

Grade 8

Science Focus



Lab Workbook

Unit 1

Mix and Flow of Matter

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:

Solute	Amount of solute added to 10 ml of water			
	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

Investigation 1-C
Page 32

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>

- manipulated variable _____
responding variable _____
- more soluble in water _____
more soluble in methanol _____
more soluble in ethanol _____
- _____ because _____

Conclude and Apply:

- 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 _____ °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)

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

Investigation 1-J
Page 68

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

Investigation 1-K
Page 72

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. _____

<p>Show calculations:</p>

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

Investigation 1-M
Page 83

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

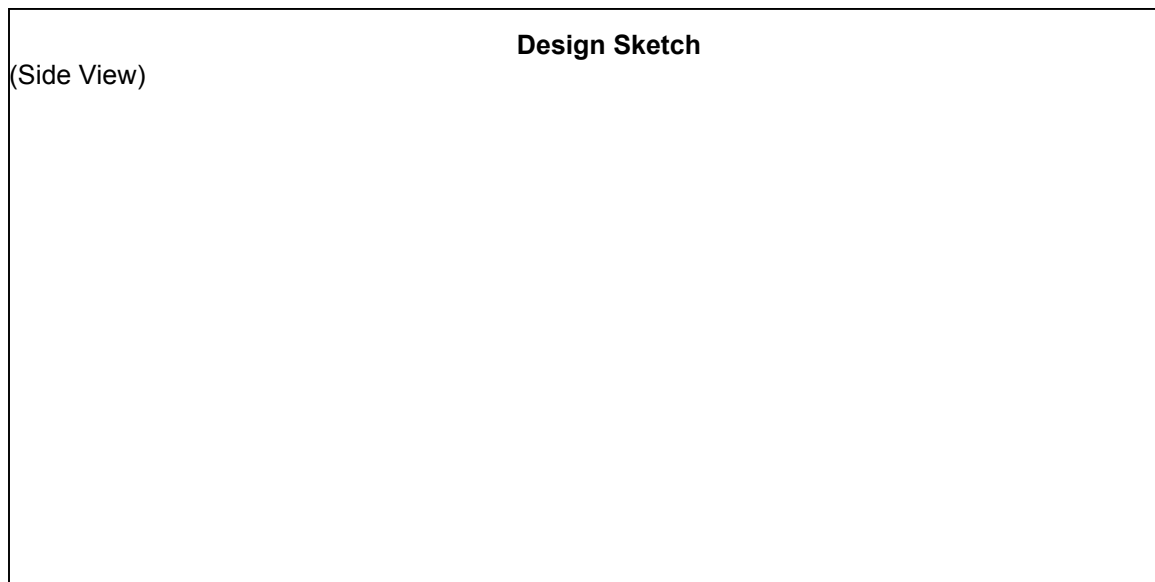
Hypothesis: _____

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

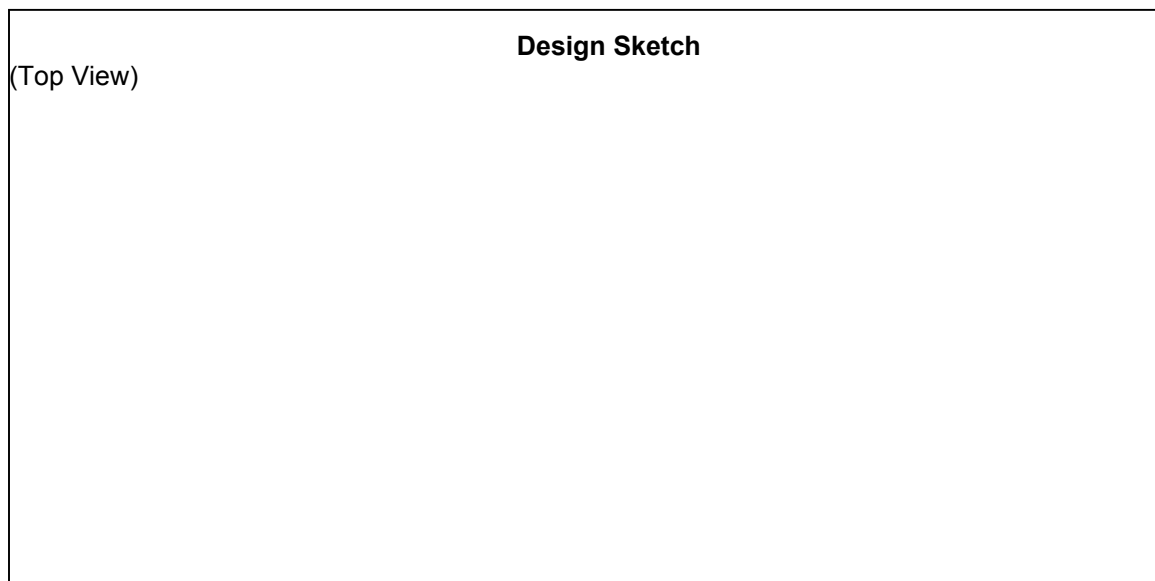
(Side View)

Design Sketch



(Top View)

Design Sketch



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://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.