GrindSpot
ONLINE GRINDS PLATFORM

LEAVING CERT 2027

LEAVING CERT PHYSICS

Exam Ready

Dyslexia friendly
large, clear text · room to write

Higher Level · New course · Workbook A

Built on the new Leaving Cert Physics course and the SEC sample papers, with 9 years of past papers: what comes up, how it's marked, and the practice to nail it.

- **9** years of exam trends, topic by topic
- **61** topic drills with answers
- **1** full practice paper, 300 marks
- ✓ every answer worked out step by step



Know what's coming.
Walk in ready.

Original GrindSpot material written in the style of the Leaving Certificate examination. Not an official SEC paper.

What comes up

2017 to 2026

Every Higher Level question of the **old course**, 2017 to 2026, by topic: a guide to what examiners like to ask. 2020 is left out (calculated grades; only a few sat a deferred exam). 12 questions a year to 2019, 14 from 2021. The table shows the topics still on the course; questions with a part that is no longer examined are counted in the last box below. We counted a topic for a question when at least one of its parts could not be answered without it.

	2017	2018	2019	2021	2022	2023	2024	2025	2026	Years
Circuits and semiconductors	5	3	4	4	5	6	5	6	5	9/9
Light and optics	5	5	6	4	3	3	4	4	3	9/9
Radioactivity and nuclear energy	2	3	3	3	3	2	4	3	2	9/9
Waves, sound and Doppler	3	3	1	3	4	2	3	3	3	9/9
Electrons, photons and atoms	3	2	1	4	2	3	4	2	2	9/9
Gravity and circular motion	2	3	4	3	2	3	2	1	3	9/9
Forces, momentum and pressure	2	3	3	1	2	3	3	3	2	9/9
Heat	2	3	2	3	3	3	2	1	3	9/9
Magnetism and induction	2	3	2	1	3	3	3	2	3	9/9
Work, energy, power and springs	1	3	2	2	1	2	2	1	2	9/9
Electric charge and fields	1	2	1	1	2	2	2	1	2	9/9
Motion and vectors	1	1	1	2	1	2	2	2	2	9/9
Particle physics	1	2	2	1	2	1	1	1	2	9/9

Darker = more questions. Source: State Examinations Commission papers, 2017 to 2026, read and grouped by GrindSpot. Every question we counted is listed at **grindspot.ie/exam-trends**. A guide to what has come up, not a prediction of what will.

Electricity and light lead. Circuits and semiconductors: 43 of the 120 questions; light and optics: 37.

Modern physics every year. Electrons and photons: 23 questions; nuclear physics: 25. Particle physics is now compulsory, not an option.

Experiments are central. Expect the apparatus, the graph and what it shows.

Old course only. 32 of the 120 questions had a part that is no longer examined (capacitors, moments, SHM, Boyle's law...). They are not a row in the table.

TOPIC 1

Motion & forces

Worked answers →

In the real exam

2 to 4 questions a paper on the old course (28 in the 9 papers), 2017 to 2026: new sample papers: paper 1, Q1; paper 2, Q7.



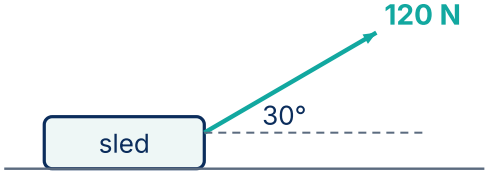
Fionn's tip: Write down *s, u, v, a, t* first and tick the three you know. Resolve forces at an angle into horizontal and vertical parts before you add them.

1. A car on the ring road in Kilkenny speeds up uniformly from 8.0 m s^{-1} to 26 m s^{-1} in 6.0 s. Find its acceleration and the distance it travels in that time.

2. Starting from $v = u + at$ and the fact that the average velocity is $(u + v)/2$ when the acceleration is uniform, derive $s = ut + \frac{1}{2}at^2$.

3.

A rope pulls a sled with a force of 120 N at 30° above the horizontal. Find the horizontal and vertical components of the force.



Question 3 (50 marks)

EIRSAT-1, the first Irish satellite, was built by students at University College Dublin. It orbited about 510 to 530 km above the Earth until it re-entered the atmosphere in September 2025. Take its orbit as a circle 530 km above the Earth's surface, as shown.

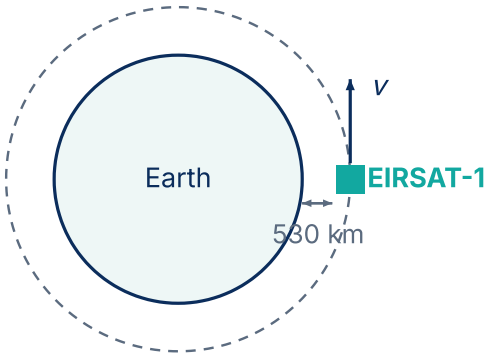


Diagram not to scale

(a) Show that the acceleration due to gravity at the height of the orbit is about 8.4 m s^{-2}.

(b) Explain why the satellite's motion needs a centripetal force, and use the gravitational force to find its orbital speed.

(c) Find its period, in minutes, and the number of orbits it made in a day.

(d) Objects inside a satellite appear weightless, although g is still 8.4 m s^{-2} there. Explain why.

(e) Use Kepler's third law, $T^2 \propto R^3$, and your answer to (c) to find the radius of the orbit of a geostationary satellite (period 24 hours).

(f) Take the frequency of the satellite's radio signal as 437 MHz.

(i) Explain the Doppler effect.

(ii) Take the satellite's velocity towards the ground station in Dublin as 7.6 km s^{-1}. This is an upper limit: only part of the orbital velocity is along the line to the station, so the real value is always a little less. Find the change in the frequency received.

(iii) As the satellite moved away from the station, how did the received frequency compare with 437 MHz? Draw a tick in one box only and justify your answer.

☐ lower ☐ the same ☐ higher

Each part shows the method, the answer and its marks, with GrindSpot's own guide to part marks, point by point (not an official scheme: the SEC has not published one for the new course). As in the SEC physics schemes up to 2026, marks go to key points and correct working; take 1 mark off a point for each arithmetic slip or missing unit.

Question 1 (50 marks)

(a) (i) $1/v = 1/f - 1/u = 1/15 - 1/20 = 1/60$, so $v = 60$ cm.

(ii) Real, inverted, magnified (three times the size) (any two).

(iii) At 1 cm to 5 cm the object is 4 cm from the lens and each F is 3 cm from it. A ray parallel to the axis refracts through F on the far side; a ray through the centre of the lens goes straight on; they cross 12 cm behind the lens, which is 60 cm.

60 cm

10 marks: (i) formula with values **3** · answer with unit **1** · (ii) two properties **2** · (iii) two correct rays **2** · image at 12 cm on the scale **2**

(b) (i) Mean $(0.42 + 0.41 + 0.43 + 0.42)/4 = 0.42$ mm. Uncertainty $0.01/0.42 \times 100 = 2.4\%$.

(ii) The wire may not be the same diameter all along; the mean of several readings reduces random error.

(iii) Accuracy is how close a measurement is to the true value; precision is how close repeated measurements are to each other.

0.42 mm; 2.4%

8 marks: (i) mean **1** · percentage **2** · (ii) reason **2** · (iii) accuracy **1** · precision **2**

(c) (i) Radial lines, evenly spaced, pointing away from the sphere.

(ii) $E = Q/(4\pi\varepsilon_0 d^2) = 8.99 \times 10^9 \times 4.0 \times 10^{-9}/0.15^2 = 1598$ N C^{-1}.

(iii) $F = qE = 1.602 \times 10^{-19} \times 1598 = 2.56 \times 10^{-16}$ N, towards the sphere.

1.60×10^3 N C^{-1}; 2.56×10^{-16} N

8 marks: (i) radial lines, outwards **2** · (ii) formula with values **2** · answer with unit **2** · (iii) force **2**