

## Apparatus

These lists give items that candidates should be familiar with using, whether they are taking the Practical Test or the Alternative to Practical.

These items should be available for use in the Practical Test. These lists are not exhaustive and we may also require other items to be sourced for specific examinations. The Confidential Instructions we send before the Practical Test will give the detailed requirements for the examination.

Every effort is made to minimise the cost to and resources required by centres. Experiments will be designed around basic apparatus and materials which should be available in most school laboratories or are easily obtainable.

Appropriate safety equipment must be provided to students and should at least include eye protection.

The following suggested equipment has been categorised, but equipment can be used in any topic.

### General

- adhesive putty (e.g. Patafix, Blu Tack®)
- adhesive tape (e.g. Sellotape®)
- card
- dropping pipette (2.5 cm<sup>3</sup>) or small plastic syringe (e.g. 5 cm<sup>3</sup>)
- ruler, 30 cm, graduated in mm
- S-hook
- scissors
- set square
- string
- thread
- top pan (electronic) balance to measure up to 500 g, with precision of at least 0.1 g
- tracing paper
- wooden board, rigid, 150 cm × 20 cm × 1.5 cm

### Mechanics

- expendable steel springs, with spring constant of approx. 0.25 N/cm
- force meter, with maximum reading or full scale deflection of between 1.0 N and 3.0 N
- G-clamp
- glass ball (marble), ball bearing (approx. 10 mm in diameter) and table tennis ball
- half-metre ruler, graduated in mm
- masses, 10 × 10 g, 10 × 100 g, including holders
- metre ruler, graduated in mm
- modelling clay (e.g. Plasticine®)
- pendulum bob
- pivots (e.g. 15 cm nails, triangular wooden blocks)
- retort stand, boss and clamp
- stopwatch, reading to 0.1 s or better

## Thermal physics

- beakers, glass (borosilicate), 100 cm<sup>3</sup>, 250 cm<sup>3</sup>, 400 cm<sup>3</sup>
- boiling tube, approx. 150 mm × 25 mm
- measuring cylinders, constant diameter, 50 cm<sup>3</sup>, 100 cm<sup>3</sup>, 250 cm<sup>3</sup>
- plastic or polystyrene cup, approx. 200 cm<sup>3</sup>
- thermometer, −10 °C to +110 °C, with 1 °C graduations

## Optics

- converging lens, spherical, +10D ( $f = 10$  cm)
- converging lens, spherical, +6.7D ( $f = 15$  cm)
- diverging lens, spherical, -6.7D ( $f = -15$  cm)
- glass or Perspex 60° prism
- glass or Perspex blocks, rectangular and semi-circular
- optics pins, minimum length 75 mm
- plane mirror, approx. 75 mm × 25 mm
- pin board
- protractor

## Electricity

*Candidates or centres may need to join components, meters and cells together to make circuits. Connectors used will be 3.5 mm or 4 mm in diameter.*

- ammeter, with full scale deflection 1 A or 1.5 A and precision of at least 0.05 A (analogue, dedicated digital or multimeter)
- voltmeter, with full scale deflection 5 V and precision of at least 0.1 V (analogue, dedicated digital or multimeter)
- cells, 1.5 V and holders to enable several cells to be joined
- connecting leads, 3.5 mm or 4 mm connectors
- crocodile clips
- d.c. power supply, variable to 12 V
- diodes
- filament lamps, low voltage (e.g. 2.5 V) and holders
- filament lamp, 12 V, 24 W and holder
- LDRs (suitable for use in 1–5 V circuits)
- push switch
- selection of resistors, values within range 5–50  $\Omega$ , power rating of 1–2 W
- thermistors (NTC only)
- wire, constantan (eureka), 0.38 mm diameter (28 swg), 0.32 mm diameter (30 swg)
- wire, nichrome, 0.38 mm diameter (28 swg), 0.32 mm diameter (30 swg)

## Safety in the laboratory

Teachers should make sure that they do not contravene any school, education authority or government regulations. Responsibility for safety matters rests with centres.

Further information can be found from the following UK associations, publications and regulations.

### Associations

CLEAPSS is an advisory service providing support in practical science and technology.  
[www.cleapss.org.uk](http://www.cleapss.org.uk)

### Publications

*CLEAPSS Laboratory Handbook*, updated 2015 (available to CLEAPSS members only)  
*CLEAPSS Hazcards*, 2019 update of 2016 edition (available to CLEAPSS members only)

### UK regulations

Control of Substances Hazardous to Health Regulations (COSHH) 2002 and subsequent amendment in 2004  
[www.legislation.gov.uk/uksi/2002/2677/contents/made](http://www.legislation.gov.uk/uksi/2002/2677/contents/made)  
[www.legislation.gov.uk/uksi/2004/3386/contents/made](http://www.legislation.gov.uk/uksi/2004/3386/contents/made)  
A brief guide may be found at [www.hse.gov.uk/pubns/indg136.pdf](http://www.hse.gov.uk/pubns/indg136.pdf)