OCR
Oxford Cambridge and RSA

Purposeful Practicals

Biology A (Gateway Science) J247

Chemistry A (Gateway Science) J248

Physics A (Gateway Science) J249

Deliver your practicals with purpose

Contents

Introduction to our Practical Menu

We understand the importance of choice and flexibility. We also understand that, sometimes, 'choice' can feel overwhelming – particularly if you are new to teaching, or you are teaching outside of your specialism.

Our Practical Menu is designed to support teachers in making good choices about which practicals to teach, and our supporting resources ensure that the delivery of these is always purposeful. Supporting Resources are located in the Teaching Delivery: Purposeful Practicals Section on Teach Cambridge.

Our menu options have been carefully curated by subject experts, and offer suggestions for practical activities that support all of the DfE's requirements for practical apparatus and techniques.

In choosing an option from each row of the menu, you can be confident that you are giving your students the experience they need to be well prepared for practical questions in their written exams.

Tell us what you think

Your feedback plays an important role in how we develop, market, support and resource qualifications now and into the future. Here at OCR, we want teachers and students to enjoy and get the best out of our qualifications and resources, but to do that we need honest opinions to tell us whether we're on the right track or not. That's where you come in.

You can email your thoughts to resourcesfeedback@ocr.org.uk or visit the OCR feedback page to learn more about how you can help us improve our resources.

Designing and testing in collaboration with teachers and students

Helping young people develop an ethical view of the world

Equality, diversity, inclusion and belonging (EDIB) are part of everything we do

Purposeful Practical Menu suggestions

Biology

Our new purposeful practical resources will help you to meet the DfE requirements for apparatus and techniques in **8** practical tasks, or **11** for Biology (separate science).

To meet the DfE requirements for Combined Science,

- do practicals **B1-B4** below, and then
- choose **one** practical from **each row** of the table.

Practical B1: Investigating enzymes: In this activity, students explore how effective the enzyme catalase is, found in potato (or liver), when it is added to different concentrations of hydrogen peroxide.

Practical B2: Investigating the effect of temperature on lipase: In this activity, students investigate how the activity of the enzyme lipase changes with temperature, and how indicators help us to follow chemical reactions.

Practical B3: Starch and amylase: In this activity, students investigate the effect of pH on amylase activity, by measuring the time taken for amylase to completely break down starch.

Practical B4: Investigating osmosis: In this activity, students investigate how solute concentration affects the movement of water in and out of plant cells (in this case, found in potatoes).

Practical	One from –		
	Suggestion A	Suggestion B	Suggestion C
B5	**Microscopy (onion cells)** In this activity, students are given the opportunity to use their practical skills to prepare and observe an onion cell slide using a light microscope.	**Microscopy (prepared slides)** In this activity, students observe plant and/or animal cells using pre-prepared slides.	
B6	**Investigating antimicrobials** In this activity, students investigate solutions that can be used to kill bacteria, allowing students to compare the efficacy of naturally antimicrobial substances.	**Investigating antibiotics** In this activity, students investigate the effect of antibiotics on bacterial growth using agar plates and measuring zones of inhibition.	
B7	**Sampling techniques (quadrats)** In this activity, students count the number of daisies in a quadrat, then carry out some calculations to arrive at an estimate.	**Sampling techniques (transects)** In this activity, students investigate the changes in the distribution of an organism along a transect.	**Observing patterns in the distribution of a simple plant** In this activity, students use a small 10 cm × 10 cm acetate quadrat to measure the distribution of an organism on tree bark.
B8	**Investigating photosynthesis** In this activity, students investigate how light intensity affects photosynthesis in pondweed.	**Investigating transpiration** In this activity, students investigate the factors affecting transpiration using a potometer.	**Investigating photosynthesis in algae** In this activity, students use algae in alginate beads to show how light intensity affects the rate of photosynthesis.

To meet the DfE requirements for Biology (separate science), please also see the next page.

Practicals for Biology (separate science only)

Practical	One from –		
	Suggestion A	Suggestion B	Suggestion C
B9	**Food tests** In this activity, students will identify the biological molecules found in a variety of foods.	**Testing for biological gases** In this activity, students carry out gas tests for carbon dioxide and oxygen.	**Testing a leaf for starch** In this activity, students carry out an investigation into whether a leaf has photosynthesised or not to identify which leaf was left in the dark.
B10	**Investigating physiological responses** In this activity, students investigate and monitor changes in pulse, ventilation rate and recovery following exercise.	**Investigating the effect of temperature on respiration** In this activity, students investigate the effect of changing temperature on respiration in yeast, allowing students to identify the optimum temperature.	
B11	**Investigating diffusion** In this activity, students will use beetroot discs to explore how temperature affects movement out of cells, identifying the colour change of the surrounding water in a set time.	**Investigating SA:V ratios and diffusion** In this activity, students will use varying sizes of agar cubes (infused with pH indicator) to investigate how their surface area to volume ratio affects the rate of diffusion when they are placed in an acid.	

Purposeful Practical Menu suggestions

Chemistry

Our new purposeful practical resources will help you to meet the DfE requirements for apparatus and techniques in **7** practical tasks, or **9** for Chemistry (separate science).

To meet the DfE requirements for Combined Science,

- do **Practical C1**, and then
- choose **one** practical from **each row** of the table.

Practical C1: Measuring the rate of reaction between magnesium and hydrochloric acid: In this activity, students carry out the reaction between hydrochloric acid and magnesium metal to determine the effect of temperature on the rate of reaction.

Practical	One from –	
	Suggestion A	Suggestion B
C2	**Making copper sulfate crystals** In this activity, students will produce copper(II) sulfate crystals.	**Microscale making copper sulfate crystals** In this activity, students will produce copper(II) sulfate crystals using a microscale method.
C3	**Extraction of limonene** In this activity, students will extract orange oil, which contains limonene, from orange peel by distillation.	**Fractional distillation of a crude oil substitute** In this microscale activity, students separate fractions using distillation.
C4	**Investigating reaction energetics** In this activity, students measure temperature changes of four reactions and classify the reactions as exothermic or endothermic.	**Heat of a displacement reaction** In this microscale activity, students will investigate the relationship between the concentration of a salt solution and the temperature rise of a displacement reaction.
C5	**Electrolysis of brine** In this activity, students carry out electrolysis of brine (sodium chloride solution) to produce hydrogen gas, chlorine gas and sodium hydroxide solution.	**Electrolysis of copper(II) chloride** In this microscale activity, students carry out electrolysis of copper(II) chloride solution in a Petri dish, producing copper solid and chlorine gas.
C6	**Chromatography** In this activity, students will use chromatography to identify the mixtures of dyes in an unknown sample of ink.	**Chromatography of leaf chloroplasts** In this microscale activity, students will extract the chloroplasts from leaves and separate the chlorophyll by chromatography.

To meet the DfE requirements for Chemistry (separate science), please also see the next page.

Practicals for Chemistry (separate science only)

Practical C7: Precipitation and flame tests: In this activity, students identify ions by qualitative analysis and determine the composition of an unknown substance.

Practical	One from –	
	Suggestion A	Suggestion B
C8	**Reactivity trends of the halogens** In this activity, students investigate the relative reactivity of the halogens via displacement reactions and their bleaching power.	**Reactivity of metals** In this microscale activity, students confirm the order of reactivity of a series of metals using displacement reactions. The magnetic nature of displaced iron is also investigated.
C9	**Titration of sodium hydroxide and hydrochloric acid** In this activity, students determine the concentration of a sample of sodium hydroxide.	**The vinegar dilemma** In this microscale activity, students experimentally determine the concentration of ethanoic acid in a range of vinegar samples.

Purposeful Practical Menu suggestions

Physics

Our new purposeful practical resources will help you to meet the DfE requirements for apparatus and techniques in **10** practical tasks, or **11** for Physics (separate science).

To meet the DfE requirements for Combined Science,

- do practicals **P1-P4** below, and then
- choose **one** practical from **each row** of the table.

Practical P1: Determining density: In these activities, students will determine the density of solids (regular and irregular shapes) and liquids.

Practical P2: Measuring the extension of a spring: In this activity, students will investigate the extension of a spring when masses are hung on it.

Practical P3: Measure the speed of waves in a solid: In this activity, students measure the speed of waves in a stretched cord, string or Slinky spring.

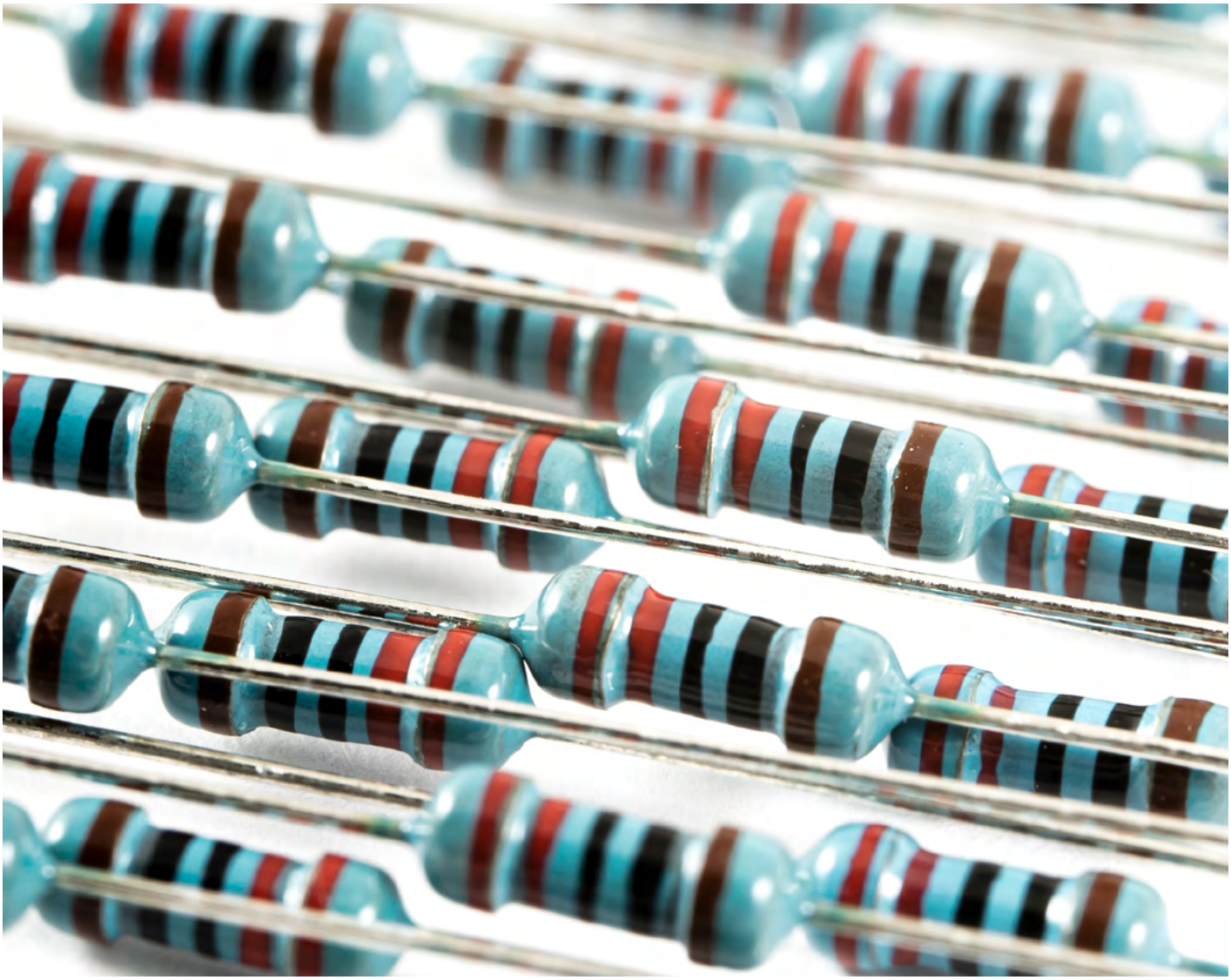
Practical P4: Investigate reflection and refraction of light: In this activity, students measure and compare the angle of refraction with the angle of incidence for a ray passing from air into a transparent block.

Practical	One from –	
	Suggestion A	Suggestion B
P5	**Measure speed (stop-clock)** In this activity, students use a stop-clock and a ruler or measuring tape to measure the speed of a moving object.	**Measure speed (light gates)** In this activity, students use a light gate (or an electrically triggered timer) and a ruler to measure the speed of a moving object.
P6	**Measure acceleration (stop-clock)** In this activity, students use a stop-clock and a ruler or measuring tape to measure the acceleration of an object.	**Measure acceleration (light gates)** In this activity, students use light gates (or electrically triggered timer) and a ruler to measure the acceleration of an object.
P7	**Measure the speed of surface waves on water (ripple tank)** In this activity, students measure the speed of surface waves on water in a ripple tank.	**Measure the speed of surface waves on water (shallow tray)** In this activity, students measure the speed of surface waves on water in a shallow tray.
P8	**Measure energy changes (increase in gravitational store)** In this activity, students measure the energy changes when an object is raised vertically.	**Measure energy changes (increase in kinetic store)** In this activity, students measure the energy changes when the speed of an object changes.
P9	**Measure specific heat capacity** In this activity, students measure the specific heat capacity of a material.	**Measure specific latent heat of vaporisation** In this activity, students measure the specific latent heat of vaporisation of water.
P10	**Component characteristics (ammeters and voltmeters)** In this activity, students use traditional analogue or digital ammeters and voltmeters to investigate the characteristic curves for an ohmic conductor, a filament lamp and a diode.	**Component characteristics (digital multimeters or datalogger and sensors)** In this activity, students use digital multimeters or dataloggers with voltage and current sensors to investigate the characteristic curves for an ohmic conductor, a filament lamp and a diode.

To meet the DfE requirements for Physics (separate science), please also see the next page.

Practicals for Physics (separate science only)

Practical	One from –	
	Suggestion A	Suggestion B
P11	**Resistance combinations (ammeters and voltmeters)** In this activity, students use traditional analogue or digital ammeters and voltmeters to determine the resistance of series and/or parallel combinations of resistors.	**Resistance combinations (digital multimeters or datalogger and sensors)** In this activity, students use digital multimeters or dataloggers with voltage and current sensors to determine the resistance of series and/or parallel combinations of resistors.



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