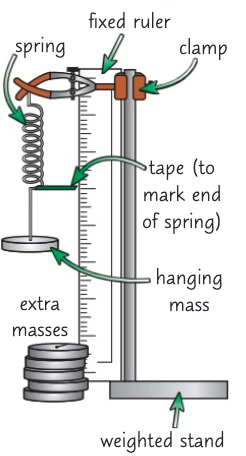
***Physics notes:***

***Paper 2 – Required Practical’s:***

A screenshot of a survey

Description automatically generated**Practical 6 – Stretching a Spring:**

* Make sure you have plenty of extra masses
* Make sure you have calculated the weight of each of them
  + W = mg
* When the line of best fit is a straight line
  + There force and extension are directly proportional
  + F = ke, so the gradient of the line is equal to k (spring constant)
* When the line begins to bend
  + the relationship is non-linear between the force and extension
  + Meaning the spring stretches more for each unit increase in force

**Method:**

1. Set up the apparatus as shown on the right
2. Measure the natural length of the spring (when no load is applied)
   1. Do this using a millimetre ruler which is clamped to the stand
      1. Make sure you take a reading at eye level
3. Add a mass to the spring and allow it to come to rest
   1. Record the mass and measure the new length of the spring
      1. The extension is the change in length
4. Repeat step 2 until you have enough measurements
5. Plot a force-extension graph of your results
   1. It will only start to curve if you exceed the limit of proportionality

**Practical 7 – Acceleration:**

* Newtons second law of motion:
  + Acceleration of an object is proportional to the force applied
  + For the effect on force:
    - We see that acceleration is proportional to the weight on the string
  + For effect on mass:
    - We see that when mass increases, the acceleration decreases

A close up of a sign

Description automatically generated**Method:**

1. Set up the apparatus as shown on the right
   1. Attach a toy car to a piece of string which goes through a pulley system
   2. At the end of the string, attach a weight
   3. On the desk, draw chalk lines at equal spacings
   4. We also need a timer
2. Hold the toy car
3. Let go of the car and start the timer at the same time
4. Because there is a resultant force acting through the string, the car will accelerate along the bench
5. Record the time that the car passes each distance marker
   1. To make this more accurate, record it using a mobile phone and watch it back
6. Repeat the experiment several times
   1. To investigate the effect of force:
      1. Each time, we decrease the weight on the pulley, but we add this to the toy car
      2. This means we don’t change the overall mass of the experiment
      3. Record the acceleration for each mass
   2. To investigate the effect of mass:
      1. Each time, we increase the weight on the car, and we leave the weight on the hook the same
      2. This means we increase the mass of the system
      3. Record the acceleration for each mass
7. Repeat this experiment to gain an average acceleration (Acceleration = Force x Mass)

A picture containing object

Description automatically generated**Practical 8 – Waves:**

**Ripple Tank**

**Method:**

1. Set up the apparatus like the one on the right
2. Using a signal generator attached to the dipper of a ripple tank you can create waves at a set frequency
3. Use a lamp to see the shadows of the waves on the paper below the tank
4. The distance between each shadow line is the wavelength
   1. As these may be close together, measure the distance between 10 waves using a ruler
      1. Then divide the value by 10 to get the wavelength
      2. To make this easier for you, take a picture of the paper and the ruler next to it
5. Use the equation, speed = frequency x wavelength to calculate the speed
6. This is suitable as it allows you to calculate the wavelength without disturbing the waves

**Waves on strings**

A screenshot of a cell phone

Description automatically generated**Method:**

1. Set up the apparatus like the one on the right
   1. Turn on the signal generator and vibration transducer, the string will start to vibrate
2. Adjust the frequency on the signal generator until there’s a clear wave on the string
3. You need to measure the wavelength of these waves
   1. To do this measure the length of 4 or 5 half wavelengths
   2. Then divide the length by the number of half lengths to find the mean half wavelength
   3. Then double to mean to get a full wavelength
4. The frequency is whatever is on the signal generator
5. A close up of a logo

   Description automatically generatedFind the speed by doing frequency x wavelength

**Practical 9 – Reflection and Refraction:**

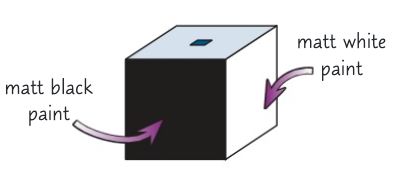
**Method:**

1. Prepare a ray box with a lens and slit inside of it to create a narrow ray of light
   1. SWITCH OFF THE RAY BOX WHEN NOT IN USE
2. Take a piece of A3 paper and draw a straight line down the centre using a ruler
   1. Then, using a protractor, draw a line at a right angle of the line, this is the normal
      1. Label this N
3. Place a glass block against the first line so that the normal is near the centre of the block
   1. Draw around this glass block
4. Use the ray box to direct a ray of light so it hits the block at the normal
   1. A close up of a map

      Description automatically generatedThis is the incident ray
5. The angle between the incident ray and the normal is called the angle of incidence
   1. Adjust the angle of incidence until we see a ray reflect from the surface of the block
   2. We should also be able to see another ray leaving the block from the opposite side
      1. This is called the transmitted ray
6. Mark the path of the incident ray, reflected ray and transmitted ray with crosses
7. Turn off the equipment and remove the glass block
   1. Draw in the reflected, incident and transmitted ray
   2. Draw a line showing the path of the transmitted ray through the glass block
8. Using a protractor, measure the angle of incidence, angle of refraction and angle of reflection
9. Repeat the experiment using a different material of block, such as Perspex

**Results:**

* You should find that the angle of incidence and reflection should be the same for both glass and Perspex
  + This is because the angles of incidence and reflection do not depend on the material
* However, the angle of refraction will be different with Perspex than glass
  + This is because the angle of refraction is different for different materials

**Practical 10 – Infrared:**

* A Leslie cube is a hollow, watertight, metal cube, whose four vertical faces have different surfaces:
  + The colours could be:
    - Matt black paint, matt white paint, shiny metal and dull metal

**Method:**

1. A picture containing text

   Description automatically generatedPlace an empty Leslie cube on a heat-proof mat
2. Boil water in a kettle and fill the Leslie cube with boiling water
3. Wait for the cube to warm up
   1. Then hold a thermometer against each of the four vertical faces of the cube
      1. All four faces should be the same temperature
4. Hold an infrared detector at a set distance away from one of the cube’s faces
   1. Record the amount of IR radiation it detects
5. Repeat this with all of the cubes vertical faces and make sure the detector is the same distance away
6. Repeat the entire experiment to verify the results

**Results:**

* You should find that you detect more infrared radiation from the black surface than the white one
* You should also find that you detect more infrared radiation from the matt surfaces than the shiny ones