Unit 3: Principles and Applications of Physics

Unit overview

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| Unit 3: Principles and Applications of Physics | |
| **Assessment type: External** | |
| **Content Area** | **Topics** |
| A: Understanding waves and optical fibres | A1 Working with waves  A2 Principles of optical fibres  A3 Uses of electromagnetic waves in communication |
| B: Forces in transportation and Newtons Laws of Motion | B1 Measurement and representation of motion  B2 Laws of motion |
| C: Electrical circuits and the transfer of energy | C1 Use of electrical components  C2 Equations  C3 Electrical energy usage  C4 Energy transfer  C5 Change of state |
| Assessment overview  The unit will be assessed through one examination of 50 marks lasting 1 hour. The paper will include a range of question types, including multiple choice, calculations, short answer and extended open response. These question types will assess knowledge and understanding of the content in this unit. Students will need to explore and relate to contexts and data presented. The assessment availability is twice a year in January and May/ June.  The first assessment availability is May/June 2026.  Sample assessment materials will be available to help centres prepare students for assessment. | |

Common student misconceptions

Below are some common misconceptions related to the content of this unit by students and ideas for how you can help your learners to avoid and overcome these.

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| What is the misconception? | How to help learners overcome it |
| How waves travel. | Best shown using a slinky so that students can see both types of waves. Transverse - the particles cross the wave. Longitudinal - the particles go along with the wave |
| Heavier objects fall faster than lighter objects | All objects would fall at the same rate if there was no air resistance (vacuum) it is the effect of air resistance on an object which effects its rate of fall |

Learning Activities and Resources

This section offers a starting point for delivering the unit by outlining a logical sequence through the unit topics and suggesting practical activities and teacher guidance for covering the main areas of content during guided learning time. Transferable skills are integrated into various activities, with those embedded in a unit indicated by an acronym in square brackets. The acronym combines the letters from the broad skill area and the specific transferable skill, e.g., **[IS-WC]**.

Please note that the activities provided below are suggestions and not mandatory.

| Learning Topic | Activities and guidance for unit content delivery | Resources |
| --- | --- | --- |

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| A: Understanding waves and optical fibres | | |
| A1 Working with Waves | * Whole class teaching and learning – Investigating waves * Use a ‘slinky’ (very long spring) to demonstrate transverse and longitudinal waves and introduce the terms wavelength, amplitude, frequency and wave speed. * **Individual Activity** – Wave simulation software * Introduce students to wave simulation software that allows them to create and modify different types of waves. * Ask students to adjust parameters such as amplitude, frequency, and wavelength. * Encourage students to experiment with both transverse and longitudinal waves and analyse the relationship between the vibration direction and wave propagation. * Small group activity – terms used to describe waves * Students work in pairs to discuss and write their ideas about the meanings of the following wave terms wavelength, amplitude, frequency, and wave speed. * Ask students to use everyday examples to help explain these terms (e.g., frequency could relate to beats in music). * Each pair combine with another pair to form a small group. * Students share their definitions and compare ideas. * As a group, students agree on a definition for each term to share with the rest of the class. * Whole class discussion to confirm meaning of wave terms and introduce the equation v= f x λ * In pairs, students use graphical and diagrammatic representations to illustrate their understanding of these terms e.g. sketch a wave and label wavelength, amplitude, crest, and trough, show how frequency relates to the number of waves per second. * Individual Activity – use of wave equation * Students’ complete worksheet using wave equation * Whole class teaching and learning- terms used to describe superposition of waves * Show diffraction and the idea of superposition of waves and introduce the terms coherence, phase difference and path difference as applied to diffraction gratings * Small group activity – coherence phase and path difference * Students work in pairs to discuss and write their ideas and draw diagrams to illustrate superposition (constructive and destructive interference) coherence phase difference and path difference. * Student pairs combine to form small groups and share ideas and definitions. * Whole class come together to agree meanings of terms discussed * Practical activity- using diffraction gratings * Give students access to diffraction gratings with different numbers of lines to look at the emissions from different lamps i.e. fluorescent lamp, LED, sodium lamp. * Do not use a mercury lamp as this produces some ultraviolet light. * Students describe the differences seen. * Whole class teaching and learning- producing line spectra * Show line spectrum produced from laser light passing through a diffraction grating. * Review the structure of an atom and explain the emission of light of different frequencies for specific elements to give the line spectra. * Explain that the lines produced for each element are unique and allows each element to be identified. * Pair activity – observing stars * Discuss how scientists are able to identify the elements that are in stars by looking at the light from stars. Write in about five lines the main points of the process * Whole class teaching and learning-Stationary/standing waves * Show stationary waves using Melde’s apparatus and a resonance tube. * Discussion with students on the application of stationary waves to various string and wind instruments and the speed of the wave on a string is given by v =√(T/µ) * Individual activity * Each student selects an instrument and makes a short presentation explain how musical notes are produced and changed. | Long slinky to extend across classroom/laboratory or down a corridor  <https://www.youtube.com/watch?v=RLOSR7IoW1k>  The Physics Classroom – information to support teachers delivering physics content with wave simulator software  [Physics Simulation: Simple Wave Simulator](https://www.physicsclassroom.com/Physics-Interactives/Waves-and-Sound/Simple-Wave-Simulator/Simple-Wave-Simulator-Interactive)  <https://www.physicsclassroom.com/Physics-Interactives/Waves-and-Sound/Simple-Wave-simulator/Simple-Wave-Simulator-Interactive>  <https://www.physicsclassroom.com/Physics-Video-Tutorial/Vibrations-and-Waves/Frequency-versus-Period/Video>  Wave equation with examples of use  <https://www.youtube.com/watch?v=o-703NmGH4A>  <https://www.tes.com/teaching-resource/gcse-physics-wave-speed-equation-practice-wavespeed-equals-frequency-x-wavelength-11442908> (TES account required to access)  <https://www.physicsclassroom.com/class/waves/Lesson-2/The-Wave-Equation>  <https://www.youtube.com/watch?v=-mIO9jqJyyI>  <https://www.savemyexams.com/a-level/physics/ocr/17/revision-notes/4-electrons-waves-and-photons/4-9-superposition-and-stationary-waves/4-9-3-interference/>  Images of spectra  <https://hubblesite.org/contents/media/images/4511-Image.html?Tag=Astronomy%20Basics>  Diffraction gratings and spectra  <https://www.youtube.com/watch?v=jnxXtbCJ2pE>  <https://www.youtube.com/watch?v=N5tMwHYXT_s>  Melde’s apparatus  <https://www.youtube.com/watch?v=Zk5_en0qgOU>  Resonance tube  <https://www.youtube.com/watch?v=u7wUvEA1v1A>  Stationary waves  <https://www.youtube.com/watch?v=1Oeiq6_McYE>  <https://www.youtube.com/watch?v=vDwXXpE-Ju4>  Resonance and musical instruments  <https://www.physicsclassroom.com/class/sound/u11l5a.cfm> |
| A2 Principles of optical fibres | * Whole class teaching and learning- refraction * Show some everyday examples of refraction. Discuss with students what happens to light when it is refracted. * Introduce the equation to find the refractive index n=sini /sinr * Pair Activity * Students work in pairs to discuss the effects of refraction and describe refraction and complete calculations * The pairs come together and agree how to describe refraction and check calculations * The whole class then decide on a description of refraction * Practical activity – refractive index * Students work in pairs to find the refractive index of glass using a glass block n=sinI/sinr * **Whole class activity** – refractive index * An average of all results obtained is calculated and compared with the accepted value of refractive index. Students discuss possible errors and suggest ways to improve accuracy of results * Whole glass teaching and learning- total internal reflection * Show example of total internal reflection and how it occurs. Introduce the equation sinc =1/n      * Practical activity – critical angle * Students use a semi-circular glass block to determine the critical angle for glass and hence the refractive index * Individual activity * Students complete work sheet and in then pairs compare answers and discuss any problems.      * Whole class teaching and learning-optical fibres * Discuss with students how light waves travel along optical fibres by total internal reflection, how the addition of cladding effects the critical angle and reduces energy losses and the differences between analogue and digital signals * Students work in pairs – optical fibres * Discuss the conditions required for light to be transmitted through optical fibres. Pairs come together to discuss and agree the conditions. The ideas are then agreed by the class. * Small group activity – optical fibres * Each group researches a use of optical fires and puts together a 2-minute presentation for the rest of the class. | Examples of refraction  <https://www.youtube.com/watch?v>  =jQDRNb-E-cY  <https://www.physicsclassroom.com/class>  /refrn/Lesson-1/The-Direction-of-Bending  Calculations  <https://www.tes.com/teaching-resource/gcse-igcse-refraction-questions-and-answers-12764457> (TES account required to access)  Ray box, glass or perspex blocks, protractors, calculators  <https://www.youtube.com/watch?v=ADN9Rph96NE>  Refraction, total internal reflection and fibre optics  <https://www.youtube.com/watch?v=gHgXrKZL_Yg>  Ray box, semi-circular glass blocks, protractor  <https://www.youtube.com/watch?v=NAaHPRsveJk>  <https://apps.asdk12>.org/staff/souza\_david/HOMEWORK/  259888\_CriticalAngleWorksheet.pdf  Optical fibres and cladding  <https://www.youtube.com/watch?v=Zeo3UOk7_vA>  <https://www.youtube.com/watch?v=4puLmP46W4U>  Analogue and digital signals  <https://www.youtube.com/watch?v=cmwt0U9ylYA> |
| A3 Uses of electromagnetic waves in communication | * Whole class teaching and Learning- Electromagnetic spectrum * Show the whole electromagnetic spectrum ask students to give uses for all parts from previous knowledge and remind them that all the waves are transverse and travel at the speed of light in a vacuum. * Discuss how the intensity of a wave decreases the further it is from the source. Introduce the equation I = k/r2 * Practical Activity – light intensity * Students use light (lux) meters and measure intensity of a light source at different distances from the source. * Calculate Ix r2 of plot I against 1/r2 * Students should find that k is not a constant and they do not get a straight line for I against 1/r2 and then explain why the results from this experiment do not fit the equation. * Individual activity – light intensity * Explain why the equation can be applied to light from a star and microwave signals from a transmitter mast. * Work through calculations using I=k/r2 and comparison of intensities given at the end of intensity video * Whole class teaching and learning- waves used for communication * Discussion of the waves in the electromagnetic spectrum used for communication, radio waves, microwaves and light waves related to frequency ranges and uses. * Small Group activity – communication systems * Each group researches the uses, advantages and differences of a given communications system, makes a short presentation and produces notes of the main features for the rest of the class. * Whole class teaching a learning * The main points are summarised and discussed by students and any points missed are given attention. | Electromagnetic spectrum  <https://www.youtube.com/watch?v=cfXzwh3KadE>  intensity experiment  <https://www.youtube.com/watch?v=US-cdZNAEhg>  Light source, light meters (light meter app ) metre rule  Intensity Video  <https://www.youtube.com/watch?v=US-cdZNAEhg>  Uses of radio waves  <https://www.vedantu.com/physics/electromagnetic-spectrum-radio-waves> |
| B: Forces in transportation and Newtons Laws of Motion | | |
| B1 Measurement and representation of motion | * Whole class teaching and teaching and individual activities -symbols units and speed * Discuss with students the difference between scalars and vectors show discuss the symbols and units used for the quantities used to describe motion the symbols and introduce the equation speed = distance/time * Students watch the videos on scalars and vectors and speed and units and make notes * Pair activity – speed calculation * Each pair prepares a calculation on speed = distance/time and gives it to the rest of the class to complete and check the answer * Individual activity – speed calculation * Use the worksheet complete calculations then check your answers * Whole class teaching and individual activities-distance-time and velocity-time graphs * Introduce the use of graphs to show the motion of objects and to calculate velocity, acceleration and the distance travelled as the area under the velocity -time graph Introduce the equation to find acceleration a= (v-u)/t * Individual activity – velocity times graphs. * Work through the examples shown on the videos and try to complete the worked example before looking at the working * Pairs activity * Discuss the calculations in pairs and check you understand the principles and equations used. * Practical activity - acceleration. * Work in pairs. * Measure the acceleration of a trolley down a ramp using a ramp light gates a ruler and a stop clock. * Repeat results and obtain an average value for acceleration. * Whole class and individual activity – equations of motion * Introduce the equations of motion and show some calculations using these equations * Individual activity * Complete the examples and check how the answers are obtained. * Pair activity – symbols used in equations * Check with your partner that you know the meaning of the symbols used in the equations and how you would find which equation to use for a calculation * Small group - device uses * Each group complete research and make a 5min presentation (PowerPoint if possible) to describe and explain the uses of accelerometers in one of the following ,’fitbits’ mobile phones , blood pressure monitors or any other relevant device. The group will select a leader, responsible for completing the presentation and allocating roles to other members of the group. * Notes from each presentation will be distributed to all the other groups in the class | Speed and units  <https://www.youtube.com/watch?v=EGqpLug-sDk>  Scalars and vectors  <https://www.youtube.com/watch?v=iLB_4Wu2QOg>  Worksheet  <https://www.youtube.com/watch?v=icRY0h9Qgk8>  Velocity from a distance-time graph  <https://www.youtube.com/watch?v=nDfolhABLH8>  Velocity time graphs  <https://www.youtube.com/watch?v=b0VKlpetP9A>  <https://www.tes.com/teaching-resource/velocity-time-graphs-11882633> (TES account required to access)  <https://www.tes.com/teaching-resource/velocity-time-graph-worksheet-and-answers-11325549> (TES account required to access)  Worked example  <https://www.youtube.com/watch?v=knHo4qjBeIM>  Using a=(v-u)/t  <https://www.youtube.com/watch?v=WvWgDfUN0Eo>  Measuring acceleration of a trolley down a slope  <https://www.youtube.com/watch?v=YUqwdD73610>  Equations of motion  <https://www.youtube.com/watch?v=WJN_F3PYp58>  <https://www.schoolphysics.co.uk/age14-16/Mechanics/Motion/text/Equations_of_motion/index.html>  Examples on the equations of motion  <https://www.ncl.ac.uk/webtemplate/ask-assets/external/maths-resources/mechanics/kinematics/equations-of-motion.html>  <https://www.tes.com/teaching-resource/equations-of-motion-sheet-for-a-level-physics-12114386> (TES account required to access) |
| B2 Laws of Motion | * Whole class and individual activity- Newton’s First Law. * Introduce the First Law of Motion, mass, inertia and weight. * Discuss these concepts with students. * Students work in pairs to formulate these ideas, decide on meanings and discuss their ideas with other pairs and eventually the whole class. * Students work individually on the questions and calculations at the end of the video on weight and then check understanding with a partner * Whole class teaching and learning- coefficient of friction µ * Introduce that friction always opposes motion and the equation F =µR * Students learn how to carry out the experiment to determine a coefficient of friction from the video. * Practical Activity – Kinetic * Students work in pairs use a flat surface with a wooden block which can be just made to move by attaching it to a string which runs over a pulley and has a weight holder attached. * Students take readings of F and R and calculate µ. Students now measure the force needed to keep the block moving at a constant velocity and find the coefficient of kinetic friction. * Pair activity – Practical evaluation * Students discuss in pairs what they have found out from the experiments or videos and give three important conclusions * Conclusions about the importance of friction and kinetic friction are then discussed and clarified by the teacher and class * Whole class teaching and learning- momentum, change in momentum and Newtons second law * Introduce the idea of momentum p = m x v momentum changing causing a force and the equation F=ma * Students work in pairs to discuss and write their ideas about the meanings of the following wave terms momentum, resultant force, acceleration * Ask students to use everyday examples to help explain these terms (e.g., bending your knees when you land from a using crash mats * Each pair combine with another pair to form a small group. * Students share their definitions and compare ideas. * As a group, students agree on a definition for each term to share with the rest of the class. * Whole class discussion to confirm understanding of importance of rate of change of momentum * Group activity - momentum. * Students discuss the relevance of momentum and Newtons second law to different ways of transporting goods (e.g. barges, tankers heavy lorries, vans, trains aeroplanes.) and produce a list of advantages and disadvantages of each type of transport which is shared with the class * Group activity – impact controls * Each group is allocated one of the impact controls which are used to reduce the severity of injuries when those in cars or on motorcycles are involved in accidents. * Each student works individually to research their topic. * The group then discusses what they have found out and decides on how their impact control reduces injuries. The group then selects a leader to present their findings to the rest of the class. * Whole Class and individual activity- Newton’s 3rd Law * Introduce Newtons Third Law and discuss this with students * Pair activity – action and reaction * Students discuss the everyday effects of action and reaction and give their own examples * Whole class and individual activity -air resistance and drag * Summarise the laws of motion and consider terminal velocity and note air resistance and drag are forms of friction * Group activity- air resistance practical * Each group to devise an investigation to show the effect of air resistance or drag and demonstrate it to the rest of the class | Newton’s First Law  <https://www.youtube.com/watch?v=_W3VbonFNcw>  Inertia and mass  <https://www.youtube.com/watch?v=1XSyyjcEHo0>  Weight and gravity, W=m x g  <https://www.youtube.com/watch?v=84fxHsh8Cmc>  <https://www.tes.com/teaching-resource/weight-mass-and-gravity-worksheet-12406430> (TES account required to access)  F=µR and experiment to determine coefficient of static friction  <https://www.youtube.com/watch?v=mN3eSpLZ_UU>  Static and kinetic friction  <https://www.youtube.com/watch?v=wY4va73SUIo>  Momentum  <https://www.youtube.com/watch?v=ZtQhlwPxE28>  Newton’s second law of Motion  <https://www.youtube.com/watch?v=SqdCCxv9YzI>  <https://www.physicsclassroom.com/Physics-Video-Tutorial/Newtons-Laws/Newtons-Second-Law/Video>  Using momentum to explain safety features  <https://www.youtube.com/watch?v=xRjRyVfiE9M>  Calculations on F=m x a  <http://www.dynamicscience.com>.  au/tester/solutions1/flight/velocity/force.htm  <https://www.tes.com/teaching-resource/newton-s-second-law-f-equals-ma-differentiated-worksheet-12114288> (TES account required to access)    Parachute falling  <https://www.youtube.com/watch?v=ElpqPZd1RJU>  Terminal velocity  <https://www.bbc.co.uk/bitesize/guides/zgv797h/revision/1>  Air resistance  <https://www.youtube.com/watch?v=v8DvquMXq8M>  Objects falling through liquids  <https://www.youtube.com/watch?v=BWlEpMgaSYM>  Newton’s third law of motion  <https://www.youtube.com/watch?v=wANmggaC9pY>  https://www.youtube.com/watch?v=eU3ULRgS8Vk |
| C: Electrical circuits and the transfer of energy | | |
| C1 Use of electrical components | * Whole class and individual learning- electrical circuitry, units and measurements * Introduce electrical quantities, symbols and measurements, and discuss with students their previous knowledge. * Demonstrate or use a video to show how circuits are set up and the positions of ammeter and voltmeter and how resistance is measured directly using a multimeter. * Pair activity – electrical symbols. * Students test each other’s knowledge of the electrical symbols and discuss the meanings of electrical quantities and their units and the positioning of ammeters and voltmeters in circuits. * Pairs come together to confirm the correct description of quantities and units and produce a table for students notes. * Practical activity – resistance * Students measure the resistance of various resistors in series and parallel to see how resistance can be changed. * Whole Class and individual activity- using electrical components * Introduce the components that students will use in circuits, thermistors, diodes, filament lamps, light dependent resistors (LDR) and light emitting diodes (LED) and discuss with students the action of these components and how the resistance of the components can be changed under different conditions. * Practical activity – electrical components * Students working in pairs are allocated a component to investigate and collect results which are shared with the rest of the class | Circuit symbols  <https://www.youtube.com/watch?v=YoGkLiF-UCE>  Electrical terms, units and circuits  <https://www.bbc.co.uk/bitesize/articles/zjm8kty#zvk22v4>  Measuring current and voltage and Ohms Law <https://www.bbc.co.uk/bitesize/guides/zcqq7yc/revision/5>  Using an ohmmeter (multimeter) to measure resistance <https://www.youtube.com/watch?v=hfj1A9T6OlA>  Thermistor <https://www.youtube.com/watch?v=2xr1O8CZdPQ>  Filament lamp <https://www.youtube.com/watch?v=fTy63edg5d8>  Diode  <https://www.youtube.com/watch?v=Yb3e6HbmnUA>  <https://www.youtube.com/watch?v=KaI1S1uQj1M>  Light dependent resistor and thermistor <https://www.youtube.com/watch?v=p8jzrHZq6VY>  LED  <https://www.youtube.com/watch?v=Hl4v1aUFWrs> |
| C2 Equations | * Whole class and individual activity- equations * Introduce the equations for power, energy and Ohm’s Law with their symbols and units. * Discuss with students a way of setting out calculations * Students work through some examples using these equations and discuss any difficulties * The teacher and class discuss the difficulties that have been identified and provide any assistance needed. * Individual activity - calculations * Students now attempt a few more calculations and check their answers | P=I x V  <https://www.tes.com/teaching-resource/power-current-and-resistance-practice-questions-11789984> (TES account required to access)  V= I x R Ohms Law  <https://www.tes.com/teaching-resource/differentiated-ohms-law-work-sheets-v-equals-i-x-r-ks4-11462050> (TES account required to access)  Power =work done /time  <https://www.tes.com/teaching-resource/aqa-1-9-power-energy-transferred-work-done-calculations-11503702> (TES account required to access)  <https://www.tes.com/teaching-resource/power-work-energy-time-6192894> (TES account required to access) |
| C3 Electrical energy usage | * Whole class and individual activity * Discuss with students’ energy use by domestic appliances and the use of which appliances add the greatest cost to the house hold energy bill * Students use the comparison of energy usage table to estimate their own usage of energy each day. * Students make a list of how they could reduce their own energy usage do some calculations and compare their list with the lists of other pairs. * The whole class discuss energy savings and decide on the most significant changes that are needed to save energy * Whole class an individual activity-fuses * Discuss with student the use of fuses in domestic appliances as a safety device * **Pair activity** * Ask students to find out the power of different domestic appliances and calculate the fuse rating for the device and explain their choice of fuse. * Compare the answers from different pairs to check understanding. | Energy use by appliances  <https://www.youtube.com/watch?v=lmQ6QvZPtj0>  Comparison of energy used by appliances  <https://www.nea.org.uk/get-help/resources/home-appliances-that-use-the-most-electricity/?gad_source=1&gclid=Cj0KCQiApNW6BhD5ARIsAC>  Calculations of energy use  <https://www.tes.com/teaching-resource/gcse-physics-worksheet-electrical-energy-costs-calculations-kwh-w-solutions-12983551>  Fuse rating for domestic appliances  <https://www.youtube.com/watch?v=SfRyJjU9pb8> |
| C4 Energy Transfer | * Whole class and individual activity- specific heat capacity * Introduce the idea that energy has to be supplied to a substance to change its temperature and introduce the equation   ΔQ =m xc x ΔT   * Students discuss and develop a meaning of specific heat capacity * Practical activity – specific heat capacity * Working in pairs students measure either the specific heat capacity of water or aluminium. * The results obtained are shared with the class and compared with the accepted values. * Class discussion of how results compare and suggestions for improvements to experimental method * Individual activity – specific heat capacity * Student’s complete calculations on specific heat capacity and check answers * Whole class and individual activity- specific latent heat * Introduce the idea that heat transfer can also produce a change in state without a change in temperature and the use of the equation ΔQ = m x L * Students develop their ideas about the meaning of specific latent heat of fusion and vaporisation * Students complete some calculations and check the answers * Practical activity – specific latent heat * Students work in pairs to measure specific latent heat of fusion or vaporisation and compare results with the accepted * Whole class discussion of possible errors and improvements | Celsius to Kelvin  <https://www.youtube.com/watch?v=c0_7QmAZPl4>  description of measuring specific heat capacity  <https://www.youtube.com/watch?v=TqJFIBODrjM>  <https://www.youtube.com/watch?v=HAPmwu7byGM>  Experiment to measure specific heat capacity  <https://www.bbc.co.uk/bitesize/guides/zpjpgdm/revision/7>  <https://www.youtube.com/watch?app=desktop&v=7bucHPbrxkg&t=0s>  <https://www.youtube.com/watch?v=R-OUS5-Lv8I>  Calculations on specific heat capacity  <https://www.tes.com/teaching-resource/specific-heat-capacity-11978694> (TES account required to access)    Specific latent heat of fusion and vaporisation  <https://www.youtube.com/watch?app=desktop&v=8VmkdzRE8sQ>  Experiment to determine specific latent heat of vaporisation of  water  <https://www.youtube.com/watch?v=3zwj3_Eidg8>  Experiment to determine specific latent heat of fusion of water  <https://www.youtube.com/watch?v=Vj9Lo312cME>  Calculations  <https://www.tes.com/teaching-resource/specific-latent-heat-of-fusion-and-vapourisation-12183642> (TES account required to access) |

Delivering signposted transferable skills

Signposted transferable skills are not mandatory for the delivery of the unit, and it is therefore your decision to deliver these skills as a part of the qualification. Below we have provided some ideas of teaching and learning activities that you could use to deliver these skills if you chose to.

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| Transferable skills | Ideas for delivery |
| SP- PS – Problem Solving | * Practical activity – Specific heat capacity * Explain to students the common ‘pitfalls’ in the experiment, and the resultant consequence they could expect. * Discuss ways around these errors and how they could be prevented. * Students may wish to consider * What equipment is available * What time is available * What impact the ‘problem’ would have on results * What solutions may be available   What impact the solutions may have. |

Resources

This section has been created to provide a range of links and resources that are publicly   
available that you might find helpful in supporting your teaching and delivery of this unit in the qualification. We leave it to you, as a professional educator, to decide if any of these resources are right for you and your students, and how best to use them.

Pearson is not responsible for the content of any external internet sites. It is essential that you preview each website before using it to ensure the URL is still accurate, relevant, and appropriate. We’d also suggest that you bookmark useful websites and consider enabling students to access them through the school/college intranet.

### Websites

Crash Course Physics  
Videos on physics topics across the specification  
<https://www.youtube.com/user/crashcourse>

Electricity Explained  
Simulations, animations, and videos to teach electricity and electrical circuit simulations  
<https://www.physicsclassroom.com>

Glenn Research Center - NASA  
Newton’s Laws of Motion application  
<https://www.grc.nasa.gov>

IOPSpark – Institute of Physics  
Learning Hub including experiments, videos, and questions  
https://spark.iop.org

Marks Physics Help – A-Level Resources and Tutoring  
Teaching resources – a variety of teaching resources to assist with the delivery of wave topics  
<https://www.marksphysicshelp.com>

Motion and Forces | High School Physics | Science – Khan Academy  
Quizzes, tutorials, resources, and videos  
<https://www.khanacademy.org/science/physics>

Resources for Teachers – Physics Tutor  
Physics tutor resources for teachers including quizzes, slide decks, and worksheets  
<https://www.physicstutor.com>

The Physics Classroom  
Physics tutorials, videos, resources, and concept checkers  
<https://www.physicsclassroom.com>

### Textbooks

Giancoli, D.C., Physics: Principles with Applications, Pearson 7th Edition, 2015

Halliday, D.P., Resnick, R., The Complete Physics Tutor, Wiley and Sons, 10th Edition, 2013

Serway, R.A., Jewet, J.W., Physics for Scientists and Engineers, Cengage Learning 9th Revised edition 1980

### Pearson paid resources also available

* Pearson Student book
* ActiveBook (a digital version of the Student Book, via ActiveLearn Digital Service)
* Digital Teacher Pack (via ActiveLearn Digital Service)

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