Effectiveness of DIFFERENT MATERIALS as thermal insulators:

Method:

- 1. Boil water, add to a beaker & measure its initial temp
- 2. Wrap 1 layer of newspaper around beaker
- 3. Add a lid & leave for 5mins (use stopwatch)
- 4. Measure final temp of water
- 5. Repeat with no material, with bubble wrap, with wool ect
- 6. Compare temp changes of materials

Results:

Lower temp difference = lowest thermal conductivity = best insulator (poor conductor of heat)

Control: volume of water, layers of material Dependent: temp change Independent: material

Effect of LAYERS on thermal insulation:

Method:

- 1. Boil water, add to beaker & measure initial temp
- 2. Wrap 1 layer of newspaper around beaker
- 3. Add lid, leave for 5 mins (measuring temp change every 1 min)
- 4. Measure temp change
- 5. Repeat with a different number of layers: 0,1,2,3,4,5
- 6. Compare results

Results:

More layers = less temp change = better insulator





Density of regular objects:

- 1. Measure mass with a balance
- 2. Work out volume (length x width x height)
- 3. Use: D = m/v

Density of irregular object:

 Measure mass with a balance
Submerge object in a eureka can, water displaced = volume of object
Use: D = m/v



Density of a liquid:

Place measuring cylinder on balance & 'O' it
Pour 10ml of liquid in the cylinder & record its mass (repeat till cylinder is full)
Use: D = m/v for each measurement
Take an average to find the density of the liquid

Refraction:

- 1. Place transparent rectangular box on paper & trace round it
- 2. Shine a ray into the middle of the block with a ray box/laser
- 3 Trace the incident ray & mark where light emerges on the other side of the block
- 4. Remove block, join the incident ray & the emerging point with a straight line (shows the path of the refracted ray)
- 5. Draw the normal where the ray entered the block
- 6. Measure the angle between the incident ray & normal = angle of incidence
- 7. Measure the angle between the refracted ray & the normal = angle of refraction
- 8. Repeat with blocks made from different materials (keep the incident angle the same)

Result:

Angle of refraction changes for different materials due to their optical densities

Reflection:

- 1. Draw a straight line across paper & place an object (so one of its sides line up with the line)
- 2. Shine a ray of light at the object's surface & trace the incoming and reflected light beams
- 3. Draw the normal where the ray hits the object
- 4. Measure the angle of incidence & reflection
- 5. Record the width & brightness of the reflected ray
- 6. Repeat with different objects

Results:

Smooth surfaces give clear reflections with a thin & bright ray equal to the incident ray (specular)

Rough surfaces cause diffuse reflection (beam is wider & dimmer)

Angle of incidence = Angle of reflection always!!!

