Downloadable Reproducible eBooks

Thank you for purchasing this eBook from www.socialstudies.com or www.writingco.com.

To browse more eBook titles, visit
http://www.socialstudies.com/ebooks.html

To learn more about eBooks, visit our help page at
http://www.socialstudies.com/ebookshelp.html

For questions, please e-mail eBooks@socialstudies.com

Free E-mail Newsletter–Sign up Today!

To learn about new eBook and print titles, professional development resources, and catalogs in the mail, sign up for our monthly e-mail newsletter at
http://socialstudies.com/newsletter/

PSYCHOLOGY ACTIVITIES

Volume 1: Basic Psychology Concepts

- Self
- Methodology
- Statistics

Created by Kathleen M. Glusick
Peanut Publishing, LLC

Table of Contents

Introduction

About This Book

The activities provided in this booklet are created to enrich psychology classes. They provide hands-on activities and demonstrations that engage students in the active study of psychology through experimentation.

This volume introduces the basic concepts of self-discovery, experiment methods, and statistics. These activities clarify the terms, procedures, and means to analyze experiments that students either perform or learn about through class and readings.

These psychology activities were created during the development of an experimental psychology course for a high school classroom. The suggestions provided in textbooks and other supplemental material did not offer the hands-on, experimental approach sought by the course instructor. As the class was to be taught in a school utilizing block scheduling (ninety and seventy-five minute classes), lessons that kept students active and interested while demonstrating the key components of psychology were developed. The classroom lessons and materials were used and refined over a two-year period during which four sections of the new psychology course were taught.

The essential goals for each activity were to make them easy to use, to involve and engage the students, and to clarify key psychology concepts.

The topics covered in this booklet, and other *Psychology Activities* volumes, parallel general Psychology textbooks and should be used as a supplemental aid. The activities and demonstrations clarify basic psychology concepts and allow students to see the effect or impact of a concept first hand.

All lessons were created with the teacher and student in mind. The purpose for each lesson is clearly stated and a specific list of materials required for each lesson is provided. Procedures are written in a step-by-step format to allow for easy implementation into a block or typical schedule format. The discussion questions provide closure to the activity and can be done as a class or as individual work to check for student understanding. Hints or tips are offered throughout the booklet to assist teachers in adapting lessons to fit their needs or the ability level of students. The Glossary, which concludes each booklet, defines psychology and experiment terms used throughout the lessons. Student handouts include all necessary instructions and directions as well as material to assist in data collection. Finally, the material is organized in such a way that incorporating the lessons into an existing curriculum is easy and enjoyable.

Current research indicates that students who are actively engaged in the learning process retain information better than those who are passive participants in the

classroom. *Psychology Activities* was created with this concept in mind. The hands on approach to Psychology that this booklet offers will spark and maintain student interest. Being involved as subjects and experimenters allows students to become an active part of their own learning. Participation in these activities also provides students with an episodic memory of a classroom experience, strengthening the concepts being taught and therefore improving learning. Most importantly, when students are actively engaged, they have more fun. These activities make the study of psychology an enjoyable experience for everyone!

About the Author

Kathleen M. Glusick graduated from the University of Wisconsin – Madison with a Bachelor's degree in Broad Field Social Studies and a minor in Psychology. She completed her Master's of Education through Cardinal Stritch University in Milwaukee, Wisconsin. She taught World Cultures, Citizenship, Sociology, and Experimental Psychology during her high school teaching career. After completing her thesis, *The Impact of Brain-Compatible Physical Structures on Classroom Learning*, Peanut Publishing was created to enhance involvement in the classroom by providing teachers with student centered activities.

Questions or comments regarding this material are welcome. Please contact:

Kathleen M. Glusick
Peanut Publishing, LLC
N84 W17166 Menomonee Ave.
Menomonee Falls WI 53051

(262) 502-0342
email: dglusick@execpc.com

SELF

Self: What's in a Picture?

Purpose:

- Introduce students to each other – ice breaker
- Introduce concepts of self
- Demonstrate weakness/flaws in self-interpretation and subjectivity
- Introduce sample tool for use in future experiments

Materials:

- Picture Interpretation Test (p. 2)
- Procedure Instructions (below)
- Discussion & Analysis (p. 3)

Procedure:

- Explain to students the importance of honesty and knowing/being aware of one's self when conducting experiments and studying psychology.

- Discuss the difference between objectivity and subjectivity.

- Hand out the Picture Interpretation Test and explain the following to the students:
  - ✎ You should draw a picture in each of the six boxes, incorporate the drawing in the box into your picture.
  - ✎ There are no right or wrong answers.
  - ✎ You should not look at anyone else's drawings, nor show others your drawings
  - ✎ For the fifth box, draw whatever comes to mind.

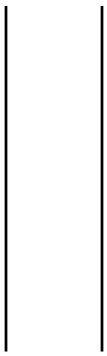
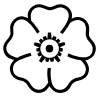
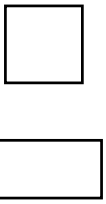
- Give students enough time to complete their illustrations thoroughly in class, or allow them to take the sheet home to work on overnight.

- When students return, go through the Discussion & Analysis discussion.

Name: _____

Self: Picture Interpretation Test

Draw a picture in each of the six boxes below. The figures in the boxes should be somehow worked into your drawing. Draw whatever comes to mind for the fifth box. There are no right or wrong answers so do not be influenced by what other people draw.

① 	② 	③ 
④ 	⑤	⑥ 

Discussion and Analysis

- The following interpretations are suggested for the boxes, there is NO psychological meaning or accuracy in these interpretations. This is purely an exercise for discussion:

  ① This box indicates conformity. Conformity would be indicated if horizontal lines were drawn (making a ladder), nonconformity would be indicated if anything else was drawn.

  ② This box indicates self-centeredness. If the dot was the center of the drawing, it indicates a self-centered person.

  ③ This box indicates interest in nature. If other flowers or a nature scene was drawn, it indicates a nature-lover.

  ④ This box indicates motivation or attitude. Any illustration continuing the upward focus indicates a positive attitude and high motivation. Any other illustration could indicate a negative or not highly motivated attitude.

  ⑤ This box indicates creativity. A design that is detailed and original shows more creativity than a basic or routine drawing (i.e. a smile, flower, etc.).

  ⑥ This box indicates structure. A design that continues with straight lines indicates a structured person, something deviating from that indicates flexibility.

- Discuss the following questions with students:

  ✎ Do the suggested interpretations make sense? Where do they come from?

  ✎ Are the suggested interpretations accurate?

  ✎ How is this a subjective measure?

  ✎ Could this be a reliable and/or valid measure in an experiment?

  ✎ What are some problems or flaws with this "test?"

Self: Personal Profile

Purpose:

- Help students open up with each other – ice breaker
- Introduce concepts of self
- Explore self – what interests are, what matters to each person

Materials:

- Copies of profiles (p. 5)
- Procedure Instructions (below)

Procedure:

- Explain to students the importance of being able to discuss issues openly with each other in order to have a comfortable learning environment. Part of creating that environment involves sharing things with each other and getting to know one another.

- Discuss how learning about oneself will allow them to apply what they learn in a more meaningful way and will allow them to create experiments that will interest them.

- Hand out the Personal Profiles and explain the following to the students:
  - Answer honestly, but include things you are willing to share with others (and are appropriate for school).
  - At the top or bottom of the profile, include a question or new category that you would like others to respond to.

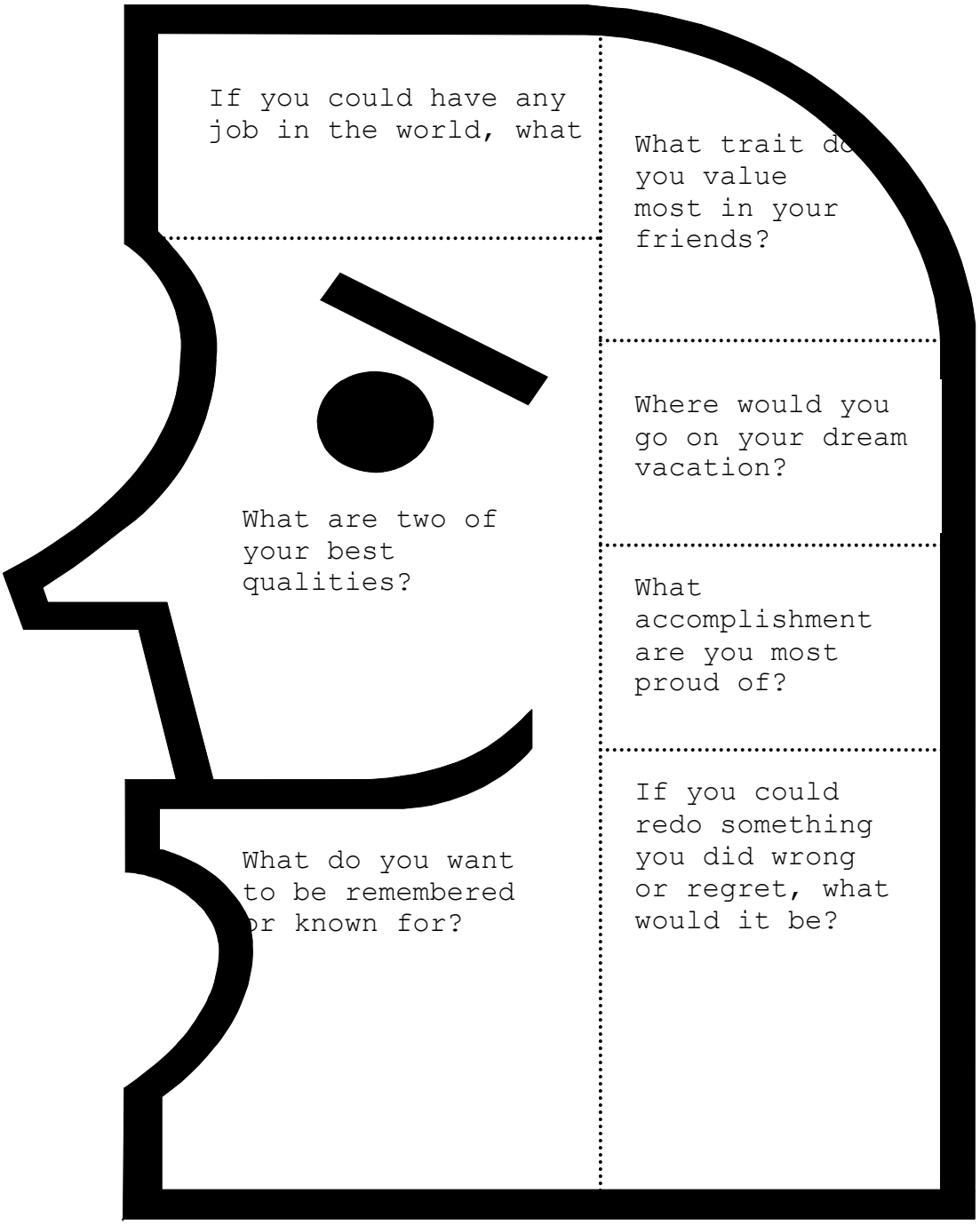
- Give students enough time to complete the profile thoroughly in class, or allow them to take the sheet home to work on overnight.

- When students are finished, ask for volunteers to present their Profile. Students should end their presentation with the question or category they came up with for others to answer.

HINT: Don't do all profiles at once, it can be too much. It's a nice break activity if 3-5 are done per day.

Name: _____

Personal Profile



METHODOLOGY

Methodology: Randomization – Making It Even

Purpose:

- Demonstrate the effectiveness of randomization
- Introduce students to methods of randomizing

Materials:

- Slips of paper with either a number one or number two on it
- A coin

Procedure:

- Explain the importance of randomization. If groups are not randomized, you can not be sure that your independent variable caused any difference you may find between groups. The difference could be due to the personal characteristics of the subjects.

- Discuss the need for randomization in the situation below:

  - ✎ Your class is going to take part in a basketball tournament for a local charity. You would like the teams to be fairly even in terms of skill and height. Dividing yourselves randomly seems to be the best way to make sure the teams are equal.

  - Explain to students that you will randomly assign them to two "teams" and then will be comparing the average height of each team.

    - ✎ Give students a coin and have them flip it in the air. If it comes up "heads," have them go to one side of the room and write their height on the board. If it comes up "tails," have them go to the other side of the room and write their height on the board.
    - ✎ Have students average the height of each team.

Hint: This is a good time to discuss the need to collect data in the same measurements. Some kids may have written their height in feet and inches which takes longer to convert when analyzing data. Stress the importance of telling subjects to give data in the same format, i.e. height in inches only.

- Explain that if randomization worked, the heights of "teams" A and B should have been about the same. Explain that there are other ways to randomize subjects and you will break them into groups another way to see if you get similar results.

    - ✎ Pass around a container with the numbered slips of paper. If students choose a number one, have them go to one side of the room and write their height on the board. If students choose a number two, have them go to the other side of the room and write their height on the board.
    - ✎ Have students average the height of each team.

- Compare the results of the average heights. Did randomization work?

 **Hint**: A third way to break students into random groups is to use a random number table. Each student is given a number from the table and then data is collected from even and odd groups.

Methodology: Sample Size Matters

Purpose:

- Discover the importance of random selection/assignment
- Learn a method for random selection
- Learn the importance of having a large sample size

Materials:

- Chalkboard

Procedure:

- Explain the importance of randomization. Discuss why it is necessary to have a large sample size, when possible.

- Beginning in one corner of the room, have students count off by twelve. (Adjust groupings if there are fewer than 24 students in the class.)

- Write the numbers one through twelve on the board.

- Tell the class that once in their group, they will need to figure out their groups' average score on some miscellaneous question. Sample questions include: What is their average shoe size in inches? average number of hours worked per week? average number of cousins?
  - ✎ Have students move into their group (1-12) and figure out their answer to your question.
  - ✎ Have a student write their group's answer on the board, under the appropriate group number.

- Compare answers from each group. Are they similar? (There should be quite a range of answers since groups are so small.) What is the average difference between groups?
  - ✎ Ask students from groups 1-3, 4-6, 7-9, and 10-12 to combine and refigure their average answer. Once again, compare the answers from each group. Did the averages become more similar? Now, what is the average difference between groups?
  - ✎ Finally, have students combine one last time (groups 1-6 and 7-12) and refigure their average answer. Once again, compare the answers from each group. Did the averages become more similar? Now, what is the difference between groups?

- Discuss the reasons why the answers became more similar as you combined groups and made the sample size larger.

Methodology: Designing an Experiment

Purpose:

- Illustrate the need to consider the number and nature of variables in an experiment
- Demonstrate how to diagram an experiment
- Provide a base for discussing:
  - pre-test/post-test v. randomization
  - operational definitions
  - independent and dependent variables
  - control procedures

Materials:

- Food item/candy for the independent variable
- Yarn and small pieces of cardboard or a spool
- Overhead of experiment design diagram (p. 11)
- Scrap paper
- Discussion and Analysis questions (p. 10)

Procedure:

- Give students the statement: "Candy (or whatever your IV is) improves ability to complete fine motor tasks." Help students go through the process of formalizing the statement so that it becomes a hypothesis you can study. The final hypothesis should be something like: "Candy improves time needed to wind yarn around a spool."
- Develop an operational definition for candy, and discuss how your new hypothesis has an operational definition for "ability…"
- Discuss how your dependent variable was an abstract term – ability – but you changed it into something observable and measurable.
- Go through the overhead of the experimental design diagram.
- Randomly assign students to either the experimental or control group (discuss control groups, if necessary).
- Give students a preview of the exact procedure written below so that they know what to expect.
- Follow the experimental procedure:
  - ✎ Have E group (experimental group) and C group (control group) move to different sides of the room.
  - ✎ Hand out yarn and a spool to subjects, instructing them to do nothing until told to begin.

- ✎ Give E group their candy and instruct them to eat it.
- ✎ When S's (subjects) are finished eating, tell them to get ready.
- ✎ On the count of three, have all subjects begin winding their yarn as you count off seconds out loud. S's can record their own time.
- ✎ Have both groups figure out the average time it took for their group to wind the yarn and put their score on the board.

Discussion and Analysis

- Discuss random assignment – this should have balanced subject-relevant variables to ensure that groups were equal to begin with. With this in mind, when is there a need for pre-test/post-test measurements?

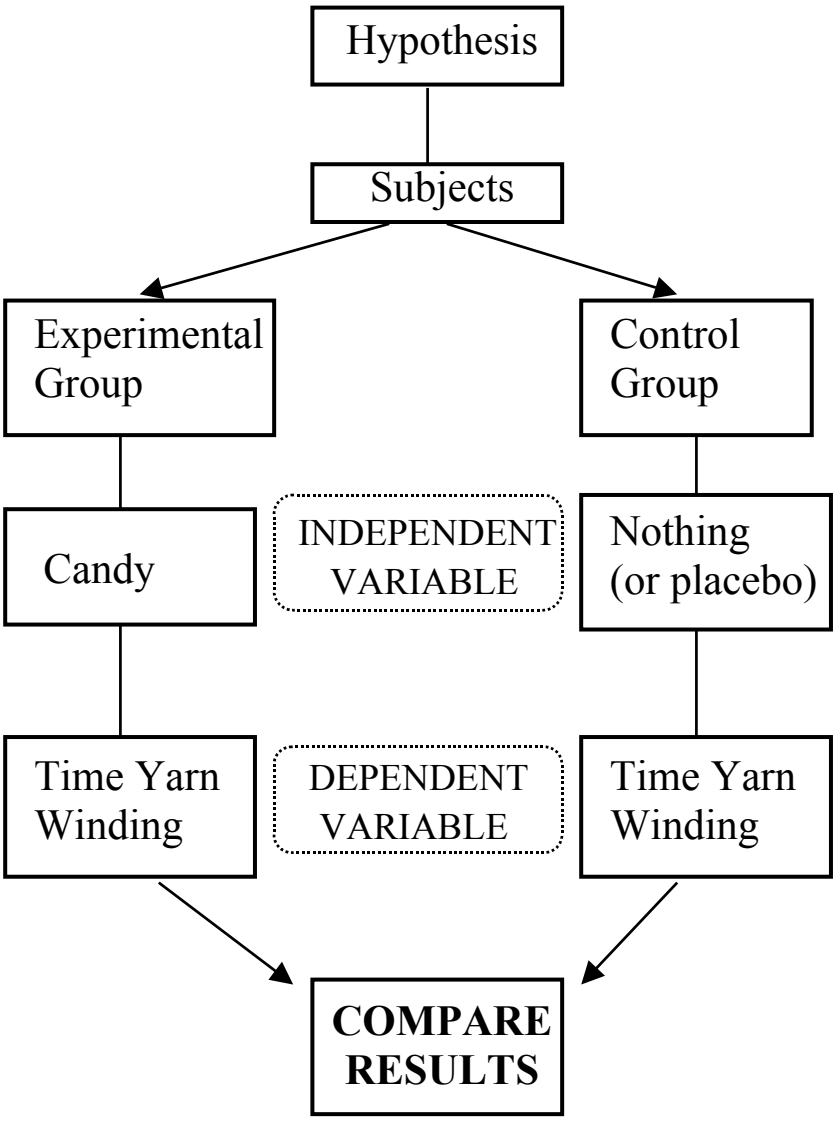
- Discuss situation-relevant variables – if groups were put in separate rooms and one room was considerably more comfortable than the other, could that affect results? Conditions should be controlled so that everything except the independent variable is different.

- Decide how much confidence you can place in your results. Can you infer anything to the rest of the population? Class can do a Student's t-test to compare means. Are the results significant? Are they replicable?

- Because of random assignment, any difference found between scores should be due to the IV. How valid the DV is as a test for fine motor ability is an issue to discuss, as is it's significance.

HINT: This activity can be expanded by having students pair up and randomly choose a slip of paper that says either: motivation, learning, memory, emotion, thinking or perception. Student pairs then develop a simple experiment about their topic. They need to define their independent variable, dependent variable, control and experimental groups, operational definitions, and hypothesis. A diagram of their experiment can then be presented to the class.

EXPERIMENTAL DESIGN



Methodology: Tension Versus Exercise

Purpose:

- Illustrate the difference between independent and dependent variables
- Demonstrate the use/measure of a physiological arousal – pulse rate – as a useful dependent variable
- Demonstrate how physiological measures can be affected by both thought processes and physical activity
- Demonstrate the need for counterbalancing of conditions in an experiment

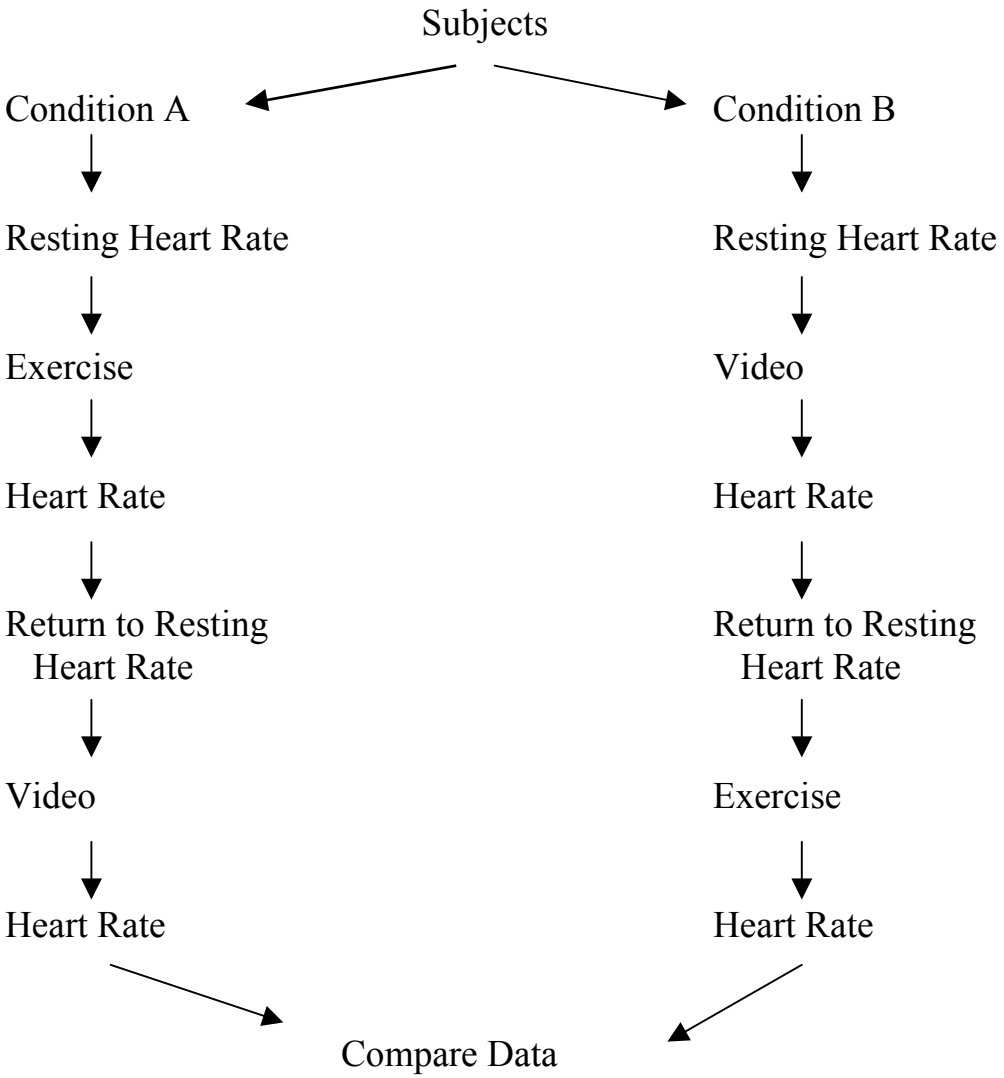
Materials:

- Copies of Experiment Overview (p.13)
- Copies of Pre-experiment worksheet (p. 14)
- Copies of Data sheet (p. 15 & 16)
- Suspenseful/frightening video clip
- Class data collection chart (p. 17 & 18)
- Class data analysis chart (p. 19)
- Discussion and Analysis (p. 20)

Procedure:

- Go through overview of the experiment with students.
  - ✎ Have students complete the "Before discussion" column of the pre-experiment worksheet.
- Discuss different/correct answers for the pre-experiment worksheet.
  - ✎ Have students make notes on "After discussion" column of the pre-experiment worksheet as the class discusses answers.
- Randomly assign students to be in Condition A or Condition B.
- Hand out the appropriate Data sheet (for Condition A or B) to the students.
- Have an "A" person pair up with a "B" person to run the experiment.
- "A" people should be the experimenter first, "B" should be the subject.
  - ✎ "A" people should follow the instructions on their instruction sheet and record the data.
  - ✎ When complete, "B" people become the experimenters, follow the instructions on their data sheet, and record data.
  - ✎ Students should fill in their data on a class data collection chart so that averages for the class can be found.
- Proceed to Discussion and Analysis section.

EXPERIMENT OVERVIEW



Name: _____

Tension Versus Exercise: Pre-experiment Worksheet

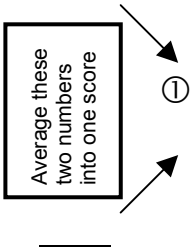
Before discussion	After discussion
Possible hypotheses:	Other possible hypotheses:
Independent variable:	Independent variable:
Why is that your IV?	Why is that your IV?
What are other levels of the IV that could be included in this experiment?	What are other levels of the IV that could be included in this experiment?
Dependent Variable:	Dependent Variable:
Why is that your DV?	Why is that your DV?
Improvements to this experimental design?	Other improvements to this experimental design? i.e. Make sure everyone is sitting when taking pulse.

Name: _____

Tension Versus Exercise: Condition A Data Sheet

Proceed through steps A-D. When taking your subjects pulse, get a 15 second reading and multiply the number by 4 to obtain a beats per minute number.

	Individual data	Class data
A		
• Take your subject's pulse, record the data to the left.	_____	
♦ Wait one minute – subject should put head down and wait quietly.	① _____	① _____
• Take your subject's pulse, record the data to the left.	_____	
B		
• Instruct your subject to run in place for 30 seconds.		
• Take your subject's pulse, record the data.	② _____	② _____
C		
♦ Wait three minutes		
• Take your subject's pulse, record the data.	_____	
♦ Continue waiting until your subject's pulse returns to either of their previous resting heart rates		
• Record their resting heart rate	_____	
D		
• Have your subject watch the video.		
• Take your subject's pulse, record the data.	③_____	③ _____



Name: _____

Tension Versus Exercise: Condition B Data Sheet

Proceed through steps A-D. When taking your subjects pulse, get a 15 second reading and multiply the number by 4 to obtain a beats per minute number. Your scores are recorded as 1, 4, 3, & 2 for counterbalancing purposes, it is not a typo.

Individual data **Class data**

A

- Take your subject's pulse, record the data to the left.
- ♦ Wait one minute – subject should put head down and wait quietly.
- Take your subject's pulse, record the data to the left.

① _____ ① _____

B

- Have your subject watch the video.
- Take your subject's pulse, record the data. ③ _____ ③ _____

C

- ♦ Wait three minutes
- Take your subject's pulse, record the data. _____
- ♦ Continue waiting until your subject's pulse returns to either of their previous resting heart rates
- Record their resting heart rate _____

D

- Instruct your subject to run in place for 30 seconds.
- Take your subject's pulse, record the data. ② _____ ② _____

Class Data Collection Chart

- This chart can be put on the board or an overhead.
- Purpose is to record individual scores so students can obtain class averages for both conditions A (running first) and B (reading first), and the conditions combined.

Score number	Cond.	Individual subjects scores, divided by condition	Average of Condition A and Condition B - separate	Average of class scores (Cond. A & B combined)
①	Cond. A			
	Cond. B			
②	Cond. A			
	Cond. B			
③	Cond. A			
	Cond. B			

Class Data Collection Chart

- If students aren't advanced enough, the effects of condition order don't have to be studied yet. In that case, combine condition A and B and only analyze the difference in pulse rates as they vary between stimuli. Use the chart below for class data collection.

Score number	Individual subjects scores, divided by condition	Average of class scores (Cond. A & B combined)
①		
②		
③		

Class Data Analysis Chart

- Use the following chart to analyze the data gathered by the class.
- Students should figure out the differences between resting pulse rates and the pulse rate obtained after presenting the different stimuli.

Experimenter Order

Difference between pulse rates

	Condition A	Condition B
#② - #① (Difference between running and resting)		
#③ - #① (Difference between video and resting)		

- If students are not analyzing the effects of the conditions (the order in which the stimuli was presented), the chart below can be used to analyze the differences found in pulse rates.

Subject Results

Difference between pulse rates

	All Subjects (Cond. A & B)
#② - #① (Difference between running and resting)	
#③ - #① (Difference between video and resting)	

Discussion and Analysis:

- Once averages are compiled for class scores (p. 17 or p. 18), help students analyze the data.
- Complete the Class Data Analysis Chart (p. 19) as a class.
- Discuss narrowing raw data down to meaningful numbers.

- Questions to stimulate discussion on stimuli type:

  - ✎ What stimuli (activity or video) affected heart rate more? Does that match your hypothesis?
  - ✎ Compare the way you thought the video would affect subjects to what you actually found.
  - ✎ Are there other videos or readings that you think would cause heart rate to go up higher? to cause heart rate to go lower? Give examples.

- Questions to stimulate discussion on condition order:

  - ✎ Did the order of presenting stimuli affect results?
  - ✎ How would you explain what you found (in "plain English")
  - ✎ How would you account for this difference, or lack of one?
  - ✎ What was the main effect for Condition Order?
  - ✎ What was the main effect for Stimuli type?
  - ✎ Was there an interaction?

Methodology: Which Way to Research?

Purpose:

- Clarify the four major research methods
- Identify problems that cannot be studied by any research method
- Provide examples of what can be done through experimentation and what cannot
- Build team/group problem solving skills

Materials:

- Copies of the handout "Which Way to Research?" (p. 22)
- Answer key for the handout (p. 23)

Procedure:

- Break students into groups, or allow them to choose their own groups.
- Have students separate or turn towards each other so that a group feeling is established.
- Provide each group with enough handouts for everyone but explain that only one sheet has to be turned in for the group.
- The directions on the handout should be self-explanatory.
- After all groups have reached a consensus among their members, discuss each item as a class. Have groups take turns presenting items and giving their answer and explanation.
- Allow for discussion of different ideas – discuss the benefits and drawbacks of each.

HINT: This activity can be expanded by instructing groups to roughly sketch out an experiment that could be done whenever they chose experimentation to be the appropriate research method.

Name: _____

Which Way to Research?

For the ten statements printed below, decide which research method would be most suitable. You should place a **?**, **N**, **S**, or **E** on the line provided to the left of the statements. Those symbols stand for the following:

? = It is impossible to study the problem scientifically
N = Naturalistic observation is the appropriate method
S = A survey approach is the appropriate method
E = An experiment is the appropriate method

_____ 1) Smoking decreases lung capacity.

_____ 2) Spirits remain on earth when a person commits suicide.

_____ 3) Children in day-care centers fight more with peers than same age children in home day-cares.

_____ 4) Individuals exercising two to three times per week report more marital satisfaction than individuals not exercising at all.

_____ 5) Unmarried teachers talk more with their colleagues than do married teachers.

_____ 6) Newborn infants have an innate ability to sense trouble.

_____ 7) Abortions decrease when the economy is stable.

_____ 8) People living on the streets have greater mental illnesses than people living in temporary shelters.

_____ 9) More youth than elderly have goals concerning financial gain.

_____ 10) Music played in the workplace increases productivity.

_____ 11) Infants roll over more often to their left if they are left-handed and to their right if they are right-handed.

_____ 12) Student absenteeism in school increases as average family income decreases.

Which Way to Research?

For the ten statements printed below, decide which research method would be most suitable. You should place a **?**, **N**, **S**, or **E** on the line provided to the left of the statements. Those symbols stand for the following:

? = It is impossible to study the problem scientifically
N = Naturalistic observation is the appropriate method
S = A survey approach is the appropriate method
E = An experiment is the appropriate method

E 1) Smoking decreases lung capacity.

? 2) Spirits remain on earth when a person commits suicide.

N/S 3) Children in day-care centers fight more with peers than same age children in home day-cares.

E/S 4) Individuals exercising two to three times per week report more marital satisfaction than individuals not exercising at all.

N/S 5) Unmarried teachers talk more with their colleagues than do married teachers.

? 6) Newborn infants have an innate ability to sense trouble.

S 7) Abortions decrease when the economy is stable.

S 8) People living on the streets have greater mental illnesses than people living in temporary shelters.

S 9) More youth than elderly have goals concerning financial gain.

E 10) Music played in the workplace increases productivity.

N 11) Infants roll over more often to their left if they are left-handed and to their right if they are right-handed.

S 12) Student absenteeism in school increases as average family income decreases.

Methodology: Observe What's Around You

Purpose:

- Develop observation skills
- Participate in an activity that encourages discussion of the accuracy and reliability of humans as observers
- Allow students to experience the difficulty of being a good observer

Materials:

- A notepad
- An area to walk around – outside is best
- Discussion and Analysis section (p. 25)

Procedure:

- Explain to students that you are going to be testing their ability to be good observers. Give students the list of activities below:
  - You will be led on a walk around _____ (i.e. school grounds).
  - During this walk, nothing unusual has been planned, you are simply to observe the normal activities taking place around you.
  - Following the walk, you will be asked some questions about your observations.

- Either lead your class a little way ahead or a little way behind. As you are walking record (or write) 20-25 things that are going on around you. Record things you see that you can later turn into questions and answers.

- Example questions:
  - How many classroom doors were open?
  - Did we pass more males or females?
  - What did the sign by the front door say?
  - What color car was parked closest to the front door?

- Avoid yes/no and subjective questions.

- When back in the classroom, read off each question. Have students put their answers to the questions on a sheet of paper and then give them the correct answer.

- Allow students time to discuss and compare/argue answers before giving them the "correct" answer.

- Proceed to the Discussion and Analysis section.

Discussion and Analysis:

- The following questions can be used for a student discussion:

  - ✎ Were certain questions harder than others to answer? How could you categorize or describe these topics?

  - ✎ Are human observations reliable? Can you support your response with the results from this demonstration?

  - ✎ Can you control experiments in such a way that would make the exercise more reliable? Can you control for human errors or lack of concentration?

  - ✎ Should students be told what to look for before going out? Does that make for better or worse observations? Would it bias you?

  - ✎ Is there a better way to confirm answers when arguments arise?

  - ✎ Does this shed new light on courtroom testimony of "eye witnesses?"

  - ✎ Were student answers different from the teacher's answers? If yes, were some of the differences due to misinterpretation of the question? Could both answers have been right?
    - Discuss the role of interpretation in experiments. Experiment surveys, questionnaires, directions, tests, etc., have to be specific, clear and concise so that misinterpretations are kept to a minimum.

Methodology: You're the Eyewitness!

Purpose:

- Demonstrate the difficulty of accurately reporting an observation
- Allow students to practice observation skills
- Determine if some things are easier to recall than others and discuss why this may be true

Materials:

- Paper and pencils
- Volunteer to assist teacher
- Volunteer Information Sheet (p. 27)
- Discussion and Analysis questions (p. 28)

Procedure:

- Arrange for a volunteer to walk into the classroom and ask you for something, give you their Volunteer Information Sheet, take one or two things from you, and leave.
- Prior to the volunteer coming into the classroom, have him or her complete the Volunteer Information Sheet.
- Allow the volunteer to choose a random time to enter your classroom and follow through with the agreed-upon activities.
- Either immediately after the volunteer leaves, or 5-10 minutes later, depending on how you'd like to adapt the lesson, have students get out a sheet of paper to answer questions on.
- Based on the information given to you by the volunteer, ask students questions about what they observed about that person. Have them write their answers down individually first, and once all the questions are complete review the correct answers as a group.
- Other questions to ask, not based on information the volunteer provided:
  - How long was the visitor in the room?
  - Did the visitor say anything to anyone? If yes, to who? What was said?
  - Did the visitor give anything to anyone? If yes, to who? What was given?
  - Did the visitor leave with anything/take anything? If yes, what was it?
- Add questions that are appropriate for the situation/interruption that occurred
- Once all students have answered the questions and the correct answers are determined, proceed to the Discussion and Analysis questions.

Volunteer Information Sheet

As the participant in this observation demonstration, please complete all questions with as much detail as possible.

General:

Age: _____ Eye color: _____

Height: _____ Hair color: _____

Weight: _____ Curly or straight hair: _____

Description of clothing:

Pants: _____ Shorts: _____ Skirt: _____ Other? _____ (Check one)

Style: _____ (i.e. jeans/khakis?)

Color: _____ (dark/light blue?)

Pattern or design?_____ (i.e. striped shirt?)

Shirt: _____ Sweater: _____ Jacket:_____ Other? _____ (Check one)

Style: _____ (i.e. collared, v-neck?)

Color: _____

Pattern or design?_____ (i.e. striped shirt?)

Miscellaneous info:

Earrings? _____ If yes, describe:

Necklace? _____ If yes, describe:

Bracelets? _____ If yes, describe:

Watch? _____ If yes, describe:

Belt? _____ If yes, describe:

Hair clip? _____ If yes, describe:

Description of shoes:

Socks? _____ If yes, describe (color):

Is there anything else to note about your appearance?

Discussion and Analysis:

- What characteristics of the volunteer were easiest to remember or had the highest rate of accuracy among observers?
- What was the average number of correct responses for the class? For males and females? Is there any other way to break the data down?
- Was there a difference in accuracy of observations between males and females?
- Were there certain characteristics that people had a hard time observing correctly? Were actions harder to observe accurately than static things (i.e. clothing)?
- Could the class have come to a consensus when disagreeing about some item?

HINT: Other ideas for expanding this activity:

- Have two different students come in, one male and one female. Analyze the results (number of accurate observations) for males and females for both the male and female volunteer. Is there an interaction for gender?
- Plan to have one student give incorrect answers on purpose and see if he/she can convince others that the incorrect answer is actually correct. Discuss how much of an influence one person can be.
- Plan to have all students, except one or two, give incorrect answers. See if the one or two students saying what they truly observed can be swayed or peer pressured into saying something they know they didn't see. Will they be swayed for little things – like saying there was a bracelet when there wasn't one? Will they be swayed for big things like hair color?

STATISTICS

Statistics: What's Normal About this Curve?

Purpose:

- Diagram and explain the bell shape of the normal probability curve
- Explain that some human characteristics are typically distributed according to this normal probability curve

Materials:

- Enough paper cups for half of your students (they'll pair up)
- 15 pennies for each cup
- Copies of the Frequency Recording Chart & the Frequency Distribution Graph (p. 31)
- An overhead of the Frequency Recording Chart & the Frequency Distribution Graph
- Discussion & Analysis (p. 30)

Procedure:

- Ask students some prompt questions regarding probability. For example, If 100 people tossed 15 pennies, which distribution – 5 heads, 7 heads, or 13 heads – will occur most frequently? Which will occur least frequently?

- Have students pair up and give each set a cup of 15 pennies, each person should have a Frequency Recording Chart and a Frequency Distribution Graph.

- Students can then be given the following instructions:
  - ✎ You are to empty the pennies onto your desk 20 times and record the number of times your pennies show 1 head, 2 heads, 3 heads, etc. You can record this on your Frequency Recording Chart.
  - ✎ When you are done with all of the tosses, transfer your recorded data to the Frequency Distribution Graph – plot your total number of "1 head," "two heads," etc. and connect your dots with a line.

- When all students are done, have them record individual data onto an overhead of a Frequency Recording Chart. Students can then combine all of their data. This can also be done by having the teacher ask, "How many times did one head occur?" and then tally the results for the class and place the total on the overhead. You can either have them plot class totals (which is why the chart goes to 40), or students can average the scores.
  - ✎ Students can then put new marks on their Frequency Distribution Chart, plotting class totals (should use an **X** instead of a dot) and again connecting their marks with a line.

- Proceed with the Discussion and Analysis.

Discussion & Analysis

- After determining the mean, discuss why it would make sense for the mean to be between 7 and 8.

- Explain that this is a bell-shaped or normal probability curve. This type of distribution is seen in many human characteristics. Have students brainstorm things we commonly see distributed in this fashion. You can give them height as an example. Very few people are three feet tall, very few people are seven feet tall, but there are many people between 5 feet 5 inches and 5 feet 9 inches. What else can they come up with?

- Some examples include: weight, academic ability, IQ, introversion/extroversion, grades on an examination, time estimation, athletic/musical/dramatic ability, income, education level, shoe size.

HINT: To expand this activity, students could do a time estimation activity. You'd need at least 50 scores – if you do not have enough students, you could combine classes or have students use their parents or siblings as subjects and bring their data to class the following day. The activity involves simply asking a subject to estimate a 30-second time interval. Record the actual time the subject thinks is 30 seconds. Your combined results should produce a normal curve, unless there are fewer than 50 scores.

Name: _____

Frequency Recording Chart

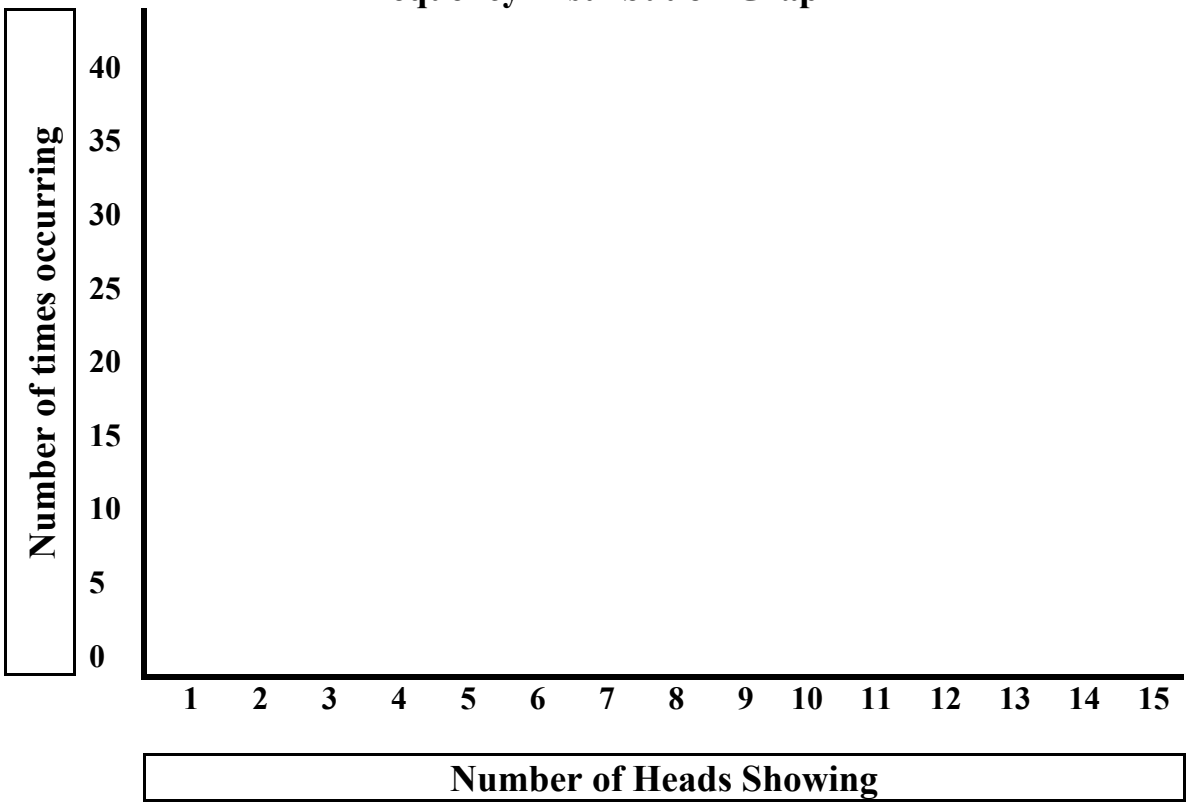
After you toss your pennies, you need to count the number of heads that are showing and put a slash mark under the appropriate number. You should complete 20 tosses and therefore have 20 slash marks.

Number of Heads showing

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Slash marks															

When you have completed 20 tosses, graph your results below. Put a • at the appropriate number of times you tossed each distribution. Connect your dots with a line. After your individual data has been combined to "class data," plot a new frequency distribution using an **X** as your marker. Again, connect your X-marks with a line.

Frequency Distribution Graph



• = Individual/pair data **X** = Class data

Statistics: Are You Average?

Purpose:

- Teach the difference between calculating the mean, mode, and median
- Explain how averages are used in analyzing data
- Discuss how certain methods of averaging are more appropriate for certain distributions

Materials:

- Slips of paper in 6 different colors
- Average Analysis Sheet (p. 33)

Procedure:

- Each student should be given a slip of paper from each color. On each slip they should write the following information:
  - On the color _____, write your height in inches.
  - On the color _____, write your weight.
  - On the color _____, write the number of siblings you have.
  - On the color _____, write the number of hours you work per week.
  - On the color _____, write the number of cousins you have.
  - On the color _____, write the number of phones in your house.

HINT: The data you collect can be changed to be more suitable for your students. You can also increase or decrease the amount of data collected depending on your class size.

- Divide the class into 6 groups and assign each group a color to collect from the rest of the class.
  - Groups should then calculate the mean, mode, and median of their data.
  - Groups should complete the Average Analysis Sheet.

- Groups can then present their Average Analysis Sheet to the class.

- Discuss why you would want to use different averages depending on the purpose for obtaining results.
  - For example, teachers want to limit the number of hours students work per week. After surveying students, teachers found the mean to be 9 hours per week, the mode to be 6 hours per week, and the median to be 5 hours per week. When making an official report, they would probably say they found the "average" number of hours worked to be 9 since this was the highest number and would help support their cause.

Name: _____

Average Analysis Sheet

Organize your data by listing it in order from lowest to highest in the boxes provided below. It is possible that you may not fill all of the boxes – it will depend on the number of students in your class. It does not matter if you fill in the chart horizontally or vertically, as long as it goes in order.

Data collected on: _____(fill in topic)									

1) Compute the ***mean*** by adding all of the "scores" together, and then divide by the total number of "scores."

2) Compute the ***median*** by determining which number falls in the middle of your distribution.

3) Compute the ***mode*** by determining which score occurs most frequently in your distribution.

4) In your opinion, which kind of "average" is most appropriate for your distribution? Why do you think that (explain your rationale)?

Statistics: Different Ways to Average

Purpose:

- Practice computing the mean, mode, and median
- Analysis of when to use the different methods of averaging

Materials:

- Copies of "Average Salary" handout (p. 35)

Procedure:

- Distribute handout to students and allow them time to work on the questions in class or assign as homework.
- Discuss correct answers in class.

 **HINT**: This can be used as an introductory, review, or remedial activity.

Answers for the worksheet:

1) $30,000

2) $46,636

3) $40,000

4) The mean, because it is the highest amount

5) The mode, because it is the lowest amount

6) Because the President's salary is so much higher, it skews the amount

Name: _____

Average Salary Worksheet

Since an "average" can be defined in different ways, an individual can be mislead if he or she is unsure of which meaning of "average" is being used. To illustrate this, use the data below to answer the questions that follow.

Position	Annual Earnings
President	$120,000
Manager	$70,000
Worker A	$45,000
Worker B	$45,000
Worker C	$45,000
Worker D	$30,000
Worker E	$40,000
Worker F	$30,000
Worker G	$30,000
Worker H	$28,000
Worker I	$30,000

1) What is the average earning if by average we mean the most frequently earned amount – that is, the mode? _____

2) What is the average earning if by average we mean the sum of all the earnings divided by the number of people – that is, the mean? _____

3) What is the average earning if by average we mean the middle earning when the earnings are rank-ordered – that is, the median? _____

4) If the president of the company were recruiting more workers for the company, which average would he or she probably use in trying to attract them? _____

   Why? _____

5) If the workers were negotiating for an increase in pay, which average would they be likely to stress? _____

   Why? _____

6) Why is the mean so much higher than the other two measures in this case? ___

   _____

Statistics: Frequency Distributions

Purpose:

- Allow students to practice organizing data
- Allow students to plot a frequency distribution

Materials:

- Copies of "Frequency Distribution" handout (p. 37)

Procedure:

- Explain that there are different methods to help understand raw data obtained in an experiment. A frequency distribution is one of these methods.

- Present the students with the following scenario:
  - A gym teacher has his four classes see how many free throws each student can make out of fifteen attempts. The numbers on your handout represent the number of baskets scored by each student.

- Ask the following questions:
  - How did the students do overall? Should the teacher stay on the basketball unit a little longer and keep working on free throws? Were most of the students successful?
  - How could you figure out the answer to these questions?

- Have students complete TASK #1 on their handout.
  - Students should count the frequency of each score (0-15), three answers are provided.

- When students are finished, discuss whether or not they have a clearer picture of how the gym students did.

- Explain that an even clearer picture can be obtained by making a graph of the scores according to frequency. Have students complete TASK #2 on their handout.
  - Students should plot the frequencies of the scores on the graph.
  - Students should connect each dot with a straight line to create a "frequency polygon."

- Discuss if it is now easier to answer the questions about how the students did on this test. What information do you gain by distributing scores by their frequency?

Name: _____

Frequency Distribution

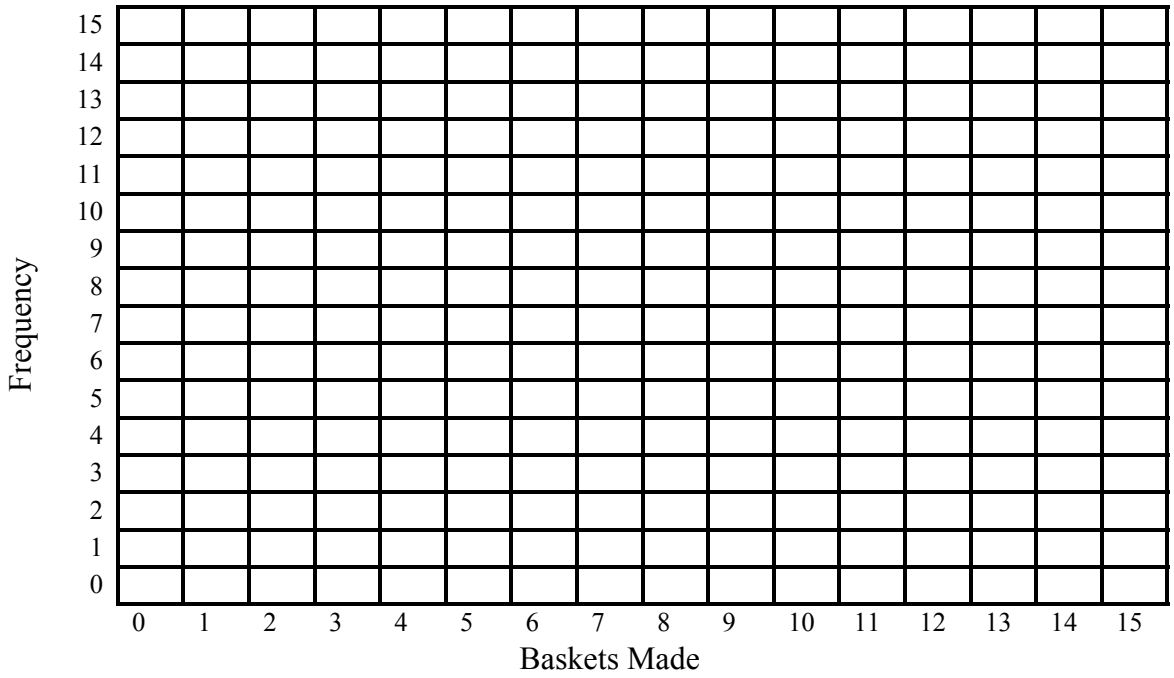
The following are 90 students' scores out of 15 free throw attempts:

Class #	Individual Class Scores – Number of Baskets Made																							
1	5	9	13	11	7	12	5	10	8	13	7	12	11	6	13	10	8	7	13	11	12	10			
2	11	14	10	13	6	15	12	14	4	15	15	11	14	9	15	12	14	3	9	14	6	12	8	14	13
3	5	13	12	14	8	13	11	15	6	14	4	15	11	13	10	14	12	15	10	14	12				
4	11	10	13	12	7	13	9	12	3	13	4	12	9	13	10	11	7	10	13	8	9	11			

TASK #1: Complete the Frequency Distribution below:

Score	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Frequency	0				3						10				

TASK #2: Plot the frequency of each score below on the Frequency Distribution Chart:



Statistics: Types of Correlations

Purpose:

- Show examples of positive and negative correlations
- Discuss the difference between correlation and causation

Materials:

- Copies of "Related Events" handout

Procedure:

- Explain the difference between positive and negative correlations in as much detail as necessary for your students.

- Explain that correlation does not mean causation; but that sometimes one thing can cause another and therefore the two things are correlated.

- Distribute "Related Events" handout to all students.
  - ✎ Students should follow the directions, check each statement as
    - Positive
    - Negative
    - Causation
    - No correlation

- Discuss the answers with the class.

- Have students come up with their own examples of positive and negative correlations.

Answers:

(1) P	(6) P
(2) P, C	(7) P
(3) N	(8) N
(4) P, C	(9) P
(5) O	(10) N

Name: _____

Types of Correlations

There are two types of **correlations**:
1) Positive: As one item increases so does the related item
2) Negative: As one item increases the other item decreases

Causation occurs when one item affects another and causes a change.

For the ten statements below, determine if the related events are: *positively correlated*, *negatively correlated*, or *not correlated* at all. Once you have gone through the list once, go back and note the statements that show *causation*. Check the appropriate box(es).

Relationship				Statements
Positive Correlation	Negative Correlation	No Correlation	Causation	
				1. Increased milk drinking occurs with increased cancer rate.
				2. Increased smoking produces increased lung cancer.
				3. Increased absences occur with decreased grades in school.
				4. Increased studying occurs with increased grades.
				5. Increased listening to loud music sometimes increases and sometimes decreases hearing ability.
				6. Moods increase in the summer and decrease in the winter – daylight and mood relationship?
				7. City dwellers have greater cancer rates.
				8. Increasing education occurs with decreasing unemployment.
				9. Full moons increase abnormal behavior.
				10. Eyesight decreases as age increases.

Statistics: Correlating Personal Data

Purpose:

- Clarify positive, negative, strong and weak correlations
- Provide students an opportunity to gather and analyze data
- Practice graphing correlations
- Interact with other student

Materials:

- Copies of "Letters and Numbers" handout (p. 41)
- Copies of the "Correlation Questions" (p. 42)
- Copies of the "Letter Chart #1" and "Letter Chart #2" (p. 43)
- Copies of the "Number Chart #1" and "Number Chart #2" (p.44)
- An overhead of the "Scattergram"
- Stopwatches

Procedure:

- Students need to have already received information about correlations in order to do this activity.

- If students need a review, or if this is a beginning exercise, include the "Correlation Questions" (p. 42) on one side of their handout.

- Have students pair up with each other. Distribute two "Letters and Numbers" handout, a "Letter Chart #1", a "Letter Chart #2", a "Number Chart #1", and a "Number Chart #2" to each pair.

- Pairs should follow their instructions:
  - ✎ Have your partner read the letters on the letter chart in order, stating both the letter and letter type (capital or lowercase). Record the time in seconds.
  - ✎ Have your partner read the numbers on the number chart in order, stating both the number and format (circled or not circled). Record the time in seconds.
  - ✎ Exchange roles and repeat these steps in reverse order. This time use a different letter chart, and a different number chart.

- Once all pairs are complete, have students call out their data and plot their responses on the overhead of the scattergram. Students can do the same on their handouts.

- Have students answer the questions on their handout.

- Discuss correct answers.

Name: _____

Letters and Numbers

Instructions for pairs:

1) Have your partner state the letters on one of the letter charts in order (left to right), stating both the letter and letter type (capital or lowercase). Record the time in seconds in the space provided below.

2) Have your partner state the numbers on one of the number charts in order (left to right), stating both the number and format (circled or not circled). Record the time in seconds in the space provided below.

3) Exchange roles and repeat these steps in reverse order. This time, use the other letter chart and other number chart.

4) Report your results to the class.

	Letter Time	Number Time
Your responses/data		
Partner responses/data		

Scattergram of class results:

Questions:

1) Is this a positive or negative correlation? _____
2) Is it a strong or weak correlation? _____
3) Would the correlation coefficient be closer to –1, 0 or 1? _____
4) What conclusions could you safely draw if this data represented a perfect correlation? _____

Name: _____

Correlation Questions

1) What is a correlation?

2) When is a correlation a weak correlation?

3) When is a correlation a perfect correlation?

4) What is a positive correlation?

5) What is an example of a positive correlation?

6) What is a negative correlation?

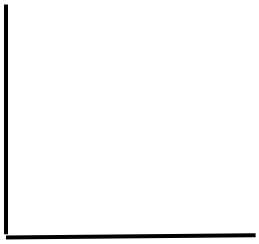
7) What is an example of a negative correlation?

8) What does a correlation coefficient of zero mean?

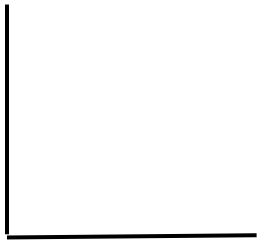
9) What does a correlation coefficient of -1 mean?

10) What does a correlation coefficient of 1 mean?

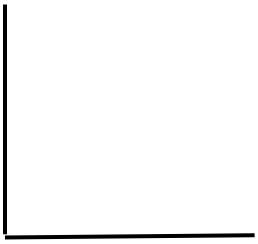
11) What would a graph look like for each type of correlation?



Weak correlation



Positive correlation



Negative correlation

LETTER CHART #1

D	j	l	I	n	c	T	m	l	C	T	h
O	p	E	v	x	k	U	h	f	M	k	F
I	K	v	t	Y	w	x	f	Z	d	Q	u
j	p	B	h	j	g	d	R	Y	e	T	I
p	M	c	h	D	w	u	r	E	S	m	L

LETTER CHART #2

T	I	N	j	d	G	E	x	b	M	l	Q
w	P	j	o	N	y	G	h	t	e	s	A
K	q	Z	x	D	S	E	g	v	n	U	d
S	o	M	w	K	f	y	H	s	x	P	o
d	E	c	Z	k	n	L	p	o	D	t	V

NUMBER CHART #1

1	①	4	②	5	2	⑧	⑦	9	③	8	②
O	3	②	1	⑥	8	4	7	③	2	⑨	⑤
5	②	⑧	3	⑥	⓪	6	⑦	2	9	④	7
⑤	⑦	1	④	5	⑨	8	4	6	②	⑧	0
④	9	②	3	2	7	⑤	8	⑨	4	⑥	1

NUMBER CHART #2

7	1	6	②	8	2	⑧	⑦	1	③	9	②
2	9	②	1	⑥	5	3	⑤	③	4	⑨	⑤
3	②	⑧	4	⑥	⓪	5	⑦	8	9	④	7
6	⑦	1	④	5	⑨	8	4	6	②	⑧	0
④	0	②	4	6	8	⑤	2	⑨	3	⑥	5

Complete Correlation Review

Purpose:

- Reinforce correlation concepts
- Practice work on plotting a scattergram
- Reinforce the difference between correlation and causation

Materials:

- Copies of "Correlation Review" handout (p. 46-48)

Procedure:

- Distribute "Correlation Review" handout to all students.
- Allow students to work in class, alone or in pairs, or assign questions as homework. It can be assigned in parts (there are three) or done together.
- Review correct answers.

Answers:

1. Yes, there is a relationship between the variables.
2. Yes, the dots swarm around an imaginary line extending forty-five degrees out from zero.
3. Positive – as one increases so does the other.
4. We cannot infer causation on the basis of correlation alone. The fact that two variables are related does not mean that one causes another. They may be related through a third variable or by chance.

1. No, but there may be a relationship between the two variables.
2. No, the dots swarm around an imaginary line which is forty-five degrees but in the other direction.
3. Negative.
4. Again, no, for the same reasoning above.

1. P
2. O
3. N
4. O
5. P
6. N
7. O
8. N
9. P
10. P
11. O
12. P
13. P
14. P
15. N

Name: _____

Complete Correlation Review

To understand how two things are correlated, it is helpful to get a "picture" of the relationship between the two variables. This sort of picture is called a "scattergram." It is a graphic presentation of the relationship between two variables. To construct a scattergram, we arrange for each variable to be located along one or the other axis of a graph.

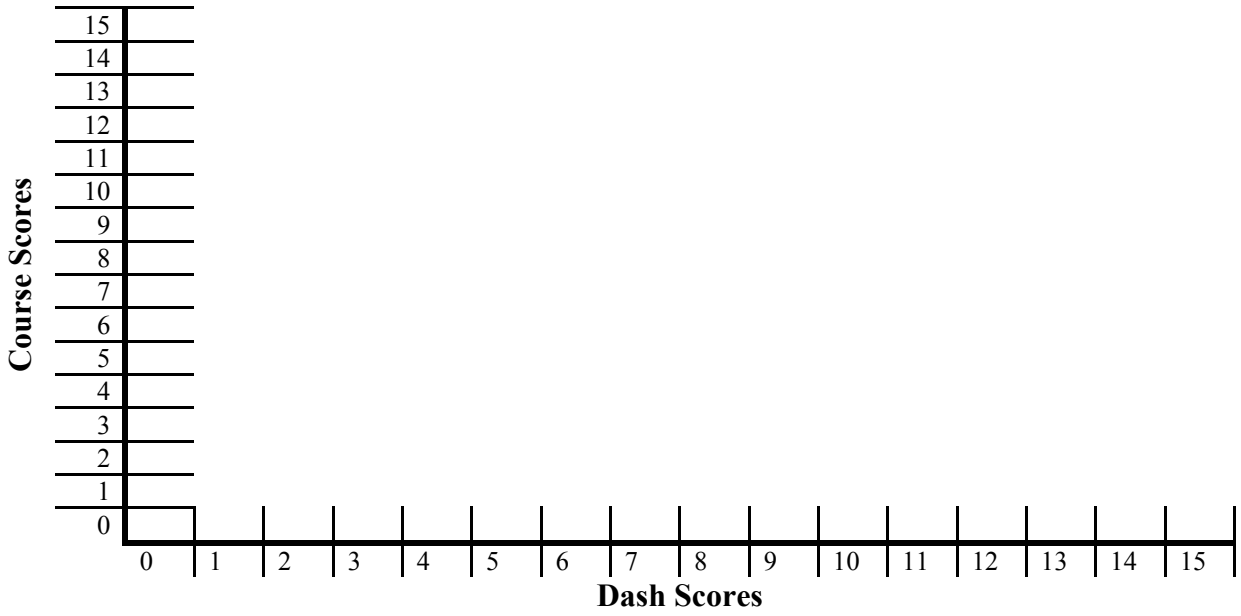
PART ONE

Below are student's times running an obstacle course and running a straight dash:

Student	Course	Dash
A	15	12
B	14	14
C	10	9
D	9	10
E	8	8
F	8	7
G	7	8
H	6	4
I	4	6
J	2	4

Plot a point for each student on the graph below at the intersection of his or her scores.

SCATTERGRAM



After you finish, answer the questions that follow.

Questions:

1. Does it appear that there was a tendency for those who did well on the course to do well on the dash also? _____
2. When the course scores were high were the dash scores high? _____
3. When the course scores were low were the dash scores low? _____
4. Is the relationship positive or negative? _____
5. If the relationship were less close than it is, what would happen to the appearance of the swarm?

   _____
6. Can you infer from the graph that there is a causal relationship between the variables – that is, do high scores in the obstacle course cause high scores in the dash, vice versa? _____

   _____

PART TWO

Suppose that the student scores were as follows:

Student	Course	Dash
A	15	4
B	14	6
C	10	4
D	9	8
E	8	7
F	8	8
G	7	10
H	6	9
I	4	14
J	2	12

On the same graph you used before, plot the intersection point between the two scores of each student. This time use a tiny circle instead of a dot. Then answer the following questions.

1. Does it appear that there was a tendency for those who did well on the course to do well on the dash also?_____
2. Is the relationship such that as the measures of one variable increase in size, the corresponding measures of the other variable also increase?_____
3. Is this a positive or a negative relationship?_____
4. Can you infer from the graph that there is a causal relationship between the variables – that is, do high scores in the course cause high scores in the dash, vice versa? _____

PART THREE

Now, consider each of the following paired variables. Make an estimate of whether the correlation between them would be generally positive, negative, or zero.

1. IQ grades and school _____
2. Reading ability and popularity _____
3. Speed in running and number of bricks carried while running _____
4. IQ and shoe size _____
5. Height and weight of persons _____
6. Price of products and the supply of those products _____
7. Eye color and personal income _____
8. Exercise and weight _____
9. Grades in algebra and grades in advanced physics _____
10. Amount of candy eaten and number of cavities _____
11. Color of uniforms and penalties against a team _____
12. Blood pressure and stress _____
13. Heat and energy bills _____
14. Age and income _____
15. Temperature and desire for hot chocolate _____

GLOSSARY

Glossary

Between-Groups design:
An experiment design in which the performance of two or more groups is compared.

Causation:
When one variable causes an effect to occur.

Confound:
A variable that was not controlled in an experiment that could yield an alternate explanation for the results.

Control Group:
A condition or group of subjects who do not receive treatment in an experiment.

Correlation:
A measure of the relationship between two variables. A strong correlation means that the variables are closely related while a weak correlation means that the variables are not related. A positive correlation occurs when both variables increase or decrease at the same rate, a negative correlation occurs when one variable increases and the other decreases.

Counterbalancing:
When using a within-subjects design, this alternating of conditions lessens the effect of an extraneous variable across the conditions.

Data:
Observations that are recorded.

Debriefing:
At the conclusion of an experiment, the purpose of the experiment is explained to the subjects.

Dependent Variable:
The variable that is being measured in an experiment.

Frequency Distribution:
A visual representation of experiment data where the number of occurrences of some event is entered on a chart.

Hypothesis:
The expected outcome of an experiment or possible answer to a research question.

Independent Variable:
The variable that is manipulated or changed in an experiment.

Interaction:
The impact of the dependent measure on each level of the independent variable.

Main Effect:
The impact of the dependent measure on the independent variable.

Mean:
The arithmetic average of scores. Total sum of scores divided by the number of scores.

Median:
The score that falls in the middle of a set of scores.

Methodology:
The procedure for completing a task.

Mode:
The score that occurs most frequently in a set of scores.

Naturalistic Observation:
Observing behaviors in the setting in which they normally occur. Observer should not interfere with the subjects being observed and subjects should not be aware that they are being observed.

Normal Probability Curve:
A distribution of scores in which the majority of scores fall in the middle range and fewer scores fall towards the extremes.

Objective:
Not impacted by attitudes, feelings, or beliefs.

Operational Definition:
Exact meaning or procedures used to produce an effect or measure a variable.

Random Assignment:
Assigning subjects to groups so that each subject is equally likely to be assigned to each condition.

Random Selection:
Selecting subjects for an experiment so that each potential subject has an equally likely chance to be chosen.

Reliable:
When the same results are consistently obtained from the same test, measure, or procedure.

Sample Size:
The number of subjects used to represent the population being studied.

Scattergram:
A representation of the relationship between two variables on a graph. Used to show a correlation.

Situation-relevant Variables:
Variables that are due to the environment in which the experiment is taking place. They may impact the dependent measure and may be a confound.

Subjectivity:
Observations or data that is influenced by feelings, attitudes, and beliefs.

Validity:
How well a dependent measure assesses what it is intended to.

Within-Subjects Design:
An experiment design in which a participant is subject to each level of the independent variable.