Grade 8

Science Focus

Lab Workbook

Unit 1
Mix and Flow of Matter

Developed by Dave Durrant

Inspector's Corner

Problem: How can common household products be classified as homogeneous and heterogeneous mixtures?

Hypothesis: _____

_____ .

Investigative Procedure: Follow the directions outlined on page 16

Data Collection:

Product	Observations	Heterogeneous or Homogeneous	Reason for choice
milk			
orange juice			
jam			
salsa			
toothpaste			
cereal			
soap			
salad dressing			

Analysis of Data:

1. _____

_____

Conclude and Apply:

2. _____

_____

3. easy _____

_____

difficult _____

_____

Lab Investigation 1-A submitted by _____ _____

Date _____

Solubility Solutions

Investigation 1-B
Pages 22 - 23

Problem: Which solute has the greatest solubility in water?
>>> Salt, sugar, potassium nitrate, baking soda, copper (II) sulphate <<<

Hypothesis: _____

_____ .

Investigative Procedure: Follow the directions outlined on pages 22 - 23

Data Collection:

	Amount of solute added to 10 ml of water			
Solute	**Trial 1**	**Trial 2**	**Trial 3**	**Average**
salt				
sugar				
potassium nitrate				
baking soda				
copper (II) sulphate				

Analysis of Data:

1. most soluble _____ least soluble _____

2. _____

Conclude and Apply:

3. **(a)** _____ **(b)** _____

(c) _____ **(d)** _____

Extend Your Skills: **4.** Scientific Illustration (solution mining) Potash Corp – Solution Mining

Lab Investigation 1-B submitted by _____ _____

Date _____

Using Filtration to Separate Mixtures

Problem: How can the process of filtration be used to separate the parts of mixtures?

Hypothesis: _____

_____ .

Investigative Procedure: Follow the directions outlined on page 32

Mixture	Appearance of filtrate	Appearance of residue

Analysis of Data:

1. _____

because _____

2. _____

because _____

Conclude and Apply:

3. (1)_____

(2)_____

(3)_____

4. Extension / Application (Complete your drawings on a separate sheet of paper and attach to this page – you need only one for each application - 4 in all**)**

body filters (water, blood, air)
car filters (air, gas, oil)
home filters (air)
recreational facilities (air, water, chemicals)

Lab Investigation 1-C submitted by _____ _____

Date _____

Hidden Colours

Investigation 1-D
Pages 34 - 35

Problem: Is it possible to separate the different pigments (colours) of an ink solution?

http://www.middleschoolscience.com/chrom.htm

Prediction 1: (colours appearing after separation) _____

_____ .

Prediction 2: (colours that cannot be separated) _____

_____ .

Investigative Procedure: Follow the directions outlined on pages 34 - 35

Type & Colour of Marker	Solvent used	Type of paper used	Observations

Analysis of Data: **http://wwwchem.csustan.edu/chem1002/mrsketch.htm**

1. manipulated variable_____

   responding variable_____

2. more soluble in water _____

   more soluble in methanol _____

   more soluble in ethanol _____

3. _____ because _____

   _____

Conclude and Apply:

4. most surprising results _____

   because _____

   least surprising results _____

   because _____

5. _____

_____

_____

_____

_____

_____

Extend Your Knowledge

6. Technologies that use **Chromatography**

http://www.varianinc.com/csb/index.html

_____

_____

_____

_____

_____

_____

_____

Internet References found:

http://www.rpi.edu/dept/chem-eng/Biotech-Environ/CHROMO/chromintro.html

http://chemistry.csudh.edu/oliver/satcoll/papchrom.htm

http://members.kr.inter.net/guesu/gs/a_introduction/chromatography.html

http://12.17.12.70/aai/committees/education/chromato.htm

Lab Investigation 1-D submitted by _____ _____

Date _____

A Sweet Process

Investigation 1-E
Pages 36 - 37

Problem: How do the steps of separation and processing produce different grades of sugar?

Hypothesis: _____

_____ .

Investigative Procedure: Follow the directions outlined on pages 36 - 37

Data Collection: Use the flow chart on page 36 or check the following websites:
http://www.sugar.org/scoop/aboutsug.html
http://www.unido.org/ssites/env/sectors/sectors62ac.html
http://www.irish-sugar.ie/education/production/i_production.html

Analysis:

1. _____

   _____

2. _____

   _____

3. **Sketch (** Filtration in Step E **)**

4. **Sketch (** Evaporation in steps F and G **)**

5. **(a)** _____

   (b) _____

   (c) _____

Lab Investigation 1-E submitted by _____ _____

Date _____

Determining Flow Rate

Investigation 1-F
Pages 41 - 43

Part 1

Problem: How fast can different liquids flow? (rank them fastest to slowest)

>>>> cooking oil, motor oil, molasses, corn syrup, liquid detergent, honey, ethyl alcohol <<<<

Hypothesis: _____

_____ .

Investigative Procedure: Follow the directions outlined on pages 41 - 42

Data Collection: Room Temperature is _____ ^{o}C

(**Test only 3 liquids – 2-3 times each – then take the average to record in the chart**)

Liquid (15 ml)	Time (s)	Flow Rate (cm/s)	Predicted Ranking	Actual Ranking	Viscosity Ranking
cooking oil					
motor oil					
honey					
molasses					
ethyl alcohol					
corn syrup					
detergent					

Analysis:

1. manipulated variable_____

   responding variable_____

   controlled variables_____

   _____

2. **Complete flow rate calculation in your chart**
3. **Rank each liquid's flow rate (fastest to slowest) in your chart**
4. **Rank viscosities (lowest to highest) in your chart**
5. _____

   _____

   _____

Conclude and Apply:

6. _____

_____

7. _____

_____

8. (Use Microsoft Excel to create your bar graph of the flow rates – Cut and paste it here)

Part 2

Problem: How fast can an object flow through different liquids?

Hypothesis: _____

_____ .

Investigative Procedure:

Follow the directions outlined on page 43 by providing a **step-by-step procedure** to test the problem.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Analysis:

1. _____

_____

2. _____

_____

Conclude and Apply:

3. _____

_____

4. _____

_____

_____

_____

_____

5. _____

_____

Lab Investigation 1-F submitted by _____ _____

Date _____

Flowing Fluid Floods City

Challenge: Read the story and answer the questions.

Analyze:

1. **(a)** _____

   (b) _____

   (c) _____

   (d) _____

   (e) _____

2. _____

   _____

   _____

3. _____

   _____

   _____

4. _____

   _____

   _____

Find out more about molasses:

The Great Boston Molasses Flood
Full Details – It killed 21 people

Types of Molasses Crosby Molasses

Storage of Molasses Premier Molasses

Lab Investigation 1-G submitted by _____ _____

Date _____

Determining Density

Investigation 1-H
Pages 54 - 56

Part 1 – Mass-to-Volume Ratios

Problem: How can measurements of mass and volume determine the density of a substance?

Hypothesis: _____

_____ .

Investigative Procedure: Follow the directions outlined on pages 54 - 55

Substance tested:				
A	**B**	**C**	**D**	**E**
Volume (ml)	**Mass of Cylinder (g)**	**Mass of Cylinder and Substance (g)**	**Mass of Substance (g)**	**Ratio of Mass to Volume (g/ml)**
100				
200				
300				
400				
500				

Summary Chart

Substance	**Mass (g)**	**Volume (ml)**	**Mass to Volume ratio (g/ml)**

Part 2 – Graphing

Use Microsoft Excel to make your graphs and attach them to this lab, when submitting it to the teacher

Analyze:

1. **straight curved ……. same slope different slope**

_____

_____

2. _____

_____

_____

3. _____

_____

_____

4. (a) _____

(b) _____

(c) _____

Conclude and Apply:

5. _____

_____

6. _____

_____

7. _____

_____

8. _____

9. _____

_____

10. _____

_____

Extend Your Skills

11. _____

_____

_____

Lab Investigation 1-H submitted by _____ _____

Date _____

Build a Density Tower

Problem: How can you build a tower out of liquids that support each other as well as solids?

Hypothesis: _____

_____ .

Investigative Procedure: Follow the directions outlined on page 60

Data Collection:

Substance	Mass	Volume	Density	Rank

Analyze:

1. _____
least dense ⟶ **most dense**

2. substances denser than water _____

substances less dense than water _____

Conclude and Apply:

3. **yes** **no** according to the particle theory _____

_____

4. _____

Extend Your Skills:

5. _____

_____

_____

Lab Investigation 1- I submitted by _____ _____

Date _____

Measuring Buoyancy

Problem: Do all liquids exert the same buoyant force?

Hypothesis: _____

_____ .

Investigative Procedure: Follow the directions outlined on page 68

Data Collection:

Substance	Weight in Air	Weight in Liquid	Difference between weight in air and weight in liquid	Density	Buoyant Force Ranking
Liquid 1	1.0 N	0.85 N		1.0 g/ml	
Liquid 2	1.0 N	0.90 N		0.67 g/ml	
Liquid 3	1.0 N	0.70 N		2.0 g/ml	

Analyze:

1. _____

_____

_____

2. _____

_____

_____

3. _____

_____

_____

Lab Investigation 1- J submitted by _____ _____

Date _____

Proving the Pressure Equation

Problem: Can you identify where the pressure equation is applied, to make work easier?

Hypothesis: _____

_____ .

Investigative Procedure: Follow the directions outlined on page 72

You may use any of the devices provided by your teacher for this lab,
or, if you have another device you would like to investigate,
check to get permission before you proceed with the lab.

Scientific Design Illustration for _____

Application of the Pressure Equation (Explanation)

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Evaluate:

1. _____

_____

2. _____

Show calculations:

3. _____

_____

Lab Investigation 1- K submitted by _____ _____

Date _____

Compression of Liquids and Gases

Design Your Own Investigation 1-L
Page 81

Problem: Can you determine the percent compression of air and water, using a simple syringe?

Hypothesis: _____

_____ .

Investigative Procedure: Follow the directions outlined on page 81 or, develop your own investigative procedure to answer the problem (get permission before doing your own procedure)

_____

_____

_____

_____

_____

Analysis of Data:

1. manipulated variable _____

2. responding variable _____

3. controlled variables _____

_____

4. _____

5. _____

_____

Conclude and Apply:

6. _____

_____

7. _____

_____

Lab Investigation 1-L submitted by _____ _____

Date _____

Make a Model of a Dentist's Chair

Problem: Can you create a working model that simulates the movement of a dentist's chair?

Hypothesis: _____

_____ .

Investigative Procedure: Follow the directions outlined on page 83

Ensure that your model meets the design specifications: **A** – must use hydraulics
B – transmit motion smoothly and **C** – parts not allowed to break

Design Sketch

(Side View)

Design Sketch

(Top View)

Evaluate:

1. _____

_____

_____

_____

_____

2. _____

_____

_____

_____

_____

3. **Not as effective** **Just as effective** **Superior**

_____

_____

_____

_____

4. _____

_____

_____

_____

_____

Lab Investigation 1- M submitted by _____ _____

Date _____

A-Mazing Hydraulics:

Project - Unit 1
Pages 88 - 89

Choose one of the following challenges and complete it to show mastery of the concepts in this unit.

Challenge 1: Design a game that uses your knowledge of fluids and hydraulics to move a marble through a maze?
(Instructions and specifications for this challenge can be found on pages 88-89 in your textbook)

Challenge 2: Can you design your own amusement park attraction that applies what you have learned about fluids and hydraulics?

Challenge 3: Can design a working model of a fluid system, such as bathtub, shower, sink and toilet in a vacation cabin or mobile home.

Project Description

This project is intended to synthesis the key concepts relating to Fluids and Pressure in the **Unit: Mix and Flow of Matter**. Students can begin doing this at the beginning of the unit of study and will continue throughout the Unit. In collaborative groups (no more than 3 per group), students will research information on the components of their fluid system, developing search skills by using Internet search engines, as well as other print and visual resources. They will make a working model and demonstrate it to the class, explaining the physics of how it works. The model must be supported with factual information that is properly cited, and students will then answer queries from their classmates and teacher. An evaluation Rubric will be provided, when the Challenge is introduced and the due date is assigned.

Students will have acquired the basic knowledge about hydraulics, fluid principles and pressure principles to complete this challenge by the end of this Unit.

References
Recommended Internet URL's to begin researching the Challenge chosen are:

Challenge 1
http://www.pumpkin-festival.com/maze.html
http://baylug.org/zonker/ZMarble.html
http://www.logicmazes.com/tilt.html

Challenge 2
http://www.learner.org/exhibits/parkphysics/
http://themeparks.miningco.com/msub24.htm
http://www.bonus.com/bonus/card/Amusement_Park_Physics.html
http://curie.uncg.edu/~mturner/title.html
http://library.thinkquest.org/2745/

Challenge 3
http://www.hometime.com/projects/howto/cabin/pc2lc13.htm
http://www.niagaraconservation.com/water.htm
http://www.howstuffworks.com/cooling-system1.htm
http://www.howstuffworks.com/washer3.htm
http://www.howstuffworks.com/house12.htm

The Research and Fact Finding involved in this project, supports the critical understandings that the students are to achieve from this unit. Students will be able to use the information gained from the activities throughout the Unit to help them in the decision making process.