MA99 EDUCATION

Physics: Practice Paper 1 01

NSW PHYSICS STAGE 6 SYLLABUS 2017 FOR HSC 2027

1. Instructions

Instructions

Three hours of writing time, plus five minutes reading. Sit it in one go. A paper done in pieces over a week measures something you will not be able to do in November. Allowed: a NESA approved calculator, the Physics data sheet, the formulae sheet and the periodic table. Not allowed: your notes, and not this document's solutions. Section I is worth 20 marks and should take about 35 minutes. Section II is worth 80 marks and should take about 145 minutes (2 hours 25 minutes). Mark the paper against the marking guide before reading any worked solution. Most of the learning in a practice paper comes from marking it.

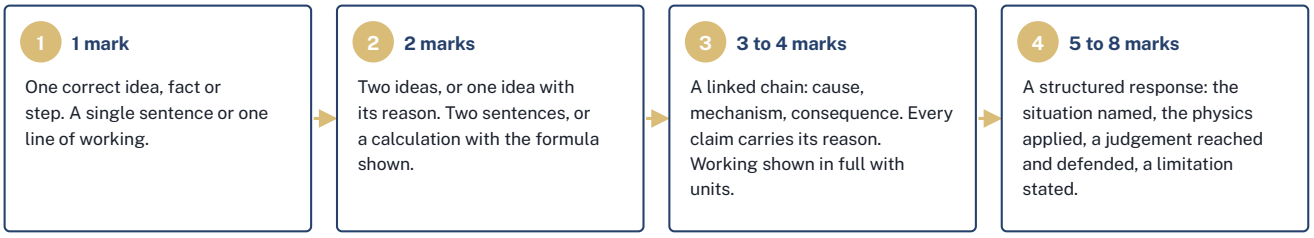


Figure 1 · What each mark value is asking you to produce. Check your answer length against this before you write.

2. Section I · Multiple choice

20 marks. Attempt Questions 1 to 20. Allow about 35 minutes for this section. Circle one answer for each question.

2.1 Section I answer grid

Circle the letter on the question, then copy it here.

Q	1	2	3	4	5	6	7	8	9	10
Q	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**

> Twenty marks in about thirty five minutes, under two minutes each. If one is taking three, guess it, mark it, and come back.

Question 1

1 MARK

A projectile is launched at 25 m/s at 30 degrees above the horizontal from level ground. Its range is closest to

A 55.2 m

B 63.8 m

C 7.97 m

D 21.7 m

Question 2

1 MARK

A projectile is launched at an angle and lands at the same height. At the highest point of its flight, its acceleration is

A zero
B directed horizontally
C 9.8 m/s^2 downward
D 9.8 m/s^2 upward

Question 3

1 MARK

An object moves in a circle of radius 36 m at 12 m/s. Its centripetal acceleration is closest to

A 0.333 m/s^2
B 4 m/s^2
C 144 m/s^2
D 0.25 m/s^2

Question 4

1 MARK

Two balls are released from the same height at the same instant. One is dropped and the other is thrown horizontally. Neglecting air resistance, they

A land at the same time
B land with the thrown ball first
C land with the dropped ball first
D cannot be compared without the masses

Question 5

1 MARK

The radius of a circular orbit is multiplied by 2. The period is multiplied by about

A 1.41
B 2
C 4
D 2.83

Question 6

1 MARK

Two parallel plates 0.02 m apart have a potential difference of 600 V across them. The electric field between them is

A 12 V/m
B 30000 V/m
C 3.33×10^{-5} V/m
D 600 V/m

Question 7

1 MARK

A straight current carrying conductor is placed in a uniform magnetic field. The force on the conductor is zero when the conductor lies

A perpendicular to the field
B parallel to the field
C at 45 degrees to the field
D in any direction, since current produces no force

Question 8

1 MARK

The voltage used to transmit a fixed power along a line is increased by a factor of 2. The power lost in the line is multiplied by

A 2
B one half
C one quarter
D 4

Question 9

1 MARK

Faraday's law states that the magnitude of the induced emf is proportional to the

A magnetic flux through the circuit
B rate of change of magnetic flux
C resistance of the circuit
D current already flowing

Question 10

1 MARK

A flat coil of area 0.02 m^2 sits in a uniform 0.4 T field, with the normal to the coil at 60 degrees to the field. The flux through the coil is closest to

A 0.004 Wb
B 0.008 Wb
C 0.00693 Wb
D 20 Wb

Question 11

1 MARK

A star has a surface temperature of 5800 K. The wavelength at which its continuous spectrum peaks is closest to

A 500 nm
B 1.68×10^{10} nm
C 2.00×10^{15} nm
D 250 nm

Question 12

1 MARK

Newton's particle model and Huygens' wave model made opposite predictions about the speed of light entering a denser medium such as glass. The wave model predicted that the light would travel

A faster than in air
B more slowly than in air
C at the same speed
D only along the surface

Question 13

1 MARK

The energy of a photon of wavelength 480 nm is closest to

A 1.29 eV
B 2.59 eV
C 5.17 eV
D 4.14 eV

Question 14

1 MARK

Maxwell's equations predicted the speed of electromagnetic waves from

A the wavelength of visible light
B two constants measured in electricity and magnetism
C the mass of the electron
D the temperature of the Sun

Question 15

1 MARK

An object travels at 0.6c relative to an observer. The Lorentz factor is closest to

A 1.25
B 0.8
C 1.56
D 1.6

Question 16

1 MARK

After 4 half lives, the fraction of the original nuclei remaining is

A 0.0625
B 0.938
C 0.2
D 0.4

Question 17

1 MARK

The main energy releasing process in a main sequence star of about one solar mass is the fusion of

A helium into carbon
B hydrogen into helium
C carbon into iron
D uranium into lighter fragments

Question 18

1 MARK

In the Bohr model of hydrogen, the magnitude of the energy of the n = 2 level is closest to

A 3.4 eV
B 6.8 eV
C 54.4 eV
D 13.6 eV

Question 19

1 MARK

Hubble's observation that distant galaxies recede faster than near ones supports

A a static universe
B an expanding universe
C a universe with a centre at the Earth
D a universe of fixed size

Question 20

1 MARK

The wavelength of the hydrogen line produced by a transition from n = 3 to n = 2 is closest to

A 547 nm
B 656 nm
C 365 nm
D 820 nm

3. Section II · Short answer, calculation and extended response

80 marks. Attempt Questions 21 to 40. Allow about 145 minutes for this section. Show all working. Answers must include appropriate units and, where relevant, a direction.

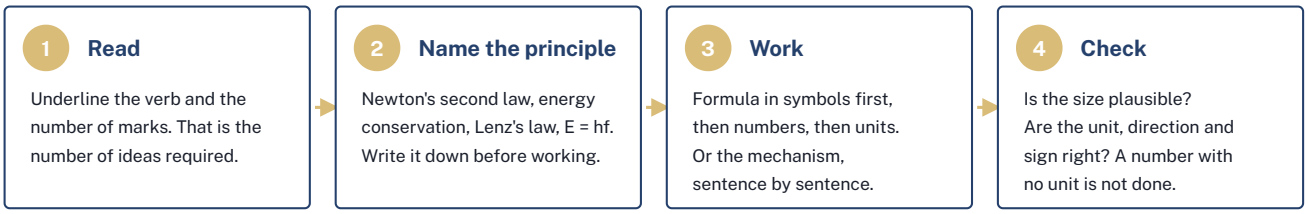


Figure 2 · The same four moves on every Section II item. Read, name the principle, work, then check the answer against the context.

> The extended response items are worth seven marks each. Seven marks is seven separate things said, not one thing said at length.

Question 21

3 MARKS

Calculate the gravitational field strength at a point 400 km above the Earth's surface, and express it as a percentage of its value at the surface. Take the mass of the Earth as 6.0×10^{24} kg and its radius as 6.371×10^{6} m.

Question 22

3 MARKS

At what height above the Earth's surface is the gravitational field strength half of its value at the surface? Take the radius of the Earth as 6.371×10^{6} m.

Question 23

4 MARKS

A test mass is launched from the Wyndarra rail at 20 m/s at 35 degrees above the horizontal from level ground. Calculate the time of flight, the maximum height and the range.

Question 24

3 MARKS

Explain why the horizontal and vertical components of projectile motion can be analysed separately.

Question 25

7 MARKS

A vehicle rounds a curve of fixed radius. Analyse the motion on a flat track and on a banked track, explaining in each case what supplies the centripetal force, and account for why banking raises the maximum safe speed. Support your answer with the relevant relationships.

Question 26

3 MARKS

Two parallel plates 0.02 m apart have a potential difference of 600 V across them. Calculate the electric field strength between them and the magnitude of the force on an electron placed in that field.

Question 27

4 MARKS

A straight conductor of length 0.3 m carries 4 A at 55 degrees to a uniform magnetic field of 0.45 T. Calculate the force on the conductor, and state the maximum force possible and the angle at which it occurs.

Question 28

5 MARKS

A coil of 120 turns and area 0.025 m^2 lies perpendicular to a magnetic field. The field changes uniformly from 0.8 T to 0.2 T in 0.3 s. Calculate the average induced emf and the current if the coil has a resistance of 15 Ω. State, with a reason, the direction of the induced current relative to the original flux.

Question 29

4 MARKS

Describe the purpose of the split ring commutator in a DC motor and explain what would happen without it.

Question 30

4 MARKS

Explain why eddy currents are a problem in a transformer core, and how the design reduces them.

Question 31

3 MARKS

Calculate the energy of a photon of wavelength 500 nm, in joules and in electronvolts.

Question 32

3 MARKS

A photon has an energy of 2.5 eV. Calculate its wavelength in nanometres, and state which region of the electromagnetic spectrum it is in.

Question 33

4 MARKS

Light of wavelength 633 nm passes through two slits 0.2 mm apart onto a screen 3 m away. Calculate the fringe spacing, and state with a reason what happens to it if the slit separation is increased.

Question 34

3 MARKS

Explain what is meant by the relativity of simultaneity.

Question 35

7 MARKS

Assess the extent to which the wave model and the quantum model of light are each required, referring to specific experimental evidence for each and explaining why neither model alone is sufficient.

Question 36

3 MARKS

Calculate the wavelength of the hydrogen spectral line produced by a transition from n = 4 to n = 2, and state which series it belongs to.

Question 37

4 MARKS

Using E n = negative 13.6 / n^2 eV, calculate the energy of the photon emitted when an electron in hydrogen falls from n = 5 to n = 2, and the wavelength of that photon.

Question 38

4 MARKS

Calculate the de Broglie wavelength of an electron travelling at 2.00×10^6 m/s, and explain why the wave nature of an everyday object is never observed.

Question 39

5 MARKS

A lithium 7 nucleus has 3 protons and 4 neutrons and a mass of 1.1648×10^{-26} kg. Take the proton mass as 1.6726×10^{-27} kg and the neutron mass as 1.6749×10^{-27} kg. Calculate the mass defect, the binding energy in MeV and the binding energy per nucleon.

Question 40

4 MARKS

Explain the role of the moderator and the control rods in a fission reactor.

4. Solutions

Section I · Answers and reasoning

Mark Section I first and total it before you look at anything else. The reason each wrong option is wrong is given, because a distractor you chose is worth more to you than the one you did not.

Q	ANSWER	WHY THAT ANSWER, AND WHAT THE OTHER OPTIONS ARE
1	A	R = u^2 sin 2 θ / g. The distractors drop the angle factor, give the maximum height, and stop at the horizontal component of the launch velocity.
2	C	The only force acting is weight, throughout the flight and at every point on it. The vertical velocity is zero at the top; the acceleration is not.
3	B	a = v^2 / r. Option A forgets to square, option C forgets to divide by the radius and option D inverts the expression.
4	A	The vertical motion is independent of the horizontal motion. Both start with zero vertical velocity and fall through the same height under the same acceleration.
5	D	r^3 / T^2 is constant, so T is proportional to r to the power three halves. The distractors take a square root, assume simple proportionality, and square.
6	B	E = V / d. Option A multiplies instead of dividing, option C inverts the expression and option D ignores the separation entirely.
7	B	F = BIl sin θ , and θ is the angle between the conductor and the f ield. Parallel to the f ield, sin θ is zero and so is the force.
8	C	The current falls by a factor of 2, and P = I^{2}R depends on the square, so the loss falls by a factor of 4.
9	B	A steady f lux, however large, induces nothing. It is d Φ /dt that matters, which is why a coil at rest in a strong f ield has no emf across it.
10	A	Φ is the component of the f ield perpendicular to the plane multiplied by the area, so Φ = BA cos θ with θ measured from the normal. The distractors omit the angle, use sine, and divide by the area.
11	A	λ max = b / T. Option B multiplies instead of dividing and option C inverts the expression.
12	B	Refraction toward the normal requires a lower speed on the wave model and a higher speed on the particle model. Measurements of the speed of light in water later supported the wave prediction.
13	B	E = hc / λ , then divide by 1.602 × 10^{-19} to convert to electronvolts.
14	B	The speed came out of the permittivity and permeability of free space, both measured in laboratory experiments that had nothing to do with light. Its agreement with the measured speed of light was the argument that light is an electromagnetic wave.
15	A	γ = 1 / $\sqrt{}$ (1 minus v^2/c^2). One distractor is the reciprocal, which is the factor a length is contracted by rather than the Lorentz factor itself.
16	A	Each half life halves the number remaining, so the fraction is one half raised to the number of half lives. One distractor is the fraction that has decayed rather than the fraction left, and the others divide linearly.
17	B	Main sequence stars of about a solar mass run the proton proton chain, converting hydrogen to helium. Helium burning begins only after the core hydrogen is exhausted.
18	A	E n = negative 13.6 / n^2 eV. The distractors forget the square, multiply instead of dividing, and give the ground state whatever n is.
19	B	A recession speed proportional to distance is what uniform expansion of space produces, and it looks the same from every point, so it implies no centre.
20	B	1 / λ = R(1 / n f^2 minus 1 / n i^2). The distractors come from forgetting to square the level numbers and from using only one of the two terms.

Section II · Worked solutions

Every number below has been recomputed independently of the question that states it. Mark against the allocations in brackets.

QUESTION 21 · MODULE 5 · 3 MARKS

Distance from the centre: r = 6.371 × 10^6 + 4.00 × 10^5 = 6.77 × 10^6 m. [1]

Formula: g = GM / r^2 = (6.67 × 10^{-11} × 6.0 × 10^{24}) / (6.77 × 10^6)^2. [1]

g = 8.73 m/s^2, which is 88.5 per cent of the surface value (9.86 m/s^2, from the same G, M and radius). [1]

QUESTION 22 · MODULE 5 · 3 MARKS

Inverse square law: g is proportional to 1 / r^2, so g is halved when (R / r)^2 = ½. [1]

Distance from the centre: r = R$\sqrt{2}$ = 1.414 × 6.371 × 10^6 = 9.01 × 10^6 m. [1]

Height above the surface: h = r − R = 9.01 × 10^6 − 6.371 × 10^6 = 2.64 × 10^6 m, or about 2640 km. [1]

QUESTION 23 · MODULE 5 · 4 MARKS

Resolve: ux = 20 cos 35 = 16.4 m/s, uy = 20 sin 35 = 11.5 m/s. [1]

Time of flight: T = 2uy / g = 2.34 s. [1]

Maximum height: H = uy^2 / 2g = 6.71 m. [1]

Range: R = ux × T = 38.4 m. [1]

QUESTION 24 · MODULE 5 · 3 MARKS

The only force acting on a projectile, once air resistance is neglected, is its weight, and weight acts vertically. (1) There is therefore no horizontal force, so the horizontal acceleration is zero and the horizontal velocity is constant throughout the flight. (1) The vertical motion has a constant acceleration g and is independent of what the horizontal velocity happens to be. The two components share only the time, which is what links them when a question asks for range. [1]

QUESTION 25 · MODULE 5 · 7 MARKS

A band 6 response makes seven moves.

One. State the requirement. Any object in uniform circular motion needs a net force of magnitude mv^2 / r directed toward the centre. The question in each case is what supplies it. (1) Two. The flat track. The weight acts downward and the normal force upward, and neither has a horizontal component. The only horizontal force available is friction, so friction alone supplies the centripetal force. (1) Three. The limit on the flat track. Friction has a maximum value, so there is a maximum speed at which the corner can be taken. Above it the required force exceeds what friction can supply and the vehicle slides outward. (1) Four. The banked track. The road surface is tilted, so the normal force is no longer vertical. Resolving it, the vertical component N cos θ supports the weight and the horizontal component N sin θ points toward the centre of the curve. (1) Five. The design speed. Dividing the horizontal equation N sin θ = mv^2 / r by the vertical equation N cos θ = mg gives tan θ = v^2/ rg, so v = $\sqrt{}$ (rg tan θ). At this speed the normal force supplies the whole centripetal requirement and no friction is needed. (1) Six. Why the maximum speed is higher. On a banked track friction is not doing the whole job, only making up the difference between the requirement and the horizontal component of the normal force.

The same available friction therefore covers a much larger range of speeds, and the maximum safe speed is correspondingly higher. (1) Seven. Close on the physical statement. Banking works by turning part of the contact force the road must exert anyway into a force pointing where the motion needs it, rather than by increasing the grip available. Note also that the design speed does not depend on mass, so the same bank angle suits every vehicle. [1]

QUESTION 26 · MODULE 6 · 3 MARKS

Field: E = V / d = 600 / 0.02. [1]

E = 30000 V/m, directed from the positive plate to the negative plate. [1]

Force: F = qE = 1.602 × 10^{-19} × 30000 = 4.81 × 10^{-15} N, on an electron directed toward the positive

plate. [1]

QUESTION 27 · MODULE 6 · 4 MARKS

Formula: F = BIl sin θ . [1]

$F = 0.45 \times 4 \times 0.3 \times \sin 55 = 0.442$ N, perpendicular to both the conductor and the field. [2]

The maximum is at 90 degrees, where $\sin\theta = 1$, giving 0.54 N. [1]

QUESTION 28 · MODULE 6 · 5 MARKS

Change in flux per turn: $\Delta\Phi = \Delta B \times A = 0.015$ Wb. [1]

emf = $n\,\Delta\Phi / \Delta t = 120 \times 0.015 / 0.3 = 6$ V. [2]

Current: $I = \text{emf} / R = 0.4$ A. [1]

By Lenz's law the induced current opposes the change. The flux is decreasing, so the induced current flows so as to maintain it, producing a field in the same direction as the original inside the coil. [1]

QUESTION 29 · MODULE 6 · 4 MARKS

The commutator reverses the direction of the current in the coil every half turn. (1) The torque on a current carrying coil in a field reverses as the coil passes through the plane perpendicular to the field. (1) Without the commutator the torque would reverse at that point and push the coil back, so the coil would oscillate about that position rather than rotate. (1) By reversing the current at the same moment, the commutator keeps the torque acting in the same rotational sense, so rotation continues. [1]

QUESTION 30 · MODULE 6 · 4 MARKS

The changing flux in the core induces emfs in the core material itself, and because the core conducts, those emfs drive circulating currents. (1) Those currents dissipate energy as heat in the core, which is energy taken from the primary and not delivered to the secondary. (1) The core is built from thin laminations insulated from one another. (1) The insulation breaks the large conducting loops the eddy currents would otherwise follow, confining them to each thin layer and greatly reducing the heating. [1]

QUESTION 31 · MODULE 7 · 3 MARKS

Formula: $E = hc / \lambda$. [1]

Substitute: $E = (6.626 \times 10^{-34} \times 3.00 \times 10^{8}) / (500 \times 10^{-9}) = 3.98 \times 10^{-19}$ J. [1]

In electronvolts: $3.98 \times 10^{-19} / 1.602 \times 10^{-19} = 2.48$ eV. [1]

QUESTION 32 · MODULE 7 · 3 MARKS

Energy in joules: $E = 2.5 \times 1.602 \times 10^{-19} = 4.01 \times 10^{-19}$ J. [1]

Wavelength: $\lambda = hc / E = (6.626 \times 10^{-34} \times 3.00 \times 10^{8}) / (4.01 \times 10^{-19}) = 4.96 \times 10^{-7}$ m, or 496 nm. [1]

This wavelength is in the visible region (blue-green light). [1]

QUESTION 33 · MODULE 7 · 4 MARKS

Formula: $y = \lambda L / d$. [1]

$y = (633 \times 10^{-9} \times 3) / (0.2 \times 10^{-3}) = 0.00950$ m, or 9.50 mm. [2]

Increasing d decreases y, because the fringe spacing is inversely proportional to the slit separation: the fringes move closer together. [1]

QUESTION 34 · MODULE 7 · 3 MARKS

Two events that occur at the same time but in different places in one inertial frame are not simultaneous in another inertial frame moving relative to the first. (1) This follows from the constancy of the speed of light: an observer moving toward one event and away from the other receives the signals at different times, and correcting for the travel time does not remove the difference. (1) Simultaneity is therefore not absolute but depends on the frame. The one thing all observers do agree on is the order of events connected by cause and effect. [1]

QUESTION 35 · MODULE 7 · 7 MARKS

A band 6 response weighs the evidence rather than listing it.

One. Evidence for the wave model: interference. Young's double slit experiment produces alternating bright and dark fringes, with spacing $y = \lambda L / d$. Dark fringes are places where light added to light gives darkness, which requires superposition of waves with a path difference. (1) Two. Further wave evidence: diffraction and polarisation. A grating gives sharp maxima where $d \sin\theta = m\lambda$, which is a wave condition. Polarisation shows further that the wave is transverse, since only a transverse oscillation has a plane that can be selected. (1) Three. Evidence for the quantum model: the photoelectric

effect. Electrons are emitted only above a threshold frequency, however intense the light and however long it is applied, and their maximum kinetic energy depends on frequency and not on intensity. (1) Four. Why the wave model fails there. A wave delivers energy continuously and spread over the whole wavefront, so given enough time or intensity any frequency should eject electrons, and greater intensity should give them more energy. Both predictions are contradicted by experiment. (1) Five. What the quantum model supplies. Energy arrives in quanta of size E = hf, and one electron absorbs one photon, giving Kmax = hf − φ . This explains the threshold, the frequency dependence and the immediate onset of emission, and intensity then correctly sets only the number of electrons. (1) Six. Why the quantum model alone is not sufficient. A stream of independent particles travelling in straight lines cannot produce interference fringes or the sharp maxima of a grating, and gives no account of polarisation. (1) Seven. The assessment. Each model is supported decisively by evidence the other cannot explain, so neither can be discarded. Light is described by a single quantum theory in which both behaviours are consequences of one description, and the model that is useful depends on the experiment: propagation and interference are handled by the wave picture, emission and absorption by the quantum picture. [1]

QUESTION 36 · MODULE 8 · 3 MARKS

Formula: 1 / λ = R(1 / n f^2 minus 1 / n i^2). [1]

1 / λ = 1.097 × 10^7 × (1/4 minus 1/16) = 2.06 × 10^6 m^{-1}. [1]

λ = 4.86 × 10^{-7} m, or 486 nm. It belongs to the Balmer series (visible) because the transition ends

at n = 2. [1]

QUESTION 37 · MODULE 8 · 4 MARKS

Levels: E_5 = negative 0.544 eV and E_2 = −3.4 eV. [1]

Photon energy: E = 3.4 − 0.544 = 2.86 eV. [1]

In joules: 2.86 × 1.602 × 10^{-19} = 4.58 × 10^{-19} J. [1]

Wavelength: λ = hc / E = 4.34 × 10^{-7} m, or 434 nm. [1]

QUESTION 38 · MODULE 8 · 4 MARKS

Formula: λ = h / mv. [1]

λ = 6.626 × 10^{-34} / (9.109 × 10^{-31} × 2.00 × 10^6) = 3.64 × 10^{-10} m. [2]

For an everyday object the mass is some thirty orders of magnitude larger, so the wavelength is of order 10^{-34} m. No aperture or lattice spacing remotely that small exists, so there is nothing that could diffract it and the wave behaviour cannot be observed. [1]

QUESTION 39 · MODULE 8 · 5 MARKS

Separate nucleons: 3 × 1.6726 × 10^{-27} + 4 × 1.6749 × 10^{-27} = 1.17174 × 10^{-26} kg. [1]

Mass defect: Δ m = 1.17174 × 10^{-26} − 1.1648 × 10 ^{26} = 6.94 × 10^{-29} kg. [1]

Binding energy: E = Δ mc^2 = 6.94 × 10^{-29} × 9.00 × 10^{16} = 6.25 × 10^{-12} J. [1]

In MeV: 6.25 × 10^{-12} / 1.602 × 10^{-19} = 3.90 × 10^7 eV = 39 MeV. [1]

Each nucleon: 39 / 7 = 5.57 MeV, which is consistent with the binding energy curve for a nucleus of this size. [1]

QUESTION 40 · MODULE 8 · 4 MARKS

Fission of uranium 235 is far more probable for slow neutrons than for the fast neutrons released by fission itself. (1) The moderator, commonly water or graphite, slows the neutrons by repeated collisions with light nuclei, which transfer energy efficiently. (1) Control rods are made of a material that absorbs neutrons strongly, such as boron or cadmium. (1) Inserting them removes neutrons from the chain and slows the reaction; withdrawing them speeds it up. The moderator makes the chain possible and the control rods hold it at a steady rate. [1]

Marking guide

Total marks by module, not just overall. A percentage alone shows 68 but not where the other 32 were lost.

MODULE	SECTION I	SECTION II	AVAILABLE	YOUR MARK
Module 5 Advanced Mechanics	**5**	**20**	**25**	
Module 6 Electromagnetism	**5**	**20**	**25**	
Module 7 The Nature of Light	**5**	**20**	**25**	
Module 8 From the Universe to the Atom	**5**	**20**	**25**	
Whole paper	**20**	**80**	**100**	

Then read the band table. It is the raw mark on this paper, not a predicted HSC mark. The value of it is the gap between your modules, which is where your next fortnight of work should go.

> Your lowest module is the next fortnight. Not the one you enjoy.

MA99 RAW MARK GUIDE	RAW MARK	WHAT IT MEANS
Band 6	90 to 100	Working accurately under time. Keep sitting whole papers rather than revising.
Band 5	78 to 89	The physics is there. The marks are in the extended responses and in stating principles before substituting.
Band 4	65 to 77	Calculations are mostly right and the explanations are thin. Work the module with your lowest Section II mark first.
Band 3 or below	Under 65	Core definitions or methods are not yet secure. Rework the Topic Notes and Summary for your lowest module, then redo its Practice Questions before sitting another paper.

Fill one row every time you sit a set. A tracker with three rows in it is worth more than a perfect one you never started, because the pattern you are looking for only shows up across attempts, not inside one.

Practice Paper 1, tracked

Date each attempt, record the section marks separately, and name one change. Section I and Section II fail for different reasons. A single total out of 100 hides which one is costing you. Make one change per paper.

DATE	SECTION I AND SECTION II MARKS	THE ONE CHANGE I AM MAKING

About this resource

MA99 EDUCATION

Scope

NSW Physics, Year 12. Written to the NSW Physics Stage 6 Syllabus (2017), Modules 5 to 8, for students sitting the HSC in 2027. A new Physics syllabus is first examined in HSC 2028. The paper matches the HSC specification in marks, section split, item count and module weighting. Some questions use the Wyndarra site and its instruments, an invented facility, and every worked solution was recomputed from its inputs before printing.

Permitted use

Print it, annotate it and keep it on any device you own, for your own study.

Not permitted

Sharing, posting, selling or redistributing it, in whole or in part. Each copy is licensed to one student.

Copyright MA99 Education.
ma99education.com.au