



L-Università
ta' Malta

MATSEC
Examinations Board



Examiners' Report

SEC Physics

Main session 2025

Examiners' Report (2025): SEC Physics

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A. STATISTICAL INFORMATION

A total number of 157 private candidates and 3197 school candidates registered for SEC PHYSICS. Private candidates sat for Papers L 1-2-3 and either Paper L 1-2 or L 2-3, while school candidates only sat for one paper, choosing between L 1-2 and L 2-3.

Table 1 shows the distribution of levels for the Main 2025 session of the examination.

LEVEL	No. of candidates
LEVEL 3	1700
LEVEL 2	306
LEVEL 1	52
NA	1296
TOTAL	3354

Table 1: Distribution of Levels

B. GENERAL REMARKS

For school candidates, the assessment consisted of two components: the school-based assessment (SBA), which contributed 30% to the final mark, and a written paper, which carried 70% of the total mark.

Private candidates, who were not engaged in school-based assessment, sat for two written controlled assessments. Paper Level 1–2–3, unique to private candidates and contributing 30% of the overall mark, focused on the same learning outcomes typically addressed in the SBA and tested understanding through practical, application-based questions, including graph work. The second paper, worth 70%, was common with school candidates.

Using the right scientific terminology, handling data confidently, and correctly applying laws and units are key to helping candidates perform adequately.

C. COMMENTS ON PAPER LEVEL 1-2-3, LEVEL 1-2 AND LEVEL 2-3

Paper Level 1-2-3

This paper, which was set for private candidates, consisted of seven questions and carried a total of 100 marks. The mean mark obtained per question, the standard deviation and S.D are listed in Table 5 below. The mean is the average candidate score to a question, computed by adding up all the marks obtained by all candidates, and dividing by the total number of candidates. The standard deviation indicates by how much the candidates' marks differ from the mean value obtained in that question. A low standard deviation means that most of the marks are close to the average. A high standard deviation means that the marks are more spread out.

Question 1

Although some candidates produced graphs of an acceptable standard, many fell short due to issues with scale, plotting accuracy, and general presentation. A good number of candidates correctly identified proportionality based on a straight line passing through the origin. However, none were able to calculate the density from the gradient of the graph. Instead, many opted to derive the solution directly from the formula.

Question 2

This question dealt with falling bodies and the acceleration due to gravity. It was unfortunate that many candidates were unfamiliar with the experiment to determine 'g' using the electromagnet and ball method, resulting in a substantial loss of marks. As in Question 1, not a single candidate mentioned determining 'g' graphically. However, the majority correctly answered the final part of the question, stating that gravity on the Moon is less than that on Earth.

Question 3

This question focused on refraction in glass. Several candidates correctly identified refraction as resulting from a change in the speed of light as it passes from one medium to another. Others, however, referred only to a change in direction—an incomplete explanation that was not always accurate and, in this context, was both irrelevant and not asked for. Once again, only a minority of candidates were able to clearly explain the method involving a rectangular glass block to investigate the angles of incidence and refraction. Additionally, the phenomenon of dispersion and the reasons behind it were poorly understood by many candidates.

Question 4

This question involved investigating the emission of heat from different surfaces. It was encouraging to see that the majority of candidates were quite familiar with this topic and, as a result, achieved good marks. At this point, it is worth highlighting a particular precaution which, judging by its frequent mention, appears to be a favourite among many candidates. The precaution "read at eye level to reduce parallax errors" has seemingly become a default response, offered in nearly every experiment and investigation. However, this is a misconception, as it is not universally applicable. Candidates should be reminded that precautions must be relevant to the specific context of the experiment being conducted.

Question 5

This question focused on current-voltage relationships and Ohm's Law in conductors. Only a small number of candidates were able to accurately draw a circuit diagram and correctly describe the procedure for investigating the current-voltage relationship in a filament lamp. The final part of the question required interpreting various current-voltage graphs, which again proved challenging for many. It is important to emphasize that such graphs should not be memorized by heart. Instead, candidates should be encouraged to reason them out mathematically, particularly by considering the significance of the gradient.

Question 6

This question was about resistance and the factors affecting it. It included a circuit containing a bulb in series with a battery, an ammeter, and a variable length of resistance wire. Several candidates confused the relationships between the length of wire, resistance, and the brightness of the bulb. Many gave conflicting answers and, unfortunately, lost marks as a result. It is also a pity that many were unable to draw the correct circuit symbol for a fuse in the final part of the question.

Question 7

This question was about magnetism. In the first part, many candidates correctly identified the balance reading as being equal to the weight of the magnet shown. However, the attempt to describe how the balance reading changes when a second magnet is introduced was inadequate. The attempt to draw a diagram that included both magnets and to clearly describe the investigation used to determine how the magnetic force varies with the distance between the two magnets was poor.

Paper II Level 1-2

This paper consisted of 12 questions and carried a total of 100 marks. Question 11 was an anchor question, being the same for both paper of Level 1-2 and Level 2-3.

The following table shows the distribution of grades for Paper 1-2.

GRADE	1	2	3	4	5	6	7	8	U	ABS	TOTAL
PAPER 1-2	-	-	-	-	-	6	8	27	63	87	191

Table 2: Distribution of grades for Physics 2025 Main session Paper II Level 1-2

Question 1

Many candidates were able to correctly explain the concept of distance as the total path travelled. However, in part (a), a significant number performed poorly with displacement, often not mentioning that it is the straight-line distance from the starting point to the final position and that it includes direction. In part (b) most candidates correctly identified the segments of the graph where Martina was resting and walking at constant speed, showing a good understanding of interpreting basic features of motion graphs. In part (c) while some candidates calculated the average speed accurately, many omitted the units in their final answers.

Question 2

In part (a) most candidates' attempt to define linear momentum was poor. In part (a) (ii) many candidates' attempt to state the SI unit of momentum was inadequate, with some giving partially correct answers and others confusing momentum with units of force or energy. In part (b) while most candidates correctly carried out the multiplication of mass and velocity, a notable number incorrectly labelled the calculation as moment equals force times distance, confusing momentum with moment. In part (c) most candidates recognized the protective role of the seat belt but explained it simplistically, such as saying it stops you from flying out, and none mentioned the increase in time of impact and the resulting reduction in force.

Question 3

In part (a) most of correct responses selected the appropriate words, demonstrating a basic understanding of how pressure changes with depth, surface area, and quantity of items. In part (b) many candidates attempted the question but incorrectly used the formula pressure equals force divided by area, which applies to solid surfaces rather than liquids, indicating confusion between pressure in liquids and pressure on solids.

Question 4

In part (a) most candidates were able to correctly label the particle diagrams for solid (A) and liquid (B), indicating a strong understanding of how particle arrangements differ between states of matter. In part (b) only a few candidates clearly explained why gases can be compressed while liquids cannot, with many responses not referring to particle spacing and some simply stating that gases can be compressed without providing a molecular explanation. In part (c) a good number of candidates correctly selected “gain” as the appropriate word, demonstrating a reasonable grasp of how energy influences particle movement during phase changes such as evaporation.

Question 5

In part (a) many responses were incorrect. In part (b) some candidates provided appropriate uses for gamma rays, such as treating cancer or sterilizing equipment, but a larger number gave accurate and relevant uses for microwaves, indicating stronger familiarity with more commonly encountered applications such as cooking and mobile communication.

Question 6

In part (a) some candidates answered correctly, showing an understanding that polythene is an insulator and that rubbing it with cloth gives it a negative charge, although a noticeable number struggled with this basic concept. In part (b) a good number of responses did not correctly identify the forces of attraction or repulsion between charged and neutral objects.

Question 7

In part (a) many candidates' attempt to draw a correct model of an atom that clearly showed the nucleus with protons and neutrons, and electrons arranged around it, was poor. In part (b) a significant number of responses did not correctly state the charges of protons, neutrons, and electrons, suggesting confusion between the particles or a lack of memorization of their basic properties. In part (c) while a good number of candidates correctly identified the nucleus as the source of nuclear radiation, none used the word “random” to describe the nature of the process.

Question 8

In part (a) most candidates were able to correctly match Jupiter with planet, the Sun with star, and the Milky Way with galaxy, showing good basic knowledge of different types of celestial bodies. In part (b) the performance of several candidates in naming two instruments used by astronomers to observe celestial bodies, was very poor.

Question 9

In part (a) (i) the attempt to correctly identify u as the object distance was poor. In part (a) (ii) some candidates correctly identified the height of the object from Figure 2, showing partial understanding or stronger observational skills. In part (a) (iii) some candidates successfully marked the image height h_i on the diagram. In part (b) the attempt to mention any application was inadequate, which suggests weak conceptual knowledge of real-life uses of lenses. In part (c) (i) only a few candidates attempted or successfully drew the graph of magnification against object distance. In part (c) (ii) some candidates used the graph or data to estimate the magnification at 35 cm, showing a reasonable ability to interpret graphical information. In part (d) the attempt to explain the rough method to find the focal length of a convex lens, was poor.

Question 10

In part (a) most candidates were able to define thinking distance correctly, indicating a good understanding of the initial phase of the stopping process related to driver perception and reaction. In part (b) while most candidates could identify at least one factor, the attempt to identify both factors affecting thinking distance from the given options was poor. In part (c) most candidates explained braking distance adequately, demonstrating reasonable knowledge of the distance a vehicle travels after the brakes are applied until it comes to a stop. In part (d), most attempts to identify both factors affecting braking distance was inadequate. In part (e) most candidates correctly explained human reaction time. In parts (f) and (g) most candidates did not perform the calculations correctly, indicating difficulty in applying formulas related to motion and energy. In part (h), the attempt to state the law of conservation of energy was poor. In part (i) many responses incorrectly chose gravitational energy when asked about energy transformations during vehicle motion and braking, suggesting confusion about the types of energy involved in this context.

Question 11

In part (a) some candidates answered incorrectly, with many misunderstanding the physical changes in particles such as energy, spacing, and density when cooled. In part (b) the performance of the majority was poor, as many incorrectly associated pressure with coldness rather than recognizing that pressure is caused by moving particles colliding with surfaces. In part (c) (i) the attempt to define radiation was inadequate, suggesting a misunderstanding of how thermal radiation transfers energy via electromagnetic waves, even through a vacuum. In part (c) (ii) a good number of candidates were able to name valid uses of infrared radiation, such as in remote controls or night vision cameras, showing familiarity with practical applications. In part (c) (iii) many correctly identified that dark, matt surfaces increase absorption and emission of radiation compared to shiny surfaces, reflecting a solid understanding of thermal radiation and surface properties. In part (c) (iv) many candidates' attempt to define convection was inadequate, indicating difficulty in understanding how heat causes fluid movement through changes in density, leading to convection currents. In part (d) (i) many candidates' attempt to define conduction was poor, often confusing it with other forms of heat transfer. In part (d) (ii) a good number of responses did not explain why an air gap reduces heat transfer.

Question 12

In part (a) (i) a good number of candidates correctly identified the circuit symbols, showing familiarity with common components. In part (a) (ii) many candidates either omitted the response or drew the circuit incorrectly, indicating a lack of understanding of how a short circuit bypasses a component, especially when illustrated in diagram form. In part (a) (iii) a noticeable number of candidates performed poorly. In part (b) (i) many candidates' attempt to describe a magnetic field effectively was inadequate. In part (b) (ii) most candidates performed poorly, with very few referencing the use of a compass or applying the right-hand rule to determine the magnetic field direction around a straight conductor. In part (b) (iii) many responses included incorrect field patterns, often resembling those around a bar magnet. A significant number did not produce the expected concentric circles. In part (c) (i) many candidates correctly identified Circuit C as a series and Circuit D as a parallel layout. In part (c) (ii) many successfully calculated the total resistance in the series circuit. In part (c) (iii) a substantial number correctly noted that in series circuits current remains the same and voltage is shared, whereas in parallel circuits current is shared and voltage remains the same. In part (c) (iv) many candidates did not draw the voltmeter correctly in parallel, which highlights a recurring misconception that voltmeters can be connected in series.

Paper II Level 2-3

This paper consisted of 12 questions and carried a total of 100 marks. Question 11 was an anchor question, being the same for both paper of Level 1-2 and Level 2-3.

The following table shows the distribution of grades for Paper 2-3.

GRADE	1	2	3	4	5	6	7	8	U	ABS	TOTAL
PAPER 1-2	232	283	346	348	307	190	294	-	940	223	3163

Table 3: Distribution of grades for Physics 2025 Main session Paper II Level 2-3

Question 1

Most of the candidates answered this question well, demonstrating a solid understanding of both the required calculations and the completion of the velocity–time graph provided. Most were able to correctly interpret the data and plot the graph accurately. However, a common error among some candidates was the incorrect use of units for acceleration, with several giving metres per second (m/s) instead of the correct unit, metres per second squared (m/s²).

Question 2

Many candidates stated Newton's law correctly, demonstrating a good understanding of the concept. However, some candidates gave incomplete answers, often omitting key phrases. In part (b), most candidates performed well, showing clear comprehension of the application of the law in a given context and providing accurate responses.

Question 3

In part (a) the performance of most candidates was inadequate. In part (b), candidates who successfully manipulated the formula to obtain the subject obtained full marks for this section of the question.

Question 4

In part (a)(i), most candidates correctly identified copper as a good conductor of heat to the water. In part (a)(ii), however, few candidates obtained the marks allocated, as they were required to provide a specific example of an insulator suitable for use with a solar panel. In part (b), most candidates answered correctly and achieved full marks.

Question 5

Candidates performed poorly in this question, with very few successfully answering part (b). Responses indicate a general lack of understanding of how speed is measured.

Question 6

In part (a) (ii), the performance was inadequate, since the attempt to explain that electrons are transferred from the acetate rod to the cloth, leaving the rod with an overall positive charge was poor. While some candidates correctly noted the movement of electrons, very few clarified that this results in the rod becoming charged. In part (a) (iii) many candidates did not recognize that the person holding the copper rod acts as a ground, allowing any excess charge on the rod to be conducted to the Earth. Finally, in part (b) (ii) responses indicate that candidates often missed the key idea that neutral particles can still be attracted to a charged plate.

Question 7

In part (a) a significant number of responses misinterpreted the question by providing a definition of 'half-life' instead of 'radioactive decay', indicating a fundamental confusion between these two distinct terms. In part (b) responses indicate that many candidates struggled with the calculation of the percentage of substance left, either omitting the answer or demonstrating significant errors in their method, such as incorrect application of the half-life concept or arithmetic mistakes in percentage calculations. In part (c) while responses indicate a basic understanding of the chemical composition changes during the decay process of the given atom, their representation of the nuclear equation was often incorrect. Common errors included incorrect ordering of reactants and products, misuse or omission of the arrow symbol, and inaccurate representation of atomic or mass numbers.

Question 8

Most candidates performed well, demonstrating a solid grasp of the topic through accurate responses and good recall of key information. Responses which were average, often submitted incorrect or incomplete responses.

Question 9

In part (a) most candidates performed well in plotting the graph, demonstrating a clear understanding of how to appropriately present the given data. However, many responses exhibited a lack of understanding regarding the concept of a 'directly proportional relationship'. A common misconception was the conclusion that the speed of sound is directly proportional to temperature, despite the presence of a y-intercept on the graph. Additionally, responses indicate that candidates performed inadequately in linking the increase in the kinetic energy of molecules with the corresponding increase in the speed of sound. In part (b) many candidates provided clearly labelled diagrams and accurate definitions of transverse and longitudinal waves. However, some relied on simplistic and incorrect descriptions such as "up and down" or "to and fro". A good number of candidates also gave appropriate explanations of mechanical waves. In part (c) most candidates correctly calculated the speed of microwaves but were confused about the effect of microwave absorption on the temperature of the ball.

Question 10

In parts (a) and (c), several candidates incorrectly stated the Law of Moments as being that the total upward forces are equal to the total downward forces. In part (b), a good number of candidates described the correct experiment to prove the Law of Moments accurately. Some candidates referred to the correct experimental setup but calculated the positions for equilibrium in advance and then placed the weights at those calculated points to check for balance, without repeating the experiment with varying weights and distances. While most candidates identified the correct measurements to be taken, not all of them explained how these measurements could be used to calculate the moment of each weight and thereby verify the Law of Moments. In part (d) most candidates successfully completed the calculation using the given distance from the end of the beam as the perpendicular distance when calculating the moment. However, most candidates skipped the intermediate step of finding the distance from the pivot and using it to calculate the moment.

Question 11

In part (a) most candidates performed well, with the majority securing full marks. In part (b) many candidates performed poorly, with a common misconception being that air particle movement ceases at low temperatures. Although many demonstrated an understanding of the kinetic theory of gases, the context of

the question involving a freezer compartment appeared to cause confusion. This led many to incorrectly assume that particles stop moving entirely at such temperatures, and as a result, they were unable to explain how the air inside the freezer exerts pressure when the compartment is closed. Responses indicate that performance in part (c) was inadequate, with only a small minority managing to answer all parts correctly. In part (c) (i) many candidates' attempt to provide a proper definition of radiation as the method of heat transfer through gases and a vacuum was poor. In part (c) (iii) several candidates focused on how changing the colour of the oven's interior would affect the baking of biscuits, rather than addressing how different surfaces influence the rates of heat emission and absorption. On the other hand, parts (c) (ii) and (c) (iv) were answered successfully by most candidates. In part (d) candidates generally performed well, showing a solid understanding of conduction as a method of heat transfer and recognising the role of gases as effective insulators in double-glazed windows.

Question 12

On average, candidates found this question to be of moderate difficulty. In part (a), although most pupils were able to apply the formula $V=IR$ with ease, many showed limited understanding when calculating voltages in series and parallel circuits. A significant number incorrectly gave the voltage across resistor R. Additionally, responses indicate that a small percentage of candidates were unfamiliar with the meaning of potential difference in parts (a) (i) and (a) (ii), instead using the formula for power, $P=IV$. In part (b), most candidates performed adequately. In part (c) (i), most responses correctly stated Faraday's Law, but the attempt to apply the concept effectively to explain the behaviour of the galvanometer in context was inadequate.

D. CONCLUDING COMMENTS

This year's performance indicates that many candidates are still struggling to express physics concepts using appropriate technical vocabulary and clear scientific language. There also remains a notable weakness in recalling standard definitions, laws, and SI units, which are fundamental to accurate scientific communication. Furthermore, the limited mathematical ability observed in many responses continues to hinder problem-solving and data interpretation. Candidates must be supported not only in strengthening their conceptual grasp but also in developing the language, mathematical competence, and precision needed to explain ideas in a clear, logical, and scientifically rigorous manner.

Chairperson

Examiners Panel 2025