

Assessment Report

On this page

[Level 3 Physics 2020](#) ▾

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Standards [91523](#) [91524](#) [91526](#)

Part A: Commentary

Students who had understood concepts and could make linking statements were more likely to achieve at higher levels.

An emphasis on path difference in association with multiple slit interference would benefit students in their understanding of diffraction gratings, maxima and minima.

Candidates who could draw vector diagrams correctly were at an advantage.

Students continue to have difficulty in understanding electromagnetic induction and often get confused with induced voltage and induced current.

There have also been instances where properties of capacitors and inductors have been mixed up, with students saying inductors store charge which is incorrect.

One of the common slip-ups across all three standards was that there were a number of students who left their calculators in radian mode and hence got incorrect answers when trig functions were involved.

Part B: Report on standards

91523: Demonstrate understanding of wave systems

Candidates who were awarded **Achievement** commonly:

- identified and substituted into correct formula for simple calculations
- could identify harmonics
- recognised that waves reflect at the ends of a pipe
- recognised that constructive interference creates antinodes, and destructive interference creates nodes
- provided generic answers rather than focussing on what the question was specifically asking
- struggled to link descriptions to formula.

Candidates whose work was assessed as **Not Achieved** commonly:

- did not interpret graphs or diagrams correctly
- had poor algebra skills
- did not understand the relationship between frequency and wavelength in $v = f\lambda$
- used beats to describe changes in diffraction or Doppler problems.

Candidates who were awarded **Achievement with Merit** commonly:

- identified key words and values in the questions
- used formulae to support written explanations (including variables that were constant)
- recognised the relationship between location of antinodes and the fundamental frequency on an open pipe
- recognised that an interference pattern has a central maxima.

Candidates who were awarded **Achievement with Excellence** commonly:

- linked ideas together to form a comprehensive answer
- used clear, accurate language and Physics terminology

- linked concepts using formulae
- recognised that the frequency emitted by a source is not the average of the frequency towards the observer and the frequency away from the observer.

Standard specific comments

Calculators should be in degrees and not left in radians.

Understanding multiple slits (EN4) would give candidates a better appreciation of how diffraction grating works, with particular emphasis on path difference, multiple sources and “defined” maxima.

Many candidates did not recognise the central maxima in an interference pattern.

91524: Demonstrate understanding of mechanical systems

Candidates who were awarded **Achievement** commonly:

- used relevant equations in a one-step calculation, when a more complex calculation was required
- used the correct method with incorrect calculation for the angular momentum
- recognised that straightening her body will increase rotational inertia, as rotational inertia depends on mass distribution or straightening her body will mean her mass is further away from the axis of rotation, or recognised that the law of conservation of angular momentum will be involved in a relevant situation.

Candidates whose work was assessed as **Not Achieved** commonly:

- did not draw the force due to gravity and the lift force correctly in both situations
- did not select the appropriate equation to solve a calculation problem
- attempted to calculate the gravitation force using only the radius of the Earth
- used conservation of rotational kinetic energy instead of conservation of angular momentum to explain what effect straightening the body has on the rotational motion
- used irrelevant equations in show questions.

Candidates who were awarded **Achievement with Merit** commonly:

- selected the right formula and used it accurately
- used two concepts to explain the effect on rotational motion in terms of angular velocity and rotational kinetic energy and linked them together
- used linking words in their explanations, showing that one event causes another.

Candidates who were awarded **Achievement with Excellence** commonly:

- were able to perform multi-step calculations to find the radius of the circle that the plane describes using the correct formulae, selected appropriate data from the question, and gave the correct units
- showed clear understanding of the conservation of angular momentum and used links to justify and explain
- showed clear understanding of SHM. Used a reference circle or an equation to calculate the velocity of Serena and the swing.

Standard specific comments

Many candidates were not able to draw the required vectors correctly for Q1a. Vectors require a correct diagram, size and label.

Many candidates displayed significant misconceptions around conservation of energy being applied to rotational kinematics.

Candidates should be able to state the conditions required for oscillation to be considered simple harmonic motion.

Many candidates demonstrated poor algebraic skills when solving for v inside a trigonometric function.

91526: Demonstrate understanding of electrical systems

Candidates who were awarded **Achievement** commonly:

- were able to draw simple diagrams
- knew that there is a changing current and changing flux when there is an inductor in a circuit at the instant a switch is turned on or off

- were able to perform basic calculations only.

Candidates whose work was assessed as **Not Achieved** commonly:

- had little understanding of LCR circuits and resonance
- were unable to use the formula to calculate peak voltage
- thought that inductors became charged and released this charge when the switch was opened
- used the incorrect formula for capacitors in parallel.

Candidates who were awarded **Achievement with Merit** commonly:

- drew correct diagrams where required
- recognised that Kirchhoff's Voltage Law does not apply to an open circuit loop
- provided accurate and precise explanations.

Candidates who were awarded **Achievement with Excellence** commonly:

- performed complex calculations
- provided detailed explanations
- had a good understanding of physics concepts.

Standard specific comments

Many candidates had difficulty understanding electromagnetic induction. Candidates are often confused about induced voltages and induced current.

[Physics subject page](#)

Previous years' reports

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[2018 \(PDF, 137KB\)](#)

[2017 \(PDF, 50KB\)](#)

[2016 \(PDF, 243KB\)](#)

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