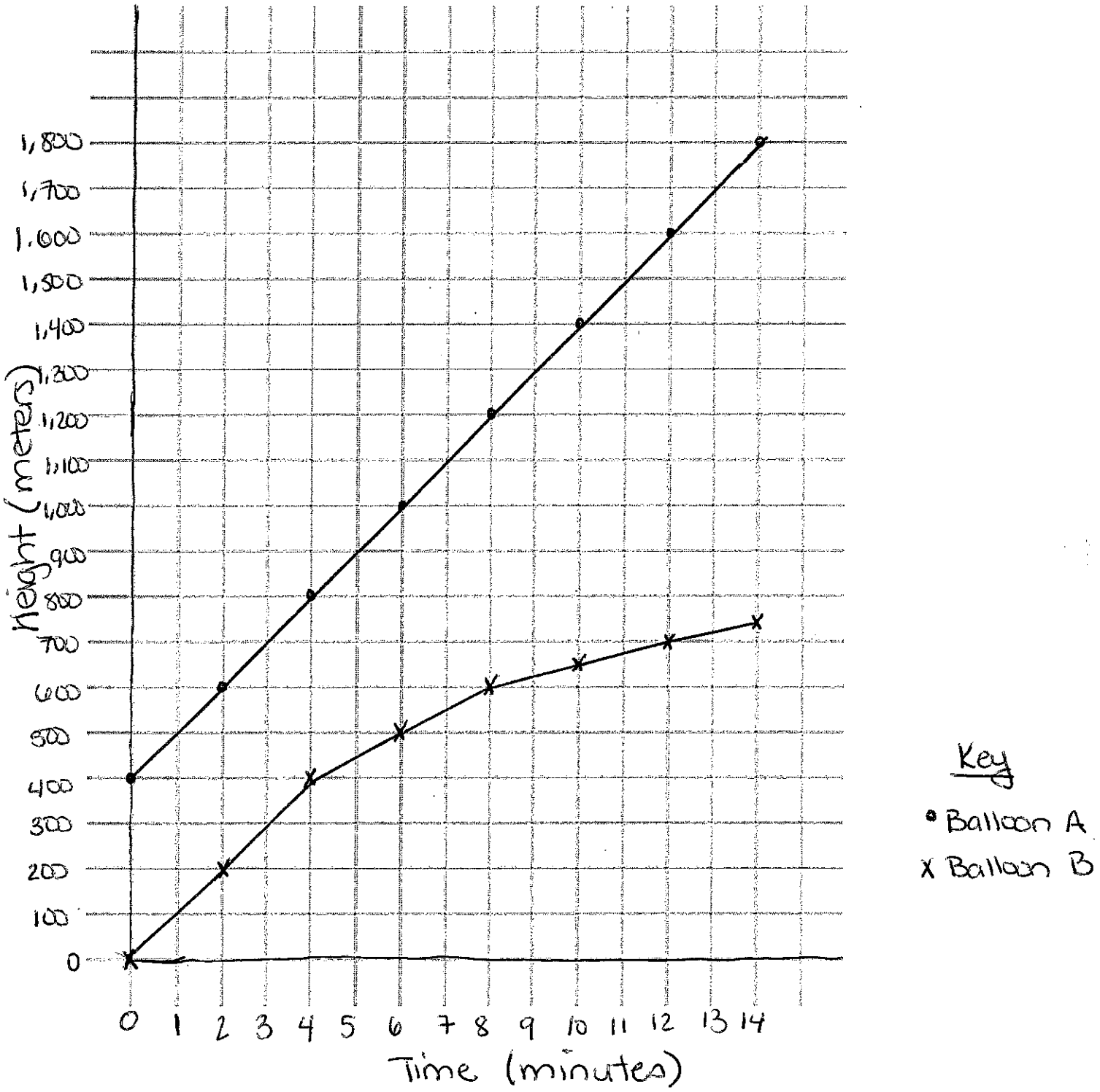
14. Make an inference as to why balloon A is rising faster than balloon B?

Answers will vary

15. The measurements of the balloon's height at different times were examples of what type of observations, qualitative or quantitative? Quantitative

5.5 pts

Graph for Part A Rate of Increase of 2 Weather Balloons:



Part B Sunspot Analysis

Introduction: Photographs of the sun show dark areas on its surface. These spots are believed to be due to solar storms, areas of cooler gases on the surface. The number and patterns of these spots change with time. When the data is collected over many years and graphed, a pattern emerges. You must use your book as a reference for a little background information on sunspots.

Objective: You will be able to through graphing recognize the pattern that exists with regard to the sunspot cycle on the sun. From the data you will be able to make predictions about sunspots into the future.

Procedure:

1. Using my useful link under "ESCI Useful Links → Introduction Unit Resources → Sunspot Graphing Data" on my teacher webpage use all of the years from 1950 through 1995 for your data table.

2. Follow the steps as modeled by your teacher in the PowerPoint to create a graph of the data that was entered on your iPad. Go to the following website in the Safari App →
   -http://www.onlinecharttool.com

3.Screen Shot and save your graph as a PDF. Make sure your name is somewhere on this document before you do both.

4. Use your graph to answer the following questions. Make sure that you use your notes to help you when answering your questions based on the graph.

Questions: 9pts

1. Name the type of pattern produced on your graph. The pattern is cyclical
   By looking at the graph how were you able to determine it was that type of graph.
   the repeating pattern

2. Which quantity on the graph is the independent variable Time in years
   Which is the dependent variable # of Sunspots

(look in your notes from our first section on graphing)

3. What year marks the beginning of a sunspot cycle? 1954
Here is where you must use your book to find out when the beginning of a sunspot cycle occurs. You could also look up the information on your iPads. What marks the beginning of a sunspot cycle? There are several beginning spots on this graph.

4. Determine Sunspot Cycle Length
   Give me a start year what you choose from 1954
   Determine the end year (where would the cycle stop) 1964

So, about how many years is it to complete the above cycle? ~ 10 years

5. In what year on your graph did the **last maximum** occur? 1989
(not any particular maximum just the last one you see on the graph)

6. **Predict** about when the next maximum in the sunspot cycle would occur? What year? You must use your answer to question 4 to help you extrapolate your answer. This answer should be based on **your information.**
~ 1999-2000 **based on your data and your table.**

7. In what year did **the last minimum** number of sunspots occurs on your graph? 1986
(not any particular minimum just the last one you see on the graph)

8. **Predict** when the **next minimum** in the sunspot cycle would occur? What year? You must use your answer to question 4 to help you extrapolate your answer. This answer should be based on **your information.**
~ 1996-1997 **based on your data and your table.**

9. Based on your data **extrapolate** out even further and in a sentence state whether we currently in the year 2013 are in the maximum part of the cycle, the minimum part of the cycle, or if we are approaching a maximum or we are approaching a minimum.

-07 min

In 2013 based off our data and graph, we would be approaching a minimum.
2014-2015 approaching a minimum

10. Based on your data **extrapolate** out even further and in a sentence state whether when **you** graduate we will be in the maximum part of the cycle, or the minimum part of the cycle, or if we are approaching a maximum or we are approaching a minimum.

Graduating class of 2016-2017 be in the minimum part of the cycle. 2018- approaching a maximum

11. In a sentence describe **another** event that occurs in a cyclic manner, where there is a regular repeating pattern and can be used to make predictions.

Tides, moon phases, seasonal temps, stock market

UNIT 14 : FINAL PROJECT

Name_____

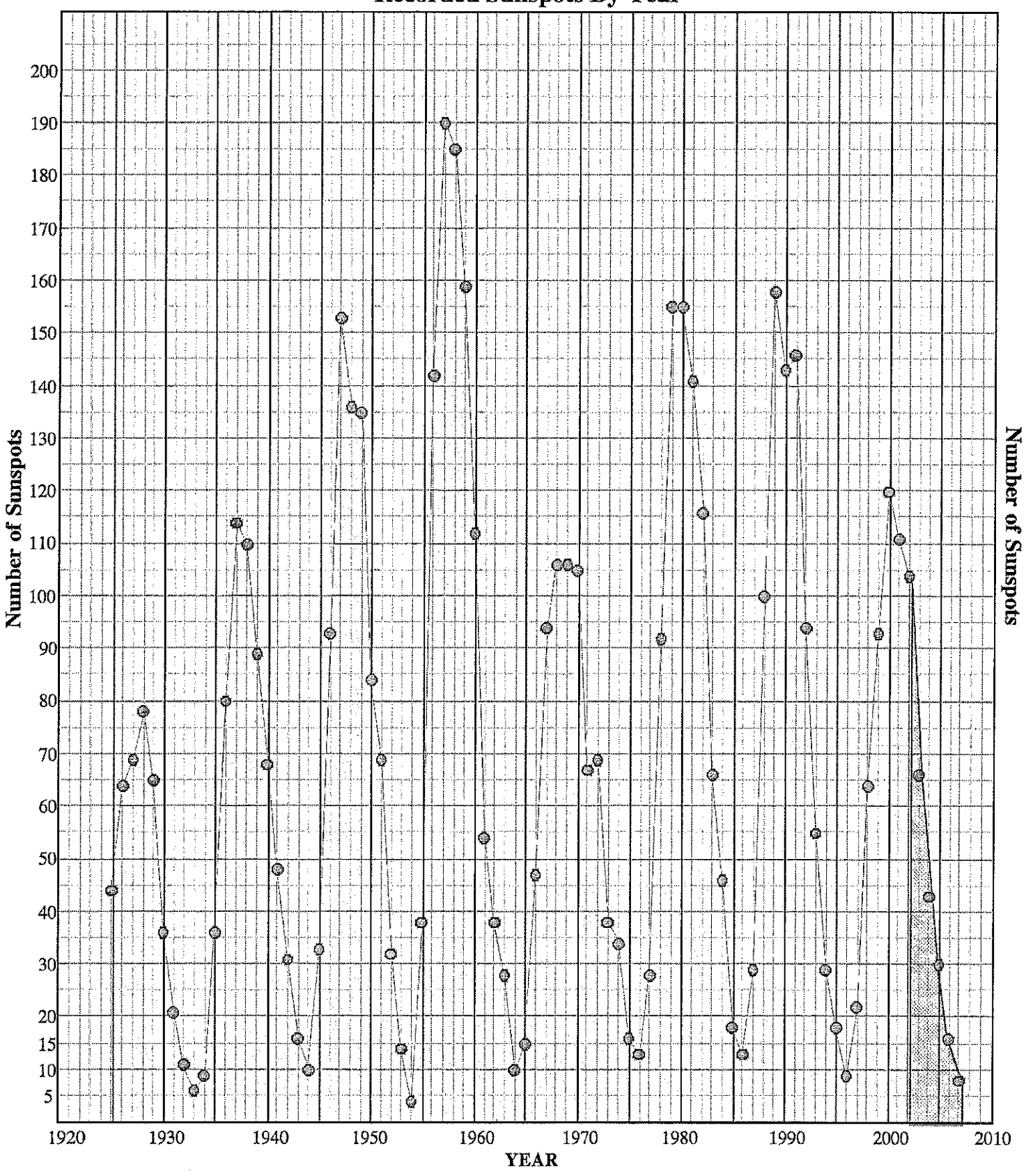
Core_____ Date_____

ACTIVITY: Graph Sunspot Data

Graph SUNSPOTS

** Plot sunspot data for the years 1925-2007 on the graph below:*

** Write your answers to the assigned questions on the back of this paper.*



UNIT 14 FINAL PROJECT

Graphing Part II Activity: To be completed after your graphing lab is turned in

Purpose: To collect your own data and create the appropriate graph based off the data. When finished you will have several questions to answer about your created graph.

Where to find your data: In Schoology there are several links to different websites to help you collect data. You will need to decide what you want to collect data about, create a table, and create a graph that bests represents your data (line graph, bar graph, pie chart, etc).

How to create your graph: I have also posted several applications for the iPad and also 1 that can be used in Safari to make your graph. Please see Schoology and pick the application that works best for you.

How to get started:

1. Decided what you are going to collect data on (need a minimum of 20 data points) → See Schoology Resource Links for ideas
2. Decide how your data table will look → What will be on the x and y axis
3. Decide what type of graph would best represent your data collected
4. Decide what application you are going to use to create your graph
5. Make sure your graph has all vital components discussed in class → It may be helpful to go back and look over your Density Lab Graph to see if you missed anything or did anything incorrectly
6. Answer the following questions about your graph when finished:
    a. What variable(s) on your graph are the independent and dependent variables?
    b. How did you decide what type of graph to make?
    c. What are three observations you can make based off your graph?
    d. What type of relationship does your graph represent? (direct, inverse, or cyclic) Explain how you came to this conclusion.
7. Submit your data table, graph and answers to Schoology as one file.

Total Point Breakdown:

Data Table= _____/5
Graph=_____/10
All necessary parts to the graph=_____/5
Questions= _____/6

Total Points: _____/26

Comments:

Graded Presentation Item	**Item met and/or correct**		**Item missing or not met**
Data Table (organized, neat, tells what the x and y axis with variables and units, minimum of 20 data points)	5 Data table is organized, neat, minimum of 20 points, x and y axis are clear	2.5 Data table is created but may be sloppy, hard to read, and just have x and y as labels as opposed to having the variables and units	0 No Data Table submitted with final report
Graph (graph is submitted either in Schoology or by hand)	10	N/A	0
Graph has all the necessary parts (has a title, key if necessary, variables on the x and y axis, units on the x and y axis, x and y axis scaled correctly)	5 All expectations mentioned are present on the graph	3 Graph is missing 1-2 expectations mentioned	0 Graph is missing more than 2 expectations mentioned
Post Graph Questions (submitted in the final report. Questions are graded on complete sentences and also being correct. Each question being worth 1 point)	6 Questions are answered in complete sentences. Each question is answered correctly and observations are accurate based off the graph	5-1 Each question is worth 1 point and graded on accuracy.	0 Questions not submitted with final report or all 6 questions are incorrect
Total Points	_____/26		

UNIT 14: FINAL PROJECT

00

Honors Earth Science : Section 1 Honors Earth Science : Period 1

Introduction Vocab Quiz

Questions | Settings | Preview | Results | Comments

Question 1 of 1 | Page 1 of 1

Question 1 (10 points)

Please match the appropriate term with the appropriate definition:

Column A		Column B
1. ☐	Quantitative Observation	a. Amount of matter packed into a given space
2. ☐	Meter	b. Extending the line on a graph in the direction of the trend
3. ☐	Dependent Variable	c. Variable that changes or is measured on y-axis
4. ☐	Density	d. Basic unit of length in the metric system
5. ☐	Observation	e. Amount of space an object takes up
6. ☐	Volume	f. Use of the five senses to interpret the environment
7. ☐	Graph	g. Precise (usually measured) feature of an item, most exact value.
8. ☐	Inference	h. Basic unit of mass in the metric system
9. ☐	Gram	i. Picture of data or change over time
10. ☐	Extrapolation	j. Educated guess based on 5 senses and prior knowledge

You are viewing this test/quiz in preview mode. Your answers will not be saved and cannot be reviewed.

Review Answers

UNIT 14: FINAL PROJECT

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Honors Earth Science : Section 1 Honors Earth Science : Period 1

Introduction Vocab Quiz

Key

Questions | Settings | Preview | Results | Comments

Question 1 of 1 | Page 1 of 1

Question 1 (10 points)

Please match the appropriate term with the appropriate definition:

Column A		Column B
1. G	Quantitative Observation	a. Amount of matter packed into a given space
2. D	Meter	b. Extending the line on a graph in the direction of the trend
3. C	Dependent Variable	c. Variable that changes or is measured on y-axis
4. A	Density	d. Basic unit of length in the metric system
5. F	Observation	e. Amount of space an object takes up
6. E	Volume	f. Use of the five senses to interpret the environment
7. I	Graph	g. Precise (usually measured) feature of an item, most exact value.
8. J	Inference	h. Basic unit of mass in the metric system
9. H	Gram	i. Picture of data or change over time
10. B	Extrapolation	j. Educated guess based on 5 senses and prior knowledge

You are viewing this test/quiz in preview mode. Your answers will not be saved and cannot be reviewed.

Review Answers

Introductory Unit
Quiz-Observations & Measurements

Name:_____

Part 1
Determine if the statement given below is an inference or an observation. Put an I for Inference and an O for Observation

_____1. The rock found by John is black and shiny.
_____2. The scientist predicted that there would be ten named storms during next 4 years of hurricane season.
_____3. The weather forecast for the next three days.
_____4. The wind is blowing from the southeast at 10 mph.
_____5. The walls of the room are white.
_____6. The temperature on January 20 1994 was -28.

Part 2 Answer the following multiple choice questions based on the information given in the question and the ideas we have discussed the past few days.

_____7. An interpretation based upon an observation is called:
a. a fact b. an inference c. a classification d. a measurement

_____8. In order to make observation, a science student must **always** use
a. experiments b. their senses c. proportions d. math calculations

_____9. A group of students observed and measured various characteristics of a stream for one day. Which statement about the stream is most likely an inference?
a. The velocity of the stream is 3 mph along the outside of the curve.
b. The stream water is dark brown.
c. The stream's depth is 5 m at 10 m from the stream bank.
d. The water level of the stream will rise after the next rainfall.

_____10. Using a ruler, please measure the line below and select the BEST answer.

a. 2cm b. 4cm c. 8cm d. 12cm

UNIT 14 FINAL PROJECT

Introductory Unit

Quiz-Observations & Measurements

Name: Key

Part 1

Determine if the statement given below is an inference or an observation. Put an I for Inference and an O for Observation

O 1. The rock found by John is black and shiny.

I 2. The scientist predicted that there would be ten named storms during next 4 years of hurricane season.

I 3. The weather forecast for the next three days.

O 4. The wind is blowing from the southeast at 10 mph.

O 5. The walls of the room are white.

O 6. The temperature on January 20 1994 was -28.

Part 2 Answer the following multiple choice questions based on the information given in the question and the ideas we have discussed the past few days.

B 7. An interpretation based upon an observation is called:

a. a fact b. an inference c. a classification d. a measurement

B 8. In order to make observation, a science student must **always** use

a. experiments b. their senses c. proportions d. math calculations

D 9. A group of students observed and measured various characteristics of a stream for one day. Which statement about the stream is most likely an inference?

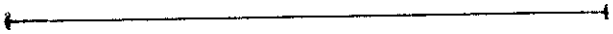
a. The velocity of the stream is 3 mph along the outside of the curve.

b. The stream water is dark brown.

c. The stream's depth is 5 m at 10 m from the stream bank.

d. The water level of the stream will rise after the next rainfall.

C 10. Using a ruler, please measure the line below and select the BEST answer.



a. 2cm b. 4cm c. 8cm d. 12cm

UNIT 14: FINAL PROJECT

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Honors Earth Science : Pd 1, Fall 2015 Honors Earth Science : Period 1

Conversions/Significant Figures/Density Quiz

Questions | Settings | Preview | Results | Comments

Questions 1-10 of 10 | Page 1 of 1

Question 1 (1 point)

If the mass of a perfect cube is 66 g and the width of the cube is 4.5 cm, what is the density?

- a D= 14.67 g/cm^3
- b D= 7.2 g/cm^3
- c D= 0.72 g/cm^3
- d D= 297 g/cm^3

Question 2 (1 point)

Please convert the following using factor label method: 12 ft/day to km/min

You may need the following conversion factors:

1 mi= 1.609 km

1 in= 2.54 cm

1 mi= 5280 ft

1 yd= 36 in

1 ft= 12 in

1 m= 1000 mm

1km= 1000 m

1 day= 24 hours

1 hr= 60 minutes

1 minute= 60 seconds

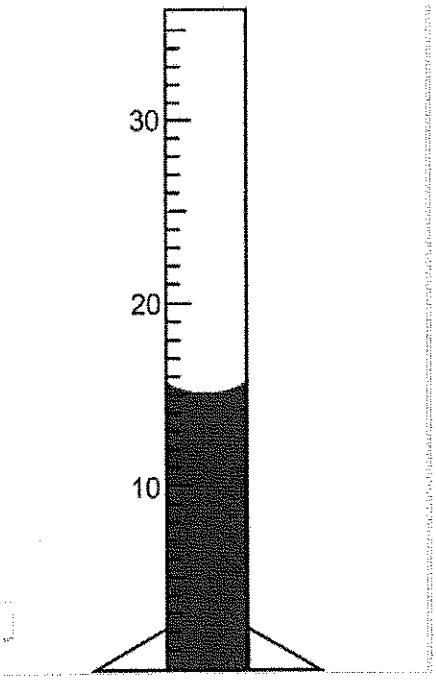
- a 0.002539 km/min
- b 2539 km/min
- c 0.000002539 km/min
- d 0.0002539 km/min

Question 3 (1 point)

Please figure out how many milliliters are in the graduated cylinder pictured below and then convert your answer to deciliters:

UNIT 14 FINAL PROJECT

65



- a 0.15 dl
- b 1500 dl
- c 0.015 dl
- d 15 dl

Question 4 (1 point)

If I double the size of a sponge, the density will remain the same.

- True
- False

Question 5 (1 point)

How many significant figures are in the following measurement: 0.00333 mm

- a 2
- b 3
- c 5
- d 6

Question 6 (1 point)

When an item is heated the density increases.

- True
- False

Question 7 (1 point)

UNIT 14: FINAL PROJECT

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Which of the following is the proper equation for density?

- a D= (l) x (w) x (h)
- b D= l x w
- c D= m/v
- d D= m x v

Question 8 (1 point)

If the density of a perfect cube is 9.5 g\cm^3 and the width is 0.4cm, what is the mass?

- a 0.148 g
- b 148 g
- c 0.0608 g
- d 0.608 g

Question 9 (1 point)

Please convert the following: 789mm to hm:

- a 78,900,000 hm
- b 0.789 hm
- c 0.00789 hm
- d 0.000789 hm

Question 10 (1 point)

3.067 x 4.3456= ? (Please put final answer in the proper amount of significant figures and make sure to pay attention to rounding!)

- a 13.33
- b 13.328
- c 13.3
- d 13.32

You are viewing this test/quiz in preview mode. Your answers will not be saved and cannot be reviewed.

Review Answers

UNIT 14: FINAL PROJECT

67

Honors Earth Science : Pd 1, Fall 2015 Honors Earth Science : Period 1
Fundamentals of Science

Prev Next

Conversions/Significant Figures/Density Quiz

Available

Questions | Settings | Preview | Results | Comments

View by Student · View by Question

 Submission 1

1/1 **Question 1**

How many significant figures are in the following measurement: 0.00333 mm

a. 2

b. 5

c. 6

✓d. 3

Add Comment

1/1 **Question 2**

Please convert the following: 789mm to hm:

a. 78,900,000 hm

✓b. 0.00789 hm

c. 0.789 hm

d. 0.000789 hm

Add Comment

1/1 **Question 3**

Please figure out how many milliliters are in the graduated cylinder pictured below and then convert your answer to deciliters:

UNIT 14 FINAL PROJECT

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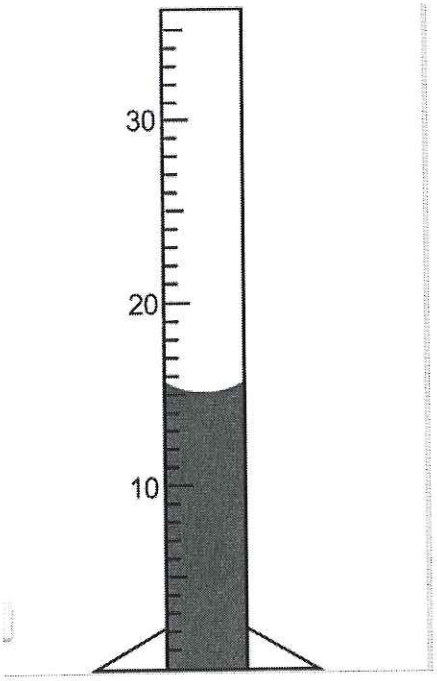

a. 15 dl

b. 1500 dl

✓c. 0.15 dl

d. 0.015 dl

Add Comment

1/1 **Question 4**

Please convert the following using factor label method: 12 ft/day to km/min

You may need the following conversion factors:

1 mi= 1.609 km

1 in= 2.54 cm

1 mi= 5280 ft

1 yd= 36 in

1 ft= 12 in

1 m= 1000 mm

1km= 1000 m

1 day= 24 hours

1 hr= 60 minutes

1 minute= 60 seconds

a. 2539 km/min

b. 0.0002539 km/min

✓c. 0.000002539 km/min

d. 0.002539 km/min

Add Comment

Question 5

UNIT 14: FINAL PROJECT

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1/1 3.067 x 4.3456= ? (Please put final answer in the proper amount of significant figures and make sure to pay attention to rounding!)

✓a. 13.33

b. 13.32

c. 13.3

d. 13.328

Add Comment

1/1 **Question 6**

Which of the following is the proper equation for density?

a. D= m x v

b. D= l x w

c. D= (l) x (w) x (h)

✓d. D= m/v

Add Comment

1/1 **Question 7**

If the mass of a perfect cube is 66 g and the width of the cube is 4.5 cm, what is the density?

✓a. D= 0.72 g/cm^3

b. D= 14.67 g/cm^3

c. D= 297 g/cm^3

d. D= 7.2 g/cm^3

Add Comment

1/1 **Question 8**

When an item is heated the density increases.

True

✓False

Add Comment

1/1 **Question 9**

If I double the size of a sponge, the density will remain the same.

✓True

False

Add Comment

1/1 **Question 10**

If the density of a perfect cube is 9.5 g\cm^3 and the width is 0.4cm, what is the mass?

a. 148 g

b. 0.0608 g

✓c. 0.608 g

d. 0.148 g

UNIT 14 : FINAL PROJECT

Name:_____ Pd: _____

Observation and Measurement Exam, Fall 2015 (Honors)

Directions: Read each question carefully. I suggest circling your answers on the test first and then going back and filling in your scantron. If you erase on the scantron, erase completely. Also, make sure you completely fill in the circles. Use a number 2 pencil. Please answer short answer questions directly on the packet.

Section I: Reading/Definitions

1.) In order to make an observation, a science student must **always** use
- a. experiments
- b. their senses
- c. proportions
- d. math calculations

2.) In order for scientists to **enhance** their powers of observations they must at times use
- a. an inference
- b. an interpolation
- c. an instrument
- d. a graph

3.) A picture of data can be represented with
- a. an instrument
- b. an experiment
- c. an extrapolation
- d. a graph

4.) The amount of space an object takes up or "capacity" is the definition of
- a. mass
- b. volume
- c. density
- d. length

5.) The instrument used to measure the ***volume of a liquid*** is a
- a. a graduated cylinder
- b. a triple beam balance
- c. a thermometer
- d. a centimeter ruler

6.) The standard, ***basic unit of volume*** that would have a value of one is the
- a. gram
- b. liter
- c. meter
- d. inch

7.) An educated guess based on observations with ones senses is a (an)
- a. proportion
- b. experiment
- c. inference
- d. measured observation

8.) The basic unit of measurement most commonly used by scientists is the
- a. English units
- b. the American system
- c. the European system
- d. The Metric system

9.) The amount of matter in an object is the objects':
- a. mass
- b. volume
- c. density
- d. length

Name:_____ Pd: _____

10.) The most common temperature scale used in science experiments or laboratories is:

a. Fahrenheit b. Kelvin
c. Richter d. Celsius

11.) What is the graph called when both variables do the same thing?

a. cyclic b. direct relationship
c. inverse relationship d. rate of change graph

12.) Which of the following is the measurement of a 2-dimensional surface?

a. volume b. area
c. density d. length

13.) When reading the volume of a liquid in a graduated cylinder you must read the bottom of the curve in the surface of the liquid, which is called

a. the extrapolation b. the meniscus
c. the inference d. the area

14.) The instrument used to measure volume of a **solid** wood block is

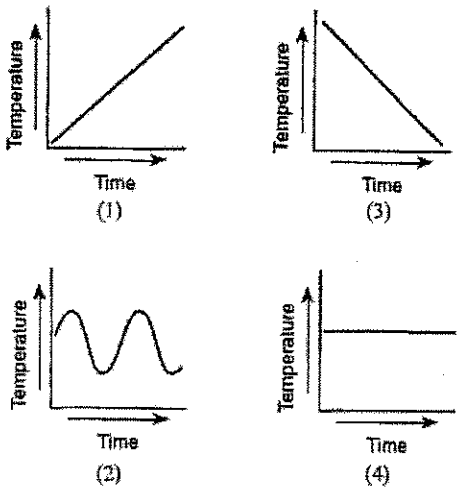
a. a graduated cylinder b. an electronic balance
c. a ruler d. a scale

15.) The relationship between two numbers in which an ***increase*** in the value of one number ***results in a decrease*** in the value of the other number is called:

a. Cyclic Relationship b. Direct Relationship
c. Inverse Relationship d. Constant Relationship

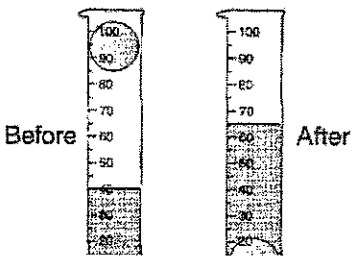
16.) Which graph most likely illustrates a cyclic change?

a. Graph 1 b. Graph 2
c. Graph 3 d. Graph 4



17.) The sphere was dropped into water in a graduated cylinder as shown below. What is the volume of the sphere?

a. 15 mL b. 40 mL
c. 65 mL d. 25 mL



Name:_____ Pd: _____

Section II: Observations & Inferences

18.) Which of the following is an example of an **observation**?
- a. The amount of snowfall on Friday was 6 inches.
- b. There are dark clouds in the sky, so it will rain soon.
- c. The sidewalk is wet, so it must have rained recently.

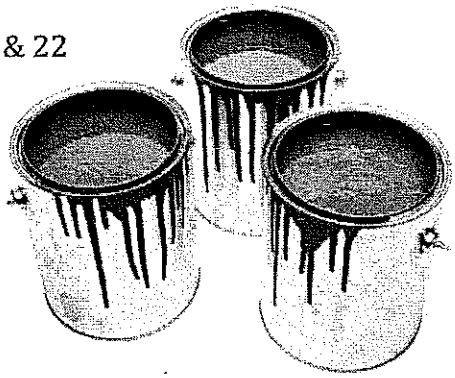
19.) Which of the following is most likely an example of an **inference**?
- a. The tree is 30 ft tall.
- b. There is a track in the dirt.
- c. The river will over flow its banks if it continues to rain.
- d. The tire is flat.

20.) There are seven schools within the Central York School District. This statement is a ?
- a. Qualitative Observation
- b. Quantitative Observation
- c. Inference

*Based solely on the pictures answer questions 21-24.

21.) There are three paint cans.
- a. Observation
- b. Inference

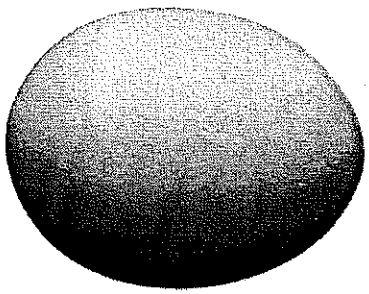
Picture 21 & 22



22.) The paint will be used to paint the playground.
- a. Observation
- b. Inference

23.) The egg is hard boiled.
- a. Observation
- b. Inference

Picture. 23 & 24



24.) The egg is ovular and smooth.
- a. Observation
- b. Inference

Section III: Density

25.) If a piece of gold has a density of 19.8g/ cm^3 and is cut into two smaller pieces, the density of the two pieces
- a. would increase
- b. would decrease
- c. would remain the same

Name:_____ Pd: _____

26.) If the mass of an unknown substance is 6.75g and has a volume of 2.25 cm^3, what is the density of the substance?

a. 15.19 g/cm^3 b. 0.33 g/cm^3 c. 3.0 g/cm^2 d. 3.0 g/cm^3

27.) If a substance has a density of 65.32 g/cm^3 and a volume of 15.10 cm^3 what is the mass?

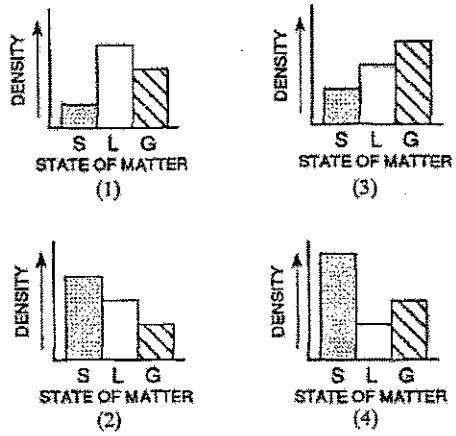
a. 986.33 g b. 0.23 g c. 4.33 g d. 65.32 g

28.) If a substance has a mass of 1.32g and a density of 3.47 g/cm^3, what is its' volume?

a. 4.58 cm^3 b. 2.63 cm^3 c. 0.38 cm^3 d. 1.0 cm^3

29.) Which graph best represents the relationship between the density of a substance and its state of matter (phase) for most earth materials, excluding water? [Key: S = solid, L = liquid, G = gas]

a. Graph 1 b. Graph 2
c. Graph 3 d. Graph 4



Section IV: Measurements

30.) Determine the length of this line (below) in **centimeters (cm). Select the best answer.**

_____

a. 7.2 b. 2.13 c. 8.4 d. 9.1

31.) All measurements should consist of?

a. number b. unit c. letter d. both a & b e. both b & c

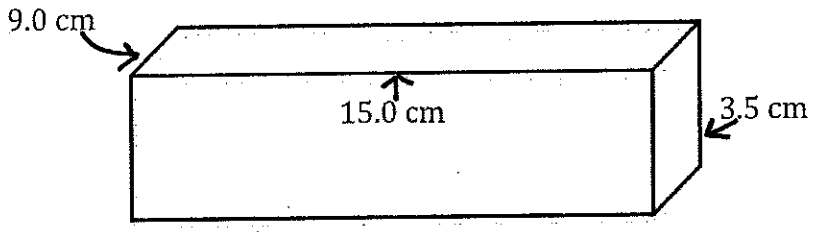
32.) Determine the length of the line (below) in **millimeters(mm). Select the best answer.**

_____

a. 3.1 b. 1.25 c. 40 d. 12.5

Name:_____ Pd: _____

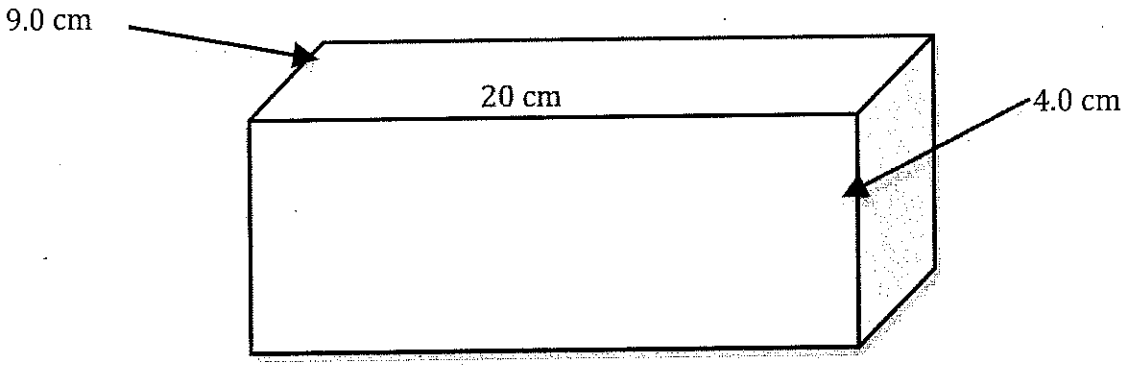
33.) Determine the **area** of the object below, not drawn to scale. Show your work and formula.



a. 24 cm^2
b.135cm^3
c. 135cm^2
d. 24cm^3

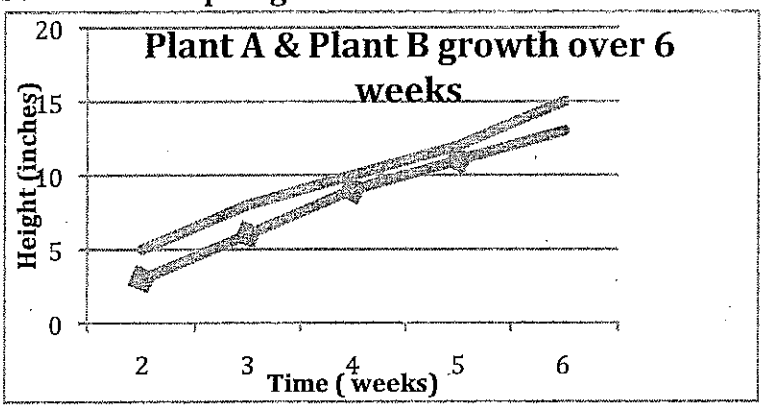
34.) Determine the volume of the object below (not to scale). Show your work and formula.

a. 33cm^2 b. 720cm^2 c. 720cm^3 d. 33cm^3



Name:_____ Pd: _____

Section V: Graphing



35.) What is the <u>independent</u> value?
- a. Time
- b. Plant Growth
- c. Height
- d. None of the above

36.) What is the <u>dependent</u> value?
- a. Time
- b. Plant Growth
- c. Height
- d. None of the above

37.) What type of relationship is being represented by the graph?
- a. Direct
- b. Inverse
- c. Cyclic

38.) What is wrong with the graph above?
- a. y-axis scaled incorrectly
- b. x-axis scaled incorrectly
- c. independent and dependent variables are switched
- d. both a and b

Section VI: Significant Figures and Conversions

How many significant figures are in the following measurements?

39.) 0.0005009

a. 5 b. 7 c. 4 d. 8

40.) 3450

a. 1 b. 2 c. 3 d. 4

41.) 3450.

a. 1 b. 2 c. 3 d. 4

Name:_____ Pd: _____

42.) 9010
a. 1 b. 2 c. 3 d. 4

43.) 1.00034
a. 2 b. 3 c. 4 d. 6

44.) 3.4901
a. 3 b. 4 c. 5 d. 6

For 45-48 Apply mathematical rules for least amount of sig figs or least decimal places.

45.) 1.235 + .456 =
a. 1.6905 b. 1.691 c. 1.69

46.) 56.457 x 1.2 =
a. 68 b. 67.7484 c. 67.748

47.) Solve 3.00456 – 0.66 + 1.789 =
a. 4.13356 b. 4.1335 c. 4.1336 d. 4.13

48.) Solve 89.2400 / 3.41 =
a. 26.170087 b. 26.171 c. 26.2 d. 26.1

Convert the following numbers to the proper units in questions 49-54.

Hint: Remember how King Henry died.

49.) 198 cm = _____mm a. 198 b. 1980 c. 19800 d. 19.8

50.) 2500 m = _____ km a. 2.500 b. 25.00 c. 250.0 d. 25,000

51.) 5.6 m = _____cm a. 560 b. 5,600 c. 56,00 d. 0.56

52.) 8 mm = _____ m a. .0008 b. .008 c. .08 d. .8

53.) 45mm = _____ cm a. 4.5 b. 450 c. 4,500 d. 0.045

54.) 2.51 m = _____ km a. 2510 b. 0.2510 c. 0.00251 d. 2.51

Name:_____ Pd: _____

PART I SHORT ANSWER: For questions 55-56, please use Factor Label Method to convert the following measurements and show your work directly on the packet. BOX in your FINAL answer!

55.) 2.5 miles to inches

56.) 7.8 mi/hr to m/min

For questions 57-58, please use the percent error equation and rate of change equation to answer the following questions. Show your work and BOX in your FINAL answer.

57.) In the lab one group calculated the density of corn syrup to be 1440 kg/m^3. The actual density found for corn syrup is 1380 kg/m^3. What is the percent error of the group's calculations.

58.) What is the average rate of cooling for the water in the beaker during the 8-minute time interval? MUST SHOW WORK IN ORDER TO RECEIVE CREDIT!

	Start								Finish
Time	0 min	1 min	2 min	3 min	4 min	5 min	6 min	7 min	8 min
Temperature	90°C	83°C	78°C	73°C	68°C	64°C	60°C	57°C	54°C

a. 3.2 C°/min b. 3.6 C°/min c. 4.5 C°/min d. 4.0 C°/min

Name:_____ Pd: _____

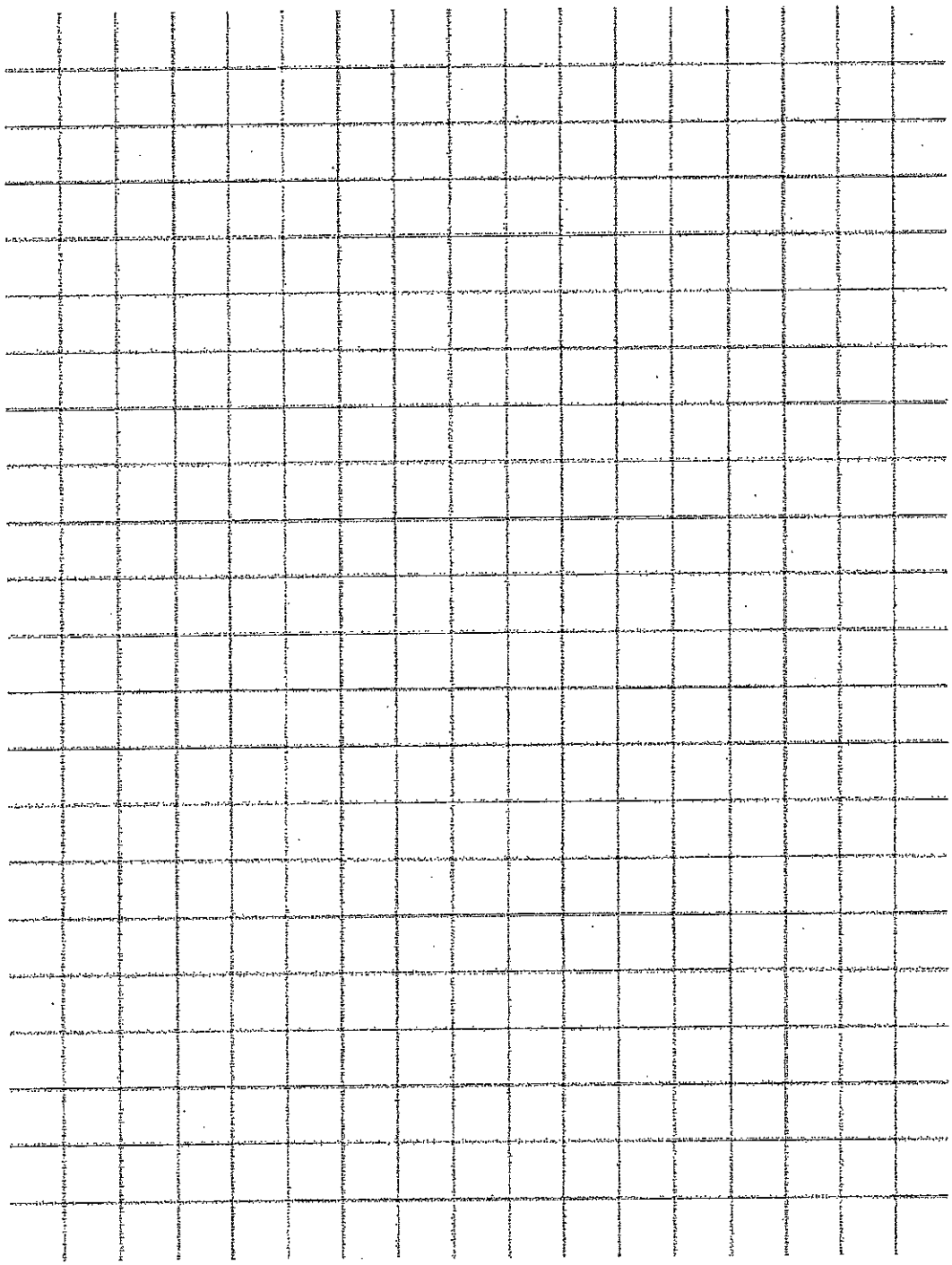
PART II SHORT ANSWER: Graph the following information. Don't forget all the vital parts to a complete graph and to answer #59 when finished! **Use all available space to display your data on the graph paper or points will be lost!**

Time (min)	Temperature (Celsius)
0	37
1	35
2	32
3	28
4	26
5	23
6	21
7	18
8	16
9	12

59.) What type of relationship is being represented by the graph?

a. Direct
b. Inverse
c. Cyclic

Answer:_____



Name: Key (65pts) Pd: _____

Observation and Measurement Exam, Fall 2015 (Honors)

Directions: Read each question carefully. I suggest circling your answers on the test first and then going back and filling in your scantron. If you erase on the scantron, erase completely. Also, make sure you completely fill in the circles. Use a number 2 pencil. Please answer short answer questions directly on the packet.

Section I: Reading/Definitions

1.) In order to make an observation, a science student must **always** use
- a. experiments
- (b.) their senses
- c. proportions
- d. math calculations

2.) In order for scientists to **enhance** their powers of observations they must at times use
- a. an inference
- b. an interpolation
- (c.) an instrument
- d. a graph

3.) A picture of data can be represented with
- a. an instrument
- b. an experiment
- c. an extrapolation
- (d.) a graph

4.) The amount of space an object takes up or "capacity" is the definition of
- a. mass
- (b.) volume
- c. density
- d. length

5.) The instrument used to measure the ***volume of a liquid*** is a
- (a.) a graduated cylinder
- b. a triple beam balance
- c. a thermometer
- d. a centimeter ruler

6.) The standard, ***basic unit of volume*** that would have a value of one is the
- a. gram
- (b.) liter
- c. meter
- d. inch

7.) An educated guess based on observations with ones senses is a (an)
- a. proportion
- b. experiment
- (c.) inference
- d. measured observation

8.) The basic unit of measurement most commonly used by scientists is the
- a. English units
- b. the American system
- c. the European system
- (d.) The Metric system

9.) The amount of matter in an object is the objects':
- (a.) mass
- b. volume
- c. density
- d. length

Name:_____ Pd: _____

10.) The most common temperature scale used in science experiments or laboratories is:

a. Fahrenheit b. Kelvin
c. Richter (d.) Celsius

11.) What is the graph called when both variables do the same thing?

a. cyclic (b.) direct relationship
c. inverse relationship d. rate of change graph

12.) Which of the following is the measurement of a 2-dimensional surface?

a. volume (b.) area
c. density d. length

13.) When reading the volume of a liquid in a graduated cylinder you must read the bottom of the curve in the surface of the liquid, which is called

a. the extrapolation (b.) the meniscus
c. the inference d. the area

14.) The instrument used to measure volume of a **solid** wood block is

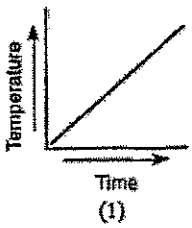
a. a graduated cylinder b. an electronic balance
(c.) a ruler d. a scale

15.) The relationship between two numbers in which an ***increase*** in the value of one number ***results in a decrease*** in the value of the other number is called:

a. Cyclic Relationship b. Direct Relationship
(c.) Inverse Relationship d. Constant Relationship

16.) Which graph most likely illustrates a cyclic change?

a. Graph 1 (b.) Graph 2
c. Graph 3 d. Graph 4



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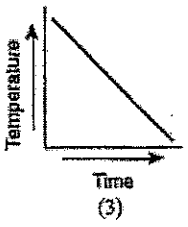

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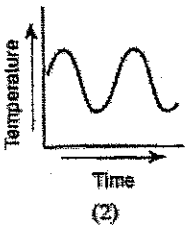
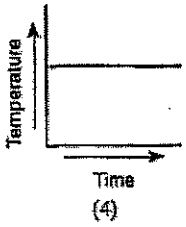


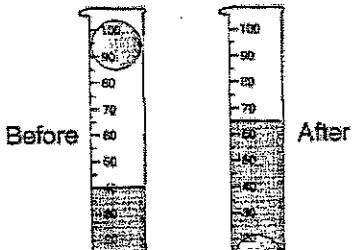
(2)



(4)

17.) The sphere was dropped into water in a graduated cylinder as shown below. What is the volume of the sphere?

a. 15 mL b. 40 mL
c. 65 mL (d.) 25 mL



Name:_____ Pd: _____

Section II: Observations & Inferences

18.) Which of the following is an example of an **observation**?
- (a.) The amount of snowfall on Friday was 6 inches.
- b. There are dark clouds in the sky, so it will rain soon.
- c. The sidewalk is wet, so it must have rained recently.

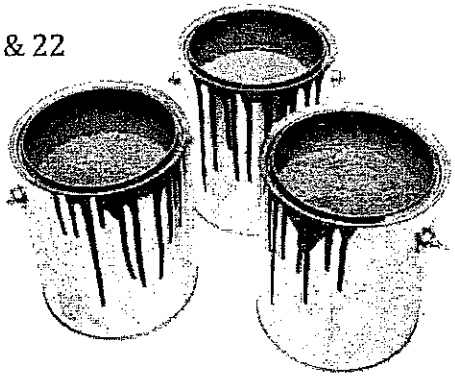
19.) Which of the following is most likely an example of an **inference**?
- a. The tree is 30 ft tall.
- b. There is a track in the dirt.
- (c.) The river will over flow its banks if it continues to rain.
- d. The tire is flat.

20.) There are seven schools within the Central York School District. This statement is a ?
- a. Qualitative Observation
- (b.) Quantitative Observation
- c. Inference

*Based solely on the pictures answer questions 21-24.

21.) There are three paint cans.
- (a.) Observation
- b. Inference

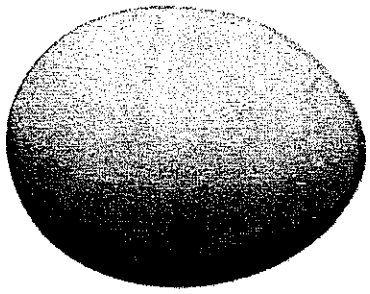
Picture 21 & 22



22.) The paint will be used to paint the playground.
- a. Observation
- (b.) Inference

23.) The egg is hard boiled.
- a. Observation
- (b.) Inference

Picture. 23 & 24



24.) The egg is ovular and smooth.
- (a.) Observation
- b. Inference

Section III: Density

25.) If a piece of gold has a density of 19.8g/ cm^3 and is cut into two smaller pieces, the density of the two pieces
- a. would increase
- b. would decrease
- (c.) would remain the same

UNIT 14 FINAL PROJECT

Name:_____ Pd: _____

26.) If the mass of an unknown substance is 6.75g and has a volume of 2.25 cm^3, what is the density of the substance?

a. 15.19 g/cm^3 b. 0.33 g/cm^3 c. 3.0 g/cm^2 (d.) 3.0 g/cm^3

27.) If a substance has a density of 65.32 g/cm^3 and a volume of 15.10 cm^3 what is the mass?

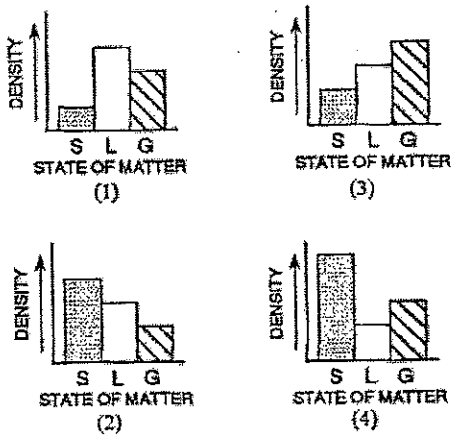
(a.) 986.33 g b. 0.23 g c. 4.33 g d. 65.32 g

28.) If a substance has a mass of 1.32g and a density of 3.47 g/cm^3, what is its' volume?

a. 4.58 cm^3 b. 2.63 cm^3 (c.) 0.38 cm^3 d. 1.0 cm^3

29.) Which graph best represents the relationship between the density of a substance and its state of matter (phase) for most earth materials, excluding water? [Key: S = solid, L = liquid, G = gas]

a. Graph 1 (b.) Graph 2
c. Graph 3 d. Graph 4



Section IV: Measurements

30.) Determine the length of this line (below) in **centimeters (cm). Select the best answer.**

_____

a. 7.2 b. 2.13 c. 8.4 (d.) 9.1

31.) All measurements should consist of?

a. number b. unit c. letter (d.) both a & b e. both b & c

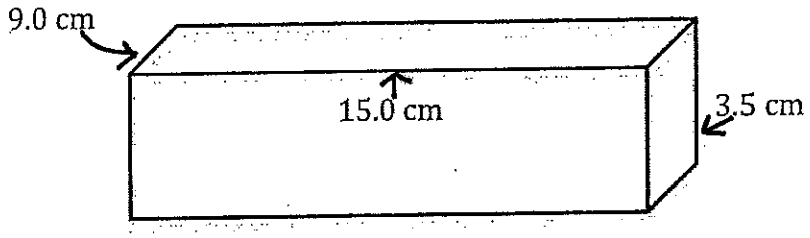
32.) Determine the length of the line (below) in **millimeters(mm). Select the best answer.**

_____

a. 3.1 b. 1.25 (c.) 40 d. 12.5

Name:_____ Pd: _____

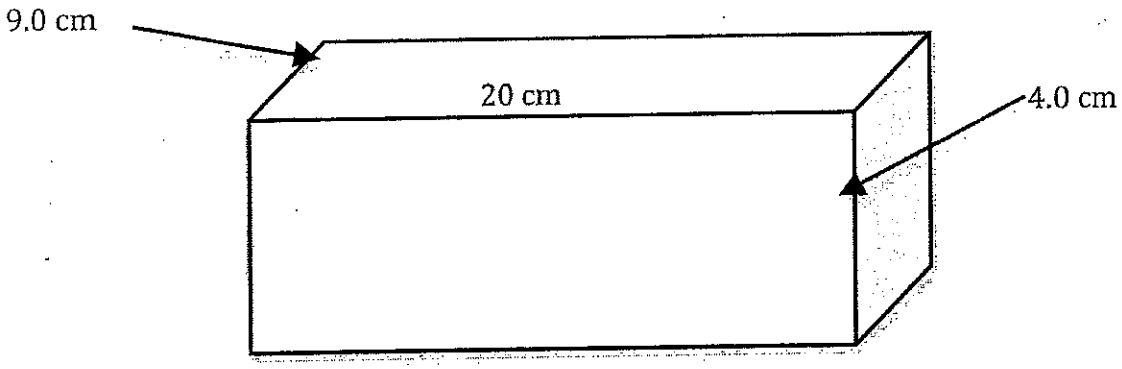
33.) Determine the **area** of the object below, not drawn to scale. Show your work and formula.



a. 24 cm^2
b. 135cm^3
c. 135cm^2
d. 24cm^3

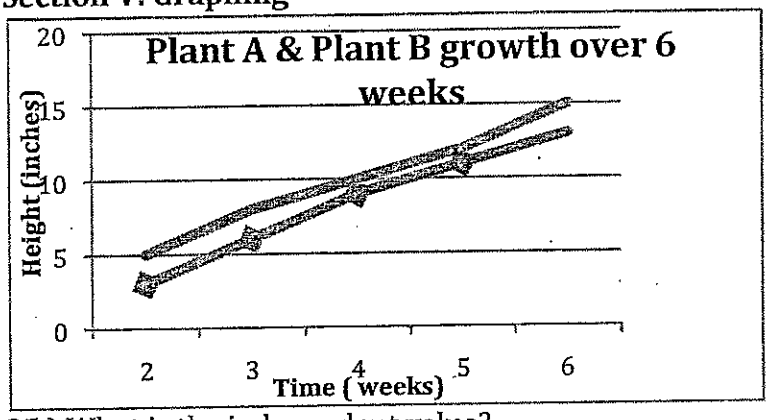
34.) Determine the volume of the object below (not to scale). Show your work and formula.

a. 33cm^2 b. 720cm^2 c. 720cm^3 d. 33cm^3



Name:_____ Pd:_____

Section V: Graphing



35.) What is the independent value?
- a. Time
- b. Plant Growth
- c. Height
- d. None of the above

36.) What is the dependent value?
- a. Time
- b. Plant Growth
- c. Height
- d. None of the above

37.) What type of relationship is being represented by the graph?
- a. Direct
- b. Inverse
- c. Cyclic

38.) What is wrong with the graph above?
- a. y-axis scaled incorrectly
- b. x-axis scaled incorrectly
- c. independent and dependent variables are switched
- d. both a and b

Section VI: Significant Figures and Conversions

How many significant figures are in the following measurements?

39.) 0.0005009
a. 5 b. 7 c. 4 d. 8

40.) 3450
a. 1 b. 2 c. 3 d. 4

41.) 3450.
a. 1 b. 2 c. 3 d. 4

Name:_____ Pd:_____

42.) 9010
a. 1 b. 2 (c.) 3 d. 4

43.) 1.00034
a. 2 b. 3 c. 4 (d.) 6

44.) 3.4901
a. 3 b. 4 (c.) 5 d. 6

For 45-48 Apply mathematical rules for least amount of sig figs or least decimal places.

45.) 1.235 + .456 =
a. 1.6905 (b.) 1.691 c. 1.69

46.) 56.457 x 1.2 =
(a.) 68 b. 67.7484 c. 67.748

47.) Solve 3.00456 – 0.66 + 1.789 =
a. 4.13356 b. 4.1335 c. 4.1336 (d.) 4.13

48.) Solve 89.2400 / 3.41 =
a. 26.170087 b. 26.171 (c.) 26.2 d. 26.1

Convert the following numbers to the proper units in questions 49-54.

Hint: Remember how King Henry died.

49.) 198 cm = _____mm a. 198 (b.) 1980 c. 19800 d. 19.8

50.) 2500 m = _____ km (a.) 2.500 b. 25.00 c. 250.0 d. 25,000

51.) 5.6 m = _____cm (a.) 560 b. 5,600 c. 56,00 d. 0.56

52.) 8 mm = _____ m a .0008 (b.) .008 c. .08 d. .8

53.) 45mm = _____ cm (a.) 4.5 b. 450 c. 4,500 d. 0.045

54.) 2.51 m = _____ km a. 2510 b. 0.2510 (c.) 0.00251 d. 2.51

UNIT 14: FINAL PROJECT

Name:_____ Pd: _____

PART I SHORT ANSWER: For questions 55-56, please use Factor Label Method to convert the following measurements and show your work directly on the packet. BOX in your FINAL answer!

1pt 55.) 2.5 miles to inches

$$2.5\,mi \times \frac{5280\,ft}{1\,mi} \times \frac{12\,in}{1\,ft} = 158{,}400\,in$$

2pt 56.) 7.8 mi/hr to m/min

$$7.8\,\frac{mi}{hr} \times \frac{1.609\,km}{1\,mi} \times \frac{1000\,m}{1\,km} \times \frac{1\,hr}{60\,min} = \frac{12550.2}{60} = 209.17\ m/min$$

For questions 57-58, please use the percent error equation and rate of change equation to answer the following questions. Show your work and BOX in your FINAL answer.

1pt 57.) In the lab one group calculated the density of corn syrup to be 1440 kg/m³. The actual density found for corn syrup is 1380 kg/m³. What is the percent error of the group's calculations.

$$\%\ = \left(\frac{1440 - 1380}{1380}\right) \times 100 = 4.35\%$$

1pt 58.) What is the average rate of cooling for the water in the beaker during the 8-minute time interval? MUST SHOW WORK IN ORDER TO RECEIVE CREDIT!

$$ROC = \frac{90 - 54}{8 - 0} = \frac{36}{8} = 4.5\ °C/min$$

	Start							Finish
Time	0 min	1 min	2 min	3 min	4 min	5 min	6 min	7 min	8 min
Temperature	90°C	83°C	78°C	73°C	68°C	64°C	60°C	57°C	54°C

a. 3.2 C°/min b. 3.6 C°/min (c. 4.5 C°/min) d. 4.0 C°/min

Name:_____ Pd: _____

PART II SHORT ANSWER: Graph the following information. Don't forget all the vital parts to a complete graph and to answer #59 when finished! **Use all available space to display your data on the graph paper or points will be lost!**

Time (min)	Temperature (Celsius)
0	37
1	35
2	32
3	28
4	26
5	23
6	21
7	18
8	16
9	12

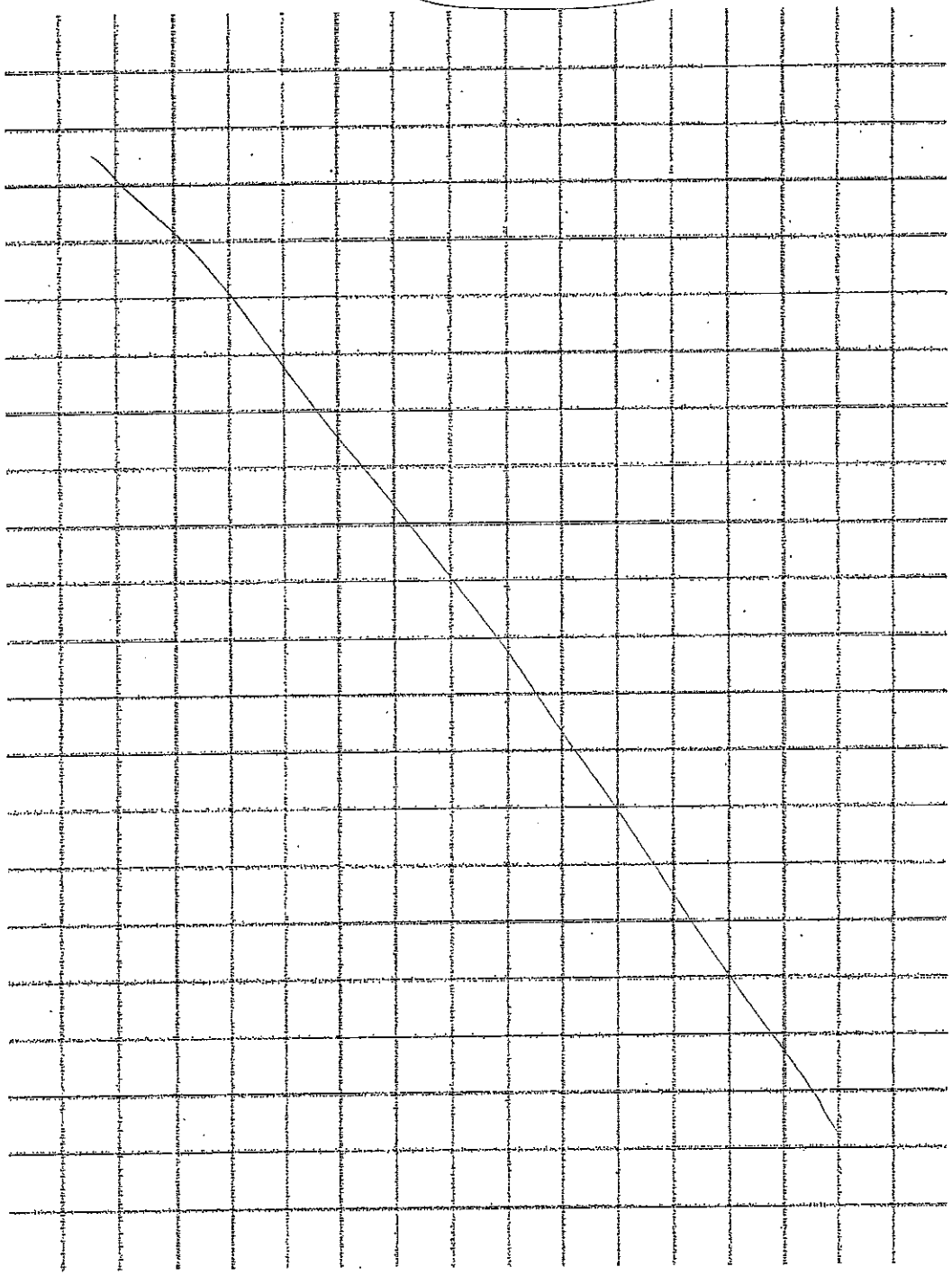
59.) What type of relationship is being represented by the graph?

a. Direct
b. Inverse
c. Cyclic

Answer: +1 pt

5 pts

Title



UNIT 14 FINAL PROJECT

Name:_____ Type 1
Date: _____

- **Promt:** Please reflect on our first unit on the fundamentals of science. Please mention the following:
  - Strengths
  - Weaknesses
  - Suggestions for the teacher
  - Areas that you feel you still need help with

- *Minimum of 10 lines and all questions must be answered for full credit!

x

• Answers will vary by student but need:

x - 10 complete lines

- complete sentences

x - Answer all bulled Points

x

x

x

x

x

x

UNIT 14 FINAL PROJECT

x

x

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x

References

McMillan, J. (2014). High-Quality Classroom Assessment. In Classroom Assessment: Principles and Practice for Effective Standards-Based Instruction (6th ed.). Pearson.

Unit 14 Sample Final Project (2015). Using Assessment to Guide Instruction Course ED 520. *Wilkes University*. Retrieved on October 7, 2015 from https://live.wilkes.edu/d2l/home/202476