

THE ELECTRIC EGGPLANT SHIRT

Casio T>E>A>M>S> Workshop
Lesson Plan

Grade Level 8

Subject Mathematics

SOL's 8.12 / 8.13 / 8.14

Physical Science

SOL's PS.1 / PS.6 / PS.7 / PS.9

Objective(s) : The student will be able to :

compare, analyze, describe and predict the effects of color on the transfer of heat

Procedure / Activity :

students will test the effects of color on heat transfer
see attached procedure sheet

Assessment :

the students will predict which color paper will transfer heat most quickly
students will graph the data collected
students will predict heat transfer rates for other colors

Closure:

middle school – shirt day
--same color / same logo

Equipment / Supplies :

Casio CFX 9850G graphing calculator
heat source (overhead projector – glass surface)
EA - 100 data collector
with 2 / 3 probes
cup of ice water
clear tape
construction paper -- black / white
assorted colors (same weight paper)

Teacher Notes / Troubleshooting

label probes
adjust time intervals and sample numbers as needed
use one probe - store formation from each sample

Suggestions / Applications :

substitute cloth or sand for the construction paper
see **extensions** on post-lab worksheet

The electric eggplant shirt
post - lab worksheet

After graphing the results from your three sensors, students should answer the following questions:

1. which sensor showed the greatest transfer of energy?
2. which sensor showed the least amount of energy transfer?
3. why do you think this happened?
4. what results will you expect if you use other colors of construction paper?
 - blue
 - green
 - yellow
 - purple
 - pink
5. now try your experiment again – using three other colors of construction paper
6. record your results in graph form at the bottom of this page

EXTENSIONS:

1. ecology / biology classes have applications with sand samples
2. vocational classes have applications in car interior design
3. fashion merchandising classes have applications in apparel color/design
4. technical drawing / design classes have applications in room color / heating / cooling concerns

*Casio Workshop @ Gloucester High School , June 1997
Diana Peters, James Renner, Margaret Williams*

APPENDIX A
the electric eggplant shirt

TO TRANSFER DATA TO CALCULATOR:

1. connect link from data collector to calculator -- making sure that each plug is secure
2. select program from main menu
press EXE
highlight *receive* (make sure calculator is programmed to receive 4 lists of data)
press EXE
the word DONE will appear on calculator screen when you are finished

TO GRAPH:

3. select STAT from the main menu
press EXE
4. press F-1 (graph)
press F-6 (SET)
press F-1 (graph 1)
move down to graph type -- choose F-2 (xy)
highlight XLIST, choose F-1 (list 1)
highlight YLIST, choose F-2 (list 2)
highlight frequency, choose F-1 (1)
highlight mark type, choose F-3 ()
highlight graph color, choose F-1 (blue)
press EXE
5. to set up for graph 2
press F-6 (SET)
press F-2 (graph 2)
move down to graph type -- choose F-2 (xy)
highlight XLIST, choose F-1 (list 1)
highlight YLIST, choose F-3 (list 3)
highlight frequency, choose F-1 (1)
highlight mark type, choose F-3 ()
highlight graph color, choose F-2 (orange)
press EXE
6. to set up for graph 3
press F-6 (SET)
press F-3 (graph 3)
move down to graph type -- choose F-2 (xy)
highlight XLIST, choose F-1 (list 1)
highlight YLIST, choose F-4 (list 4)
highlight frequency, choose F-1 (1)
highlight mark type, choose F-3 ()
highlight graph color, choose F-3 (green)
press EXE
7. to draw graphs on the same screen
press SEL (F-4)
turn statgraph 1 on F-1
turn statgraph 2 on F-1
turn statgraph 3 on F-1
press F-6 (DRAW)

* all three graphs should be displayed on screen

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APPENDIX B
SET UP OF THE EA-100 DATA COLLECTOR

1. place probes on overhead projector so all are sharing the center of the glass
2. weight or tape the probes so that ends do not touch glass
 -the last 2 cm of the probe is the thermocouple
3. plug probes into proper ports of EA-100
4. check to see that probes are functioning properly

5. ON, MODE
CH-VIEW will shift between ports
 one should read room temperature (20* - 25*)

set up to take data
ON / OFF see NONE
SHIFT then MODE sec numbers in msec or sec to choose time between samples (intervals)

DATALOG see selection change

TRIGGER to select your choice (see number)

DATALOG to select number of samples

TRIGGER to arm

TRIGGER begin taking samples Done

Graphing data: (bar graphs)

group number into list 1
group data into list 2
push **GRPH** (F1)
SHIFT MENU to get setup. Make sure Stat Wind is :Manual, if not, push F2 for Manual
exit
push **SET** F6
StatGraph graph type :hist
 xlist :list1
 frequency :list2 (frequency is Y - how often does Y occur?)
exit
push **GRPH** (F1)
Set Interval start: 1
 pitch: 1

draw (F6)