3. Invent yourself
Curved Mirrors

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Contents of presentation

• Problem
• Experiment 1
• Experiment 2
• Experiment 3
  • Setup
  • Testing
  • Results
    • Weight of mass
    • Effect of ice
    • Effect of insulation
• Conclusion
• Acknowledgements
The Problem

“Suggest and demonstrate interesting experiments in which large concave mirrors can be used to heat up or cool down various objects.”
The Re-Written Problem

“Design and construct a device which lowers an object’s temperature using concave mirrors”
Heat

• What is heat
• Why things cool down
• How concave mirrors heat things up
Experiment 1

- Cooling an object down via convection
Experiment 2

- Metal pipe
  Covering in insulation

- Thermometer

- Black patch

- Mirror

- Ice
Experiment 3 ~ Setup

- Bung
- Bell jar lined with tinfoil
- 3.6Kg weight
- Pipe half filled with ice
- Thermometer 1
- Thermometer 2
Experiment 3 ~ Testing

• Heat of metal weight
• With and without ice
• With and without insulation
Experiment 3 ~ Heat of Weight

Termperature at position 2

- 100°C
- 120°C
- 140°C
- 160°C
Heat energy ~ Calculations

\[ Q = mc\Delta t \]

\[ Q = 3.6kg \times 510.79 \times 105 \]

\[ Q = 193.08kJ \]
Heat energy ~ Calculations

Type equation here.
Heat energy ~ Calculations

\[ \Delta t = \frac{Q}{mc} \]

\[ \Delta t = \frac{Q}{3.6kg \times 510.79} \]
Heat energy ~ Results

Lowest temperature recorded at position 2

Temperature (°C) vs. Heat stored in weight (J)
Experiment 3 ~ Effect of Ice

Effect of Ice on Temperature at position 2

- Without Ice
- With Ice
Experiment 3 ~ Effect of Insulation
Experiment 3 ~ Minimising temperature

- Weight at 100°C
- With Ice
- With insulation
- Stayed in sun once bung is removed
Conclusions

“Design and construct a device which lowers an objects temperature using concave mirrors”

• How ice, insulation and the heat of the weight effects temperature change
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