



General Certificate of Education  
Advanced Level Examination  
June 2014

## Physics

## PHY6T/P14/TN

Unit 6 Investigative and Practical Skills in A Level Physics

Investigative Skills Assignment (ISA) P

## Teachers' Notes

## Confidential

The Exams Officer should make two copies of these Teachers' Notes; one copy for the Head of A-level Physics and one for the technician.

These copies can be released to the Head of A-level Physics and the technician at any point following publication but must be kept under secure conditions at all times.

Teachers can have sight of the Teachers' Notes but no further copies should be made.

All teacher-assessed marks to be submitted by 15 May.

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## ISA (P) Circular Motion

### Centre instructions for the investigation

In this ISA candidates will be asked to investigate how the time period of a conical pendulum of constant radius varies with the length of the pendulum.

### Information for centres

Candidates should be told approximately one week before undertaking Stage 1 of the ISA that the investigation will involve measuring the time period for a body moving at constant speed around a circular path and carrying out calculations involving circular motion.

### Apparatus

Centres should ensure that the apparatus provided can be used safely. Each candidate will need:

- (a) plain sheet of A3 paper with a circle of minimum diameter 26 cm clearly drawn on it using a black felt tip pen. In tests a standard ten inch plate was used as a template for drawing the circle. The centre of the circle should be clearly marked
- (b) pendulum consisting of a string of length 120 cm with a pendulum bob or mass of about 100 g attached to one end
- (c) stopclock or stopwatch with a precision of 0.1 s or better
- (d) metre ruler
- (e) sticky tape or Blu-Tack to hold the sheet of paper in position on the floor
- (f) pen suitable for marking the string and a reference mark on the circle.

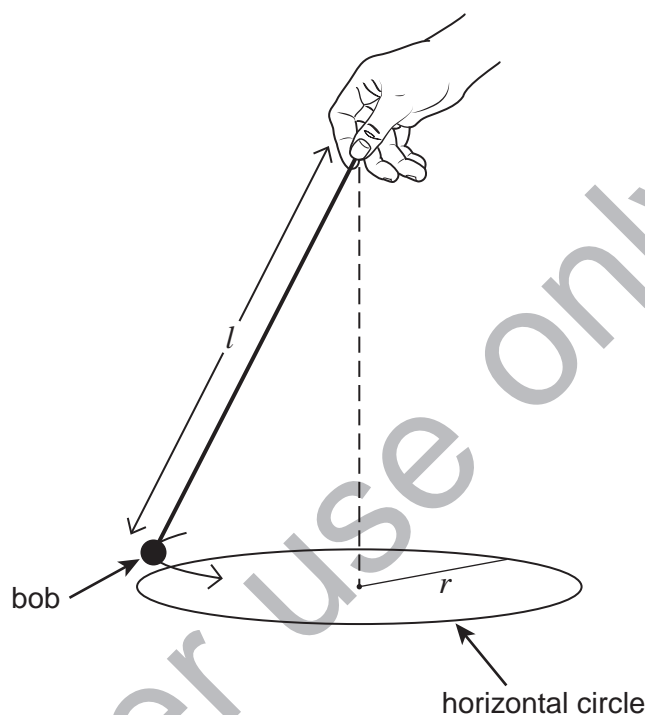
Centres need to ensure that the string can be suitably marked. A new string must be provided for each candidate.

## Task Sheet

You are going to investigate how the time period for the circular motion of a pendulum varies with the length of the pendulum.

Figure 1 shows the apparatus you will use which consists of a pendulum of length  $l$ . The bob moves in a horizontal circle of radius  $r$ .

Figure 1



- Measure and record the diameter,  $d$ , of the circle drawn on the sheet of A3 paper.
- Estimate and record the uncertainty in your measurements of  $d$ .
- Fix the paper with the circle face upwards on the floor.
- Make a mark on the string approximately 0.25 m from the centre of the bob. Measure and record this length,  $l$ , of the pendulum.
- Estimate and record the uncertainty in your measurement of  $l$ .
- Hold the string at the 0.25 m mark directly above the centre of the circle and rotate it gently so that the mass moves with uniform circular motion of radius,  $r$ , equal to the radius of the drawn circle.
- Take suitable readings to measure the time period,  $T$ , of the circular motion.
- Repeat the measurements of  $T$  and  $l$  for a range of values of  $l$  between 0.25 m and 1.10 m.
- Record all your measurements in a table.
- Plot a graph of  $T$  (on the  $y$ -axis) against  $l$ , drawing a best fit curve.
- Record the precision of the stopclock or stopwatch you used.