MATERIALS and PROCEDURE

\*MATERIALS\*

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| 1 | Water - to water the plants |
| 2 | 1 Packet of Radish Seeds - to plant for Trials 1 and 2 [$1.75] |
| 3 | 1 Packet of Sunflower Seeds - to plant for Trial 3 [$1.75] |
| 4 | Potting Soil - to grow the plants in [$5.00] |
| 5 | FERTL-GRO Window Greenhouse Seed Starter (36 individual 1-1/2" cells) - to grow the plants in (reusable for all 3 trials) [$4.00] |
| 6 | GE Plant Light Kit with 65 watt plant light bulb - the light source for the plants [$20.00] |
| 7 | Ruler - to measure the height and width of the plants (metric ruler) |
| 8 | Black Construction Paper - to make into covers for the plants during "lights out" period [$2.00] |
| 9 | Masking Tape - to label the plants, and to help create covers for the plants [$0.99] |
| 10 | Measuring Cup - to measure the amount of soil |
| 11 | Tablespoon - to measure the amount of water |
| 12 | Clock or Timer - to keep track of time |
| 13 | Dark Room or Area - the place where the plants will be kept and the place where the plant light can be installed |
| 14 | Pen / Pencil / Paper - to record data and observations |

\*PROCEDURE\*

The controls of the experiment are the 12 hour group (representing the normal length of daylight, an estimated value), the amount of soil and water used, and the area and the environment in which the plants are grown. The manipulative variable is the length of the photoperiod.

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| 1 | Gather materials. |
| 2 | Find a room or area where a plant light can be mounted and install the light about 3 feet above the ground. |
| 3 | Separate the 36-cell planting tray into 4 sections of 9 cells (3 x 3) and label one section "12 hours", another "16 hours", another "20 hours", and the last one "24 hours." |
| 4 | Create 3 square covers out of the construction paper as wide as the 3 cells and for the height, add about 3 inches to the length of the width. |
| 5 | Tape all of the sides and make sure it is light proof by holding the open side up to the light and seeing if you can see any light on the outside through cracks. |
| 6 | If it is not light proof, cover the area with some construction paper and tape. The covers must be light proof because you are testing the affect of just 12 hours of light, just 16, just 20, and so on. |
| 7 | Fill up each individual cell with about 1/2 cup of soil. |
| 8 | Place one radish seed in the middle of each cell and cover each with about 1 cm of soil. |
| 9 | Water each seed with 1 tablespoon of water. |
| 10 | Put them in the area you have set aside. |
| 11 | Set up a time schedule. For example: at 6a.m. turn on the light; after 12 hours, which will be 6p.m., cover only the 12 hour group; after 4 more hours (or a total of 16), which will be 10p.m., cover only the 16 hour group; after 4 more hours (or a total of 20), which is 2a.m., cover the 20 hour group. The 24 hour group does not need to be covered. Then, when it is 6a.m. again, instead of turning on the light, just uncover all of the plants and start the cycle again. |
| 12 | The day after you plant the seeds, you can start you time schedule so you will have a full day. And the next morning when you collect data, that will be Day 1. |
| 13 | At the time that you uncover all of the plants, in the example it was at 6a.m., collect data and any observations from all of the plants (height and width measurements in mm), and water the plants 1 tablespoon of water. |
| 14 | Continue this cycle for about 14 days, or until you have substantial data. |
| 15 | Also take pictures periodically and record the number of the picture on your data table. |
| 16 | For Trial 2, you only need a 12 and a 24 hour group so that differences can be easily seen. |
| 17 | If the covers are still functional they can be reused along with the cells. |
| 18 | Instead of 9 plants in each group, plant 12. |
| 19 | The time schedule can be the same, just without the 16 and 20 hour coverings. |
| 20 | Again, collect data and observations and water all of the plants when you uncover the 12 hour plants each day. |
| 21 | Run the experiment for 14 or more days. |
| 22 | For Trial 3, again have only a 12 and a 24 hours group. |
| 23 | Instead of radishes, plant sunflower seeds. |
| 24 | Follow the same steps for Trial 2 (steps 17-21). |
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|  | NOTE: The plant light will be on for the entire 14 or more days of each trial. |