# Biology PAG 1: Microscopy

### Combined Science PAG B1: Microscopy

# Suggested Activity 1: Examining human cheek cells

## Instructions and answers for teachers & technicians

These instructions cover the learner activity section which can be found on [page 7](#_Student_Activity). This Practical activity supports OCR GCSE Biology.

**When distributing the activity section to the learners either as a printed copy or as a Word file you will need to remove the teacher instructions section.**

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| This is a **suggested** practical activity that can be used as part of teaching the GCSE (9-1) Gateway Science (A) and Twenty First Century Science (B) specifications.  These are **not controlled assessment tasks**, and there is **no requirement to use these particular activities**.  You may modify these activities to suit your learners and centre. Alternative activities are available from, for example, [Royal Society of Biology](https://www.rsb.org.uk/education/teaching-resources/secondary-schools), [Royal Society of Chemistry](http://www.rsc.org/learn-chemistry), [Institute of Physics](http://www.iop.org/education/teacher/resources/index.html), [CLEAPSS](http://science.cleapss.org.uk/) and [publishing companies](https://global.oup.com/education/content/secondary/key-issues/gcse_science_2016/?region=uk), or of your own devising.  Further details are available in the [specifications](http://www.ocr.org.uk/science) (Practical Skills Topics), and in these [videos](https://www.youtube.com/playlist?list=PLBD9B84FF4BD54AA4). |

**OCR recommendations:**

**Before carrying out any experiment or demonstration based on this guidance, it is the responsibility of teachers to ensure that they have undertaken a risk assessment in accordance with their employer’s requirements, making use of up-to-date information and taking account of their own particular circumstances. Any local rules or restrictions issued by the employer must always be followed.**

**CLEAPSS resources are useful for carrying out risk-assessments: (**<http://science.cleapss.org.uk>**).**

**Centres should trial experiments in advance of giving them to learners. Centres may choose to make adaptations to this practical activity, but should be aware that this may affect the Apparatus and Techniques covered by the learner.**

### Introduction

In this practical activity, learners will be preparing a microscope slide of their own cheek cells and examining them using a light microscope.

### DfE Apparatus and Techniques covered

The codes used below match the OCR Practical Activity Learner Record Sheet ([**Biology**](http://www.ocr.org.uk/Images/-295601-gcse-biology-learner-record-sheet.doc) / [*Combined Science*](http://www.ocr.org.uk/Images/304431-gcse-combined-science-learner-record-sheet.doc)) and Trackers ([**Biology**](http://www.ocr.org.uk/Images/323480-gcse-biology-practical-tracker.zip) / [*Combined Science*](http://www.ocr.org.uk/Images/323483-gcse-combined-science-practical-tracker.zip)) available online. **There is no requirement to use these resources.**

**1** *[1]***:** Use of appropriate apparatus to make and record a range of measurements accurately, including: **i**[*i*]) length

**7** *[7]*: Use of appropriate apparatus, techniques and magnification, including microscopes, to: i) make observations of biological specimens; ii) produce labelled scientific drawings

### Aims

To use apparatus to measure length.

To use apparatus and techniques to observe cheek cells and produce labelled scientific drawings.

### Intended class time

20-30 minutes

### Links to Specifications:

### Twenty First Century

B1.1.1b describe how to use a light microscope to observe a variety of plant and animal cells

### Gateway

B1.1a describe how light microscopes and staining can be used to view cells

### Mathematical Skills covered

M1b Recognise and use expression in standard form

M2a Use an appropriate number of significant figures

M3b Change the subject of an equation

### Twenty First Century IaS references covered

IaS2.1 present observations and other data using appropriate formats

IaS2.2 when processing data use SI units where appropriate

IaS2.3 when processing data use prefixes and powers of ten for orders of magnitude

IaS2.5 when processing data interconverts units

IaS2.6 when processing data use an appropriate number of significant figures

### Gateway Working scientifically references covered

WS1.4c use SI units

WS1.4d use prefixes and powers of ten for orders of magnitude

WS1.4e interconvert units

WS1.4f use an appropriate number of significant figures in a calculation

WS2a carry out experiments

WS2b make and record observations and measurements using a range of apparatus and methods

WS2c presenting observations using appropriate methods

### Equipment

* Light microscope
* Microscope slides (one per person)
* Cover slip (one per person)
* Cotton bud (per person)
* Mounted needle
* Filter paper
* Methylene blue stain

Disinfectant should be available – place used cotton buds and slides in this after use.

### Health and Safety

Methylene blue is a low hazard substance but will stain skin and clothing so care should be taken when using it.

The inside of the cheek is delicate tissue so the cotton bud just needs to be rubbed gently once down the surface to pick up some cells. The cotton bud should then be immediately placed in disinfectant.

### Method

It is probably a good idea to demonstrate the lowering of the cover slip onto the microscope slide using the mounted needle in order to maximise chances of learners getting this right. Learners also need to be reminded to focus all the way down (to the point that the objective lens is almost touching the slide) without their eye to the eyepiece lens and then to focus up in order to avoid broken cover slips. If used cotton buds and slides are placed in disinfectant when they are no longer needed, there should be no contamination issue.

### Notes

This practical exercise needs to be accompanied by some teaching and learning about magnification calculations in order for learners to be able to answer one of the quiz questions that supports the practical and the associated skills.

### Technician Notes

For this practical the teacher will require for a class of 30, working in pairs:

* 15 × light microscopes
* 30 × microscope slides
* 30 × cover slips
* 30 × cotton buds
* 15 × mounted needles
* 30 × small pieces of filter paper (optional)
* 15 × Methylene blue stain

For class use: disinfectant e.g. 1% Virkon solution in which to place used cotton buds and microscope slides.

### Answers for quiz questions

1. Name one structure that would be present in an animal cell such as a cheek cell but is not visible using a light microscope. **[ 1 mark]**

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| Mitochondria ✓ |

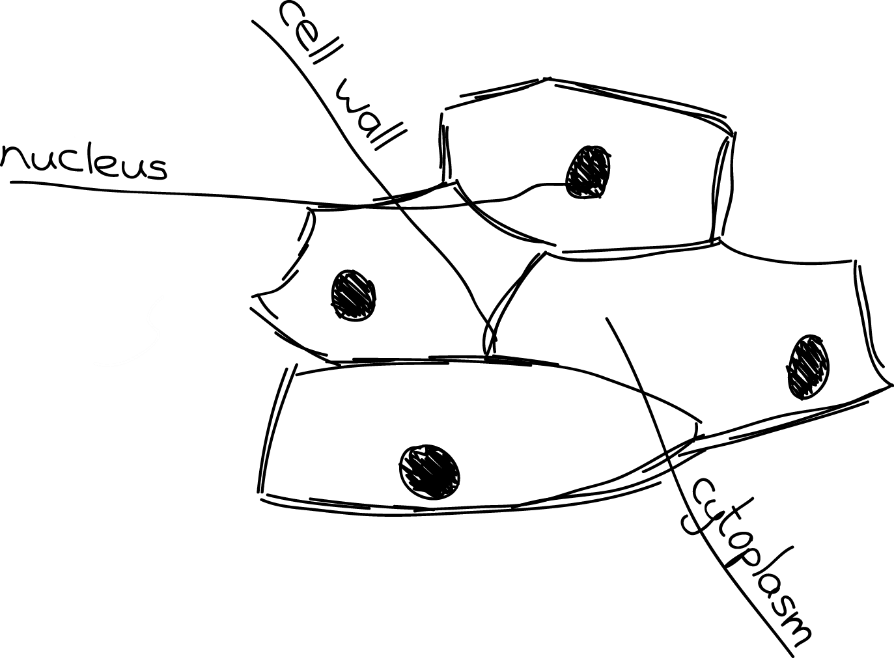
1. A student measured a drawing of a nucleus in a muscle cell to be 9 mm. The magnification of the drawing was ×1500.

What was the actual size of the nucleus? Use the appropriate unit for your answer.   
**[2 marks]**

|  |
| --- |
| actual size = measured size  magnification  9 ÷ 1 500 = 0.006 mm ✓  6 μm ✓ |

1. The diagram below shows a drawing done by a student from a light microscope image of onion epidermis (skin).

Suggest three improvements to the drawing. **[3 marks]**



|  |
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| Any three from:  Lines should be solid, not sketched ✓  There shouldn’t be any shading e.g. of nuclei ✓  Label lines should be drawn with a ruler ✓  Label lines should not overlap ✓  Label lines should not have labels written on them, the labels should be written horizontally, next to the line ✓ |

### Document updates

v1 Published on the qualification pages

v1.1 January 2017 Consolidated labelling of activities



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v1.2 June 2021 Update to meet digital accessibility standards



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# Biology PAG 1: Microscopy

# Combined Science PAG B1: Microscopy

# Suggested Activity 1: Examining human cheek cells

## Learner Activity

### Introduction

In this practical activity you will have the chance to prepare a microscope slide of cells from your own cheek, stain them and examine them using a light microscope.

### Aims

To use apparatus to measure length.

To use apparatus and techniques to observe cheek cells and produce labelled scientific drawings.

### Intended class time

### 20-30 minutes

### Equipment (per group)

* Light microscope
* Microscope slides (one per person)
* Cover slip (one per person)
* Cotton bud (per person)
* Mounted needle
* Filter paper (optional)
* Methylene blue stain.

Disinfectant should be available – place used cotton buds and slides in this after use.

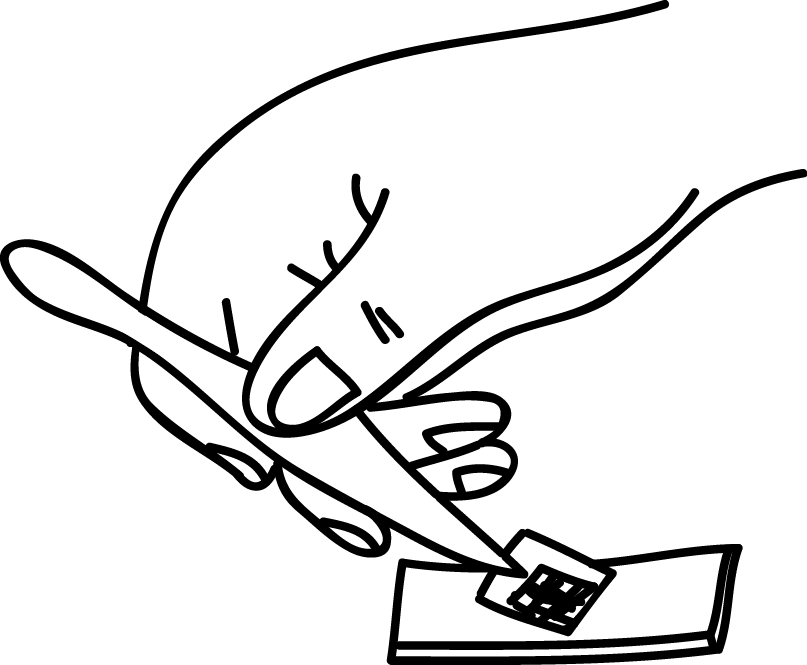
### Health and Safety

Methylene blue is a low hazard substance but will stain skin and clothing so care should be taken when using it.

The inside of the cheek is delicate tissue so the cotton bud just needs to be rubbed gently once down the surface to pick up some cells. The cotton bud should then be immediately placed in disinfectant.

### Method

* Set up the microscope ready with the lowest power objective lens e.g. ×4.
* Rub one side of the cotton bud down the inside of one side of your cheek once. This is enough to pick up some cells without damaging the delicate tissue of your inner cheek.
* Rub the side of the cotton bud with the cells on it once on the centre of the microscope slide.
* Place one drop of methylene blue on top of where the cells are on the slide.
* Take the cover slip and carefully place one side into the methylene blue using the mounted needle, as shown below.



* Slowly lower the other side of the cover slip into the methylene blue, taking care not to trap any air bubbles.
* Examine the slide under the microscope using low power first. Move up to high power.
* Once you have done your drawing, place the slide and cover slip into disinfectant as directed by your teacher.

### Results

Draw two or three typical cheek cells from your slide. Remember only to draw what you can see and to make sure you use a sharp pencil to draw a large drawing. Use solid lines and don’t shade. If you are labelling, use a ruler to draw the label line and make sure they don’t overlap. Don’t forget to add the magnification of your drawing.

### Quiz - test your knowledge and understanding

1. Name one structure that would be present in an animal cell such as a cheek cell but is not visible using a light microscope. **[1 mark]**

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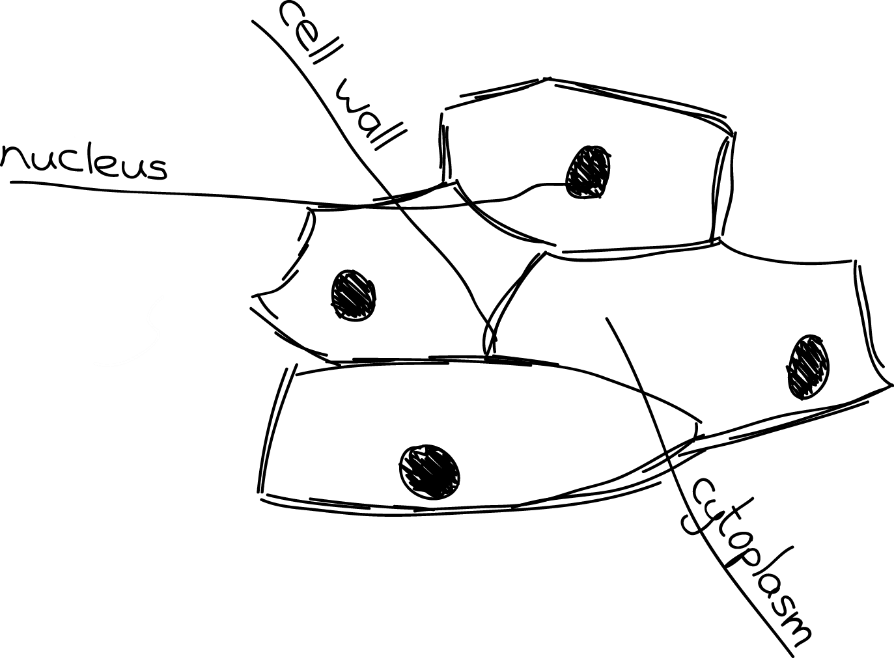
1. A student measured a drawing of a nucleus in a muscle cell to be 9 mm. The magnification of the drawing was ×1500.

What was the actual size of the nucleus? Use the appropriate unit for your answer.   
**[2 marks]**

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|  |

1. The diagram below shows a drawing done by a student from a light microscope image of onion epidermis (skin).

Suggest three improvements to the drawing. **[3 marks]**



|  |
| --- |
| **1.** |
| **2.** |
| **3.** |

### DfE Apparatus and Techniques covered

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|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Biology** | |  | **Combined Science** | |
| 1i | |  | 1i | |
| 7i | 7ii |  | 7i | 7ii |