Grade Descriptions for Cambridge IGCSE Physics 0625

What are grade descriptions?

Grade descriptions describe the level of performance typically demonstrated by candidates achieving the different grades awarded for a qualification. For Cambridge IGCSEs, they describe performance at three levels – grades ‘F’, ‘C’ and ‘A’.

Grade descriptions sit alongside other key documents that illustrate examination standards, including:

- the syllabus, which presents what students should be taught over a course of study and explains how this is assessed
- the specimen assessment materials, which illustrate the structure of the assessment and the kinds of tasks that candidates complete
- grade thresholds, which show the total mark required to achieve a grade.

Grade descriptions are produced with a wide range of audiences in mind. For teachers, they support lesson planning and curriculum development, while students may gain useful insights into what is required to achieve a high grade and what candidate performance at lower grades typically looks like. For university admissions staff and employers, and those less familiar with Cambridge, they paint a picture of typical performance at different grades.

Cambridge publishes grade descriptions for a qualification once examinations have taken place for the first time, and we review them when a qualification is substantially revised. They are developed by highly experienced examiners who understand performance standards in the subject area and have studied samples of candidate work.

How do I use this resource?

Grade descriptions are presented as a grid with content areas at the start of each row and the different grades at the top of each column.

The content areas group together various aspects of the syllabus – they reflect topics, assessment objectives, key concepts, syllabus aims and components. The way they are organised is specific to each subject.

For each content area, there is a descriptor for each grade. Reading across the row from left to right, the descriptors represent increasing levels of performance, with each grade descriptor building on, and including, the last.

Each column represents overall performance at a particular grade. Reading down the column from top to bottom, the descriptors capture the range of knowledge, understanding and skills that a candidate ‘comfortably inside the grade’ is likely to demonstrate.

Cambridge produces grade descriptions to support teaching and learning and the interpretation of candidate scores and grades. We do not use them to set grade thresholds. As such, they cannot be used to challenge the grade awarded to any individual candidate.

Version 1, published January 2025

Grade descriptions

Area of knowledge, understanding and skills	Typical performance at grade F	Typical performance at grade C	Typical performance at grade A
Motion, forces and energy	Students recall $v = s / t$. They use this to do simple calculations to find the speed of an object. They state that distance travelled is the area under a speed–time graph.	Students rearrange $v = s / t$ to calculate distance or time. They interpret speed–time graphs to identify when objects are at rest, moving with constant speed or moving with constant acceleration. They use information from a graph to calculate the distance travelled when speed is constant.	Students interpret information from speed–time graphs to describe the motion of objects when there is changing acceleration or deceleration. They use information from a graph to calculate the distance travelled by objects where speed and/or acceleration varies. Students use $a = \Delta v / \Delta t$ in a range of contexts.
	Students know that forces change the speed or direction of motion of objects. They find the resultant force from a diagram showing two forces acting in opposite directions along the same straight line.	Students recall the formula $k = F / x$, relating force to the extension it produces in a spring. They recall $F = ma$. They use this to calculate the force which produces an acceleration.	Students calculate the spring constant of a spring using information from a force–extension graph. They combine $F = ma$ with $a = \Delta v / \Delta t$ in complex calculations.
	Students know that the pressure an object exerts on the ground depends on its force and the surface area in contact with the ground. Students recall $\rho = m / V$. They use this to calculate the density of an object.	Students recall $P = F / A$. They use this to calculate pressure. Students recall $\Delta E_p = mg\Delta h$. They use this to calculate how energy in the gravitational store changes when an object moves away from or towards the ground.	Students recall $\Delta p = \rho g \Delta h$. They use this to calculate changes in pressure with depth in a liquid. They use $\Delta E_p = mg\Delta h$ to calculate the change in height of an object above the ground.
Thermal physics	Students describe the structure of solids, liquids and gases. They describe differences in the structure of solids, liquids and gases in terms of the separation of particles. Students relate the amount of thermal expansion to the state of matter.	Students link the motion of particles to the temperature of substances. Students begin to describe how pressure changes when the temperature of a gas increases, in terms of particles.	Students explain differences in the structure of solids, liquids and gases in terms of the motion of particles or the forces between particles. They partially explain the pressure of a gas in a container in terms of particle collisions and their relation to force and pressure.

Area of knowledge, understanding and skills	Typical performance at grade F	Typical performance at grade C	Typical performance at grade A
	Students show some understanding of conduction, convection and radiation as methods of energy transfer from the internal (thermal) store. They know that solids conduct energy from the internal (thermal) store.	Students know that radiation is the only method of energy transfer in a vacuum. They may also know that black is a good absorber of infrared radiation and that shiny surfaces are good reflectors of radiation.	Students know that convection is the main method of energy transfer from the internal (thermal) store in liquids and gases. They describe how energy is transferred by a convection current in a liquid or gas.
Waves	Students identify the wavelength of a transverse wave from a diagram. They know what is meant by the amplitude and frequency of a wave. They can draw a ray diagram showing the reflection of a wave at a plane surface. Students describe some of the characteristics of images produced by thin converging lenses. They can identify a real image from a ray diagram. Students know the names of the main regions of the electromagnetic spectrum. They identify uses of some types of electromagnetic radiation. Students state excessive exposure to electromagnetic radiation is harmful to humans.	Students know that when a wave is reflected at a plane surface the angle of incidence is equal to the angle of reflection. They can draw a diagram showing refraction of, for example, water waves moving from a shallow to deep area of water. Students draw ray diagrams to show the formation of a real image using a thin converging lens. They identify the focal length, principal axis and principal focus on a ray diagram. Students identify the uses of different types of electromagnetic radiation. They describe the harmful effects on humans of excessive exposure to electromagnetic radiation such as X-rays and ultraviolet light.	Students define the term refractive index in terms of the ratio of the speeds of a wave in two different media. They recall and use $n = \sin i / \sin r$. They may use data given in a question or by obtaining values from diagrams showing refraction. Students draw ray diagrams to show the formation of a virtual image by a thin converging lens. They know the different characteristics of real and virtual images. Students know that modern communication systems make use of electromagnetic radiation. They identify regions of the electromagnetic spectrum used in mobile phone technology and fibre optic transmission.
Electricity and magnetism	Students know that there are both positive and negative charges. They describe repulsion between like particles and attraction between oppositely charged particles.	Students know that electrons are negatively charged. They explain that when friction is used to charge solids this involves the transfer of electrons.	Students define an electric field. They may draw diagrams showing the pattern of a simple electric field. They interpret diagrams to deduce the direction of an electric field.

Area of knowledge, understanding and skills	Typical performance at grade F	Typical performance at grade C	Typical performance at grade A
	Students use standard circuit symbols to draw simple electric circuits. They recall $R = V / I$ and use it to find the resistance in a simple circuit. They recall $P = IV$ and $E = IVt$. They use these formulae to calculate power and electrical energy. Students identify step-up and step-down transformers from diagrams or information about the number of turns on the primary and secondary coils of the transformer. They recall $V_p / V_s = N_p / N_s$.	Students know that in a parallel circuit the current from the source is larger than the current in each branch. Students use $P = IV$ or $E = IVt$ to calculate values of current or potential difference. Students use $V_p / V_s = N_p / N_s$ in calculations. They make simple statements about the operation of a transformer, e.g. stating that an e.m.f. is induced across the secondary coil. They state that when electricity is transmitted at high voltages there is a low current	Students describe electrical conduction in metals in terms of the movement of free electrons. They use $I = Q / t$ in calculations of charge, current and time. They work out the combined resistance of two resistors in parallel. Students give a partial explanation of the operation of a simple transformer. They recall and use $I_pV_p = I_sV_s$ alongside $V_p / V_s = N_p / N_s$ to solve transformer problems. They use $P = I^2R$ to explain the advantages of high-voltage transmission.
Nuclear physics	Students give a simple description of the structure of an atom in terms of protons, neutrons and electrons. They identify the number of protons in an atom from the nuclide notation. Students identify sources of background radiation. They know the three types of radiation: α-particles, β-particles and γ-radiation. They may be able to identify the type of radiation from its properties.	Students calculate the number of neutrons in the nucleus of an atom. They explain that isotopes of an element have different numbers of neutrons in the nucleus of the atom. Students explain the term background radiation. They identify alpha, beta and gamma emissions from their relative ionising effects and penetrating abilities. With simple data, not involving background radiation, they can calculate the half-life of a radioactive sample.	Students use information about the scattering of α-particles to describe the structure of an atom. They describe the processes of nuclear fission and nuclear fusion in terms of the splitting or joining of nuclei. Students describe the deflection of α-particles, β-particles and γ-radiation in electric and magnetic fields. They may be able to calculate the half-life of a radioactive sample with data which includes background radiation. They use information about radiation type and half-life to choose suitable sources for different applications.

Area of knowledge, understanding and skills	Typical performance at grade F	Typical performance at grade C	Typical performance at grade A
Space physics	Students know that the Solar System includes the Sun and eight named planets. They describe the planets nearest the Sun as rocky and small and the planets furthest from the Sun as gaseous and large. Students know that the Sun is the most massive object in the Solar System. They know that the gravitational attraction of the Sun keeps the planets in orbit. Students state that the Milky Way is one of many billions of galaxies. They know that the Solar System is in the Milky Way. They may recall the approximate size of the Milky Way	Students know that the Earth rotates on a tilted axis once in approximately 24 hours. They may recall the order of the eight named planets in the Solar System. Students know that there are other objects in the Solar System: asteroids, dwarf planets and comets. Students know that one light-year is the distance travelled by light through space in one year. Students use the term redshifted to describe how light from distant galaxies appears different to an observer on the Earth from light emitted on the Earth. They recall some of the stages in the life cycle of a star	Students recall $v = 2\pi r / T$. They use this to calculate orbital speed, radius of orbit or orbital period from given information. They distinguish between objects in the Solar System that have elliptical orbits and those whose orbits are approximately circular. Students know that the Sun's gravitational field strength decreases as distance from the Sun increases. Students partially explain why objects in an elliptical orbit travel faster when closer to the Sun and vice versa. Students explain that light is redshifted because distant galaxies are moving away from the Earth. Students recall $H_0 = v / d$. They use this to find either the distance or recession speed of a distant galaxy. They can partially explain stages in the life cycle of a star.
Experimental skills and investigations	Students take experimental measurements using simple measuring instruments. They suggest how to ensure that an accurate reading is taken, for example by avoiding parallax errors. Students complete the column headings of a simple table. They record measurements in the table. They perform simple calculations given the formula required.	Students read instruments to the required accuracy. They take experimental measurements from analogue and digital instruments. Students complete column headings of a table with both the variable name and unit of measurement. They record measurements to a suitable number of significant figures.	Students identify appropriate measuring instruments to use in a range of experimental contexts. They state precautions and begin to explain why a particular precaution ensures an accurate measurement is taken. Students use data in tables to draw graphs, labelling axes with quantity and unit and plotting points accurately. They draw appropriate best-fit lines or curves given the data.

Area of knowledge, understanding and skills	Typical performance at grade F	Typical performance at grade C	Typical performance at grade A
	They plot data onto a graph and interrogate a simple graph, for example to find maximum speed on a speed–time graph. Students begin to plan an investigation into the relationship between two variables. They partially describe the method for the investigation. They may identify one variable to control.	They draw simple graphs and identify a best-fit straight line from the data plotted. They find the gradient of a best-fit line. Students plan an investigation into the relationship between two variables. They describe a simple method and identify some measurements that need to be taken. They construct a table for the results.	They find the gradient of a curve at a particular point by drawing a tangent to the curve at that point. Students produce a coherent plan for an investigation. They describe the method and identify variables to control. They suggest how to analyse results and make conclusions about the investigation.