	Experiment	Sources of Error	Precaution
	Balancing ruler / moments	1. The retort stands are old and rusty, it is difficult to make small changes to height of the metre rule. Thus the metre rule may not be exactly horizontal. 2. The reference point where it is used to measure the length of spring may not be consistent. Hence, affecting length *l*. 3. To measure *l*, the 30 cm rule has to be held vertically by hand. However, error is incurred in this measurement as the rule could not be held steadily. 4. The spring does not stretch linearly (or has too small an extension) for smaller values of *x* near the pivot. 5. The mass may have shifted and the distance between the weight and pivot will be different. Therefore affecting the force that is needed.	1. Ensure the ruler is horizontal by measuring the distance from the ruler to the table at both ends. These distances should be the same. 2. Read the ruler (to obtain length of spring) at eye level to avoid parallax error, so as to have accurate reading of length *l*.
	Period of oscillation	1. The thread may be slightly elastic, therefore affecting length of pendulum. 2. The thread may have slip through the split cork, therefore affecting the length *l* of pendulum.	Improvement: Take the length before every reading. Precaution: Allow the pendulum to swing a few times before starting to record the time.
	Centre of gravity	1. The plumbline and the card will move/oscillate if the ruler touches it. This makes it difficult to measure *x* accurately as ruler cannot be placed against the card. 2. The mass of each paper clip may not be the same, thus the relationship between *x* and *n* may not be correct.	
	Refraction through two glass blocks	1. Due to the size of the paper, the pins could not be placed far apart. This may cause inaccuracy in the location and measurement of ray P_1P_2. 2. The holes made by the pins provided are rather large thus affecting the accurate construction of the paths of incident and emergent rays. 3. The bevel edge of the glass block do not allow the tracing of the glass block to be accurate. Therefore, the glass block may not be placed back to the original place, thus affecting incident angle.	
	Total internal reflection	1. The holes made by the pins provided are rather large thus affecting the accurate construction of the paths of incident and emergent rays. 2. The bevel edge of the glass block do not allow the tracing of the glass block to be	

		accurate. Therefore, the glass block may not be placed back to the original place, thus affecting incident angle.	
	Reflection	1. The mirror is very light and shifts during the experiment. This causes error in the angle of incidence and hence the emergent ray. 2. The holes made by the pins provided are rather large thus affecting the accurate construction of the paths of incident and emergent rays.	
	Focal length of a convex lens	1. The edge of the object is uneven which makes it difficult to locate the position of the sharp image. Thus *v* may not be accurate. 2. The entire illuminated object may not be exactly parallel to the lens due to the texture of the cardboard. Thus *v* may not be accurate.	
	Magnification of an object	1. In order to measure *x,* the ruler must be placed against the lens and thus lens may be slightly shifted during the experiment. 2. The middle of lens holder may not coincide with the centre of the lens and thus incurring an error in the measurement of *x*. 3. Though eye is placed close to the card *'C'* the position of observer may not be exactly the same throughout the experiment.	
	Cooling of liquid	1. Heat gain from the surrounding may cause the temperature to be higher. 2. Mass of solid may not be the same as the mass that is measured as some may be stuck onto the filter paper. 3. The amount of stirring in the two experiments is different due to the different exposed areas of the cups (one with hole in lid and the other without lid). 4. It is difficult to read the thermometer and stopwatch at the same time. The temperature read at each interval may not be correct 5. Temperature throughout water may not be uniform because stirring is difficult.	Improvement: Lagging to reduce heat loss to the surrounding Provide a cover to reduce heat loss through rising hot air. Place a Styrofoam cup around the beaker to provide insulation to reduce heat conducted to/from the surrounding. Precaution: Ensure the bulb of the thermometer is at the centre of the fluid/immersed.
	Mixing of liquids at different temperatures	1. Initial temperature of water may not be that of boiling water due to loss of heat to surrounding when transferring it to water. Thus, t_x and t_w may be inaccurate. 2. Final temperature (T_F) measured may not be that of the mixture because heat is also lost to the surrounding.	
	Electricity	1 The wire becomes hot after some time and thus value of *I* may be different (heat dissipated at wire will affect resistance of wire and hence values of *I*). 2 There are kinks in the wire and thus wire	Improvement: Open the switch after every reading.

		cannot be straightened on ruler. 3 The wires are not of uniform thickness thus the readings taken at each point may not reflect the actual values. 4 The reference point in which the wire is measured is not consistent, thus affecting length *l*. 5 Contact of jockey is not consistent thus causing some variations in the reading of *I*. 6 The batteries may be old and not able to supply as a consistent emf, thus affecting the current. 7 There are fluctuations of the pointer making it difficult to obtain the accurate value of V. (in some instances).	