BOARD OF STUDIES
NEW SOUTH WALES

2010 HSC Physics
Marking Guidelines

Section I, Part A

Question	Answer
1	C
2	D
3	A
4	B
5	D
6	B
7	D
8	C
9	C
10	D
11	D
12	B
13	D
14	C
15	B
16	A
17	D
18	C
19	B
20	B

Section I, Part B

Question 21

Criteria	Marks
• Sketches in general terms TWO consequences of the angle not being optimal and for each, relates it explicitly to the angle	2
• States ONE consequence of the angle not being optimal and relates it explicitly to the angle OR • Identifies TWO consequences, but does not relate them explicitly to the angle	1

Question 22 (a)

Criteria	Marks
• Substitutes correct values into the equation for the uniform horizontal velocity of the projectile	1

Question 22 (b)

Criteria	Marks
• Substitutes the correct values, including +/- to indicate directions, into correct equation, relating initial vertical velocity to the other known variables	2
• Substitutes the magnitudes of the correct variables into correct equation relating initial vertical velocity to the other known variables	1

Question 22 (c)

Criteria	Marks
• Provides sketch showing path with shorter range and lower maximum height	2
• Provides sketch showing path with shorter range or lower maximum height to the angle	1

Question 23 (a)

Criteria	Marks
• Provides ONE or more correct explanations including direction of acceleration	2
• Correctly identifies cause of mass not hanging vertically but gives incorrect direction	1

Question 23 (b)

Criteria	Marks
• Draws a path from the position of the mass on the diagram along the line of the string • Identifies the vertical component of the acceleration • Identifies the horizontal component of the acceleration	3
• Provides any TWO of the above	2
• Provides any ONE of the above	1

Question 24

Criteria	Marks
• States that both the Sun and the Earth exert a gravitational force on the JWST • Reasons that the resultant force is consistent with a greater orbital speed of the JWST than would be the case if the Sun's gravitational force alone were acting on the JWST • Indicates that their analysis is related to Kepler's law of periods	3
• States Kepler's law of periods • Makes a correct deduction about the motion of the JWST	2
• States Kepler's law of periods OR • Makes a correct deduction about the motion of the JWST	1

Question 25 (a)

Criteria	Marks
• States that the momentum of the burnt fuel and the momentum of the rocket must be equal but in opposite directions for total momentum to be conserved OR • Reasons that the change in momentum of the fuel and the rocket is produced by equal and opposite forces acting on the fuel and rocket	2
• States that the momentum of the burnt fuel and the momentum of the rocket are in opposite directions OR • Describes the force pair in opposite directions associated with the fuel and rocket OR • States the law of conservation of momentum	1

Question 25 (b)

Criteria	Marks
• Relates the decrease in mass to an increase in acceleration	2
• Relates a change in mass to acceleration	1

Question 26 (a)

Criteria	Marks
• Correctly relates the rate of flux change, and hence potential difference, to the speed of the falling magnet.	2
• States that the magnet is moving faster at Y than it is at X. OR • States that the rate of flux change is greater at Y than X.	1

Question 26 (b)

Criteria	Marks
• Shows on the graph that compared to the original graph: – the induced potential difference is initially negative, and then positive – the potential difference has a greater magnitude at positions corresponding to X and Y – it takes less time for both the negative and positive changes in potential difference to take place	3
• Correctly shows TWO changes to the graph that result from the described experiment	2
• Correctly shows ONE change to the graph that results from the described experiment	1

Question 27

Criteria	Marks
• States TWO applications of superconductors that are not related to MRI • Provides a point for each application to show how these applications affect society AND/OR the environment • Provide a clear judgement as to the impact on society and the environment of ONE or TWO applications	5–6
• States TWO applications of superconductors that are not related to MRI • Provides a point for each application to show how the applications affect society AND/OR the environment OR • States TWO applications of superconductors that are not related to MRI • Provides a point for ONE application to show how ONE application affects society AND/OR the environment	3–4
• Mentions valid applications but does not discuss their impact on society AND/OR the environment	1–2

Question 28

Criteria	Marks
• States the direction of the field unambiguously and correctly calculates strength	4
• Calculates strength correctly OR • Calculates strength incorrectly by failing to convert kilograms to Newtons AND correctly states the direction of the field	3
• Calculates strength incorrectly by failing to convert kilograms to Newtons	2
• States the direction of the field unambiguously OR • Provides a similar relevant formula	1

Question 29

Criteria	Marks
• Correctly identifies the number of plates and how signals applied to them result in the observed pattern	3
• Identifies that there are two pairs of plates which deflect the beam horizontally and vertically	2
• States that the plates deflect the beam or that they produce an electric field	1

Question 30 (a)

Criteria	Marks
• Identifies the semiconductor as p-type and relates this to a comparison of the number of outer electrons in boron and germanium	2
• Identifies the semi conductor as a p-type and relates this to the electron structure of boron	1

Question 30 (b)

Criteria	Marks
• States that the addition of boron increases the conductivity and relates this to the greater number of charge carriers resulting from hole formation, in comparison to electron-hole pair formation in pure germanium	3
• Associates increased conductivity with the formation of holes	2
• Identifies the conductivity of boron-doped germanium is better than pure germanium	1

Question 31 (a)

Criteria	Marks
• Selects correct formulae and correctly substitutes	2
• Correctly links relevant formulae OR • Correctly uses ONE of the formulae	1

Question 31 (b)

Criteria	Marks
• Shows a good understanding of the photoelectric effect and relates it to the production of a current • Shows understanding that longer wavelengths mean lower energy photons	3
• Shows a basic understanding of the photoelectric effect • Mentions the connection between cut-off frequency and some threshold in response OR • Shows understanding that longer wavelengths mean lower energy photons	2
• Provides a relevant statement about the photoelectric effect OR • States a connection between wavelength and photon energy	1

Question 32

Criteria	Marks
• Demonstrates thorough knowledge and understanding of the physics related to the problems affecting a manned spaceflight to Mars • Identifies the components of each problem • Draws out or shows the relationship between the physics and the problem • Demonstrates coherence and logical progression and includes correct use of scientific principles and ideas	7–8
• Demonstrates sound knowledge and understanding of the physics related to the problems affecting a manned spaceflight to Mars • Describes the issues related to the problems • Communicates some scientific principles and ideas in a clear manner	5–6
• Demonstrates a basic knowledge of the physics related to either problem identified • Outlines the problems or the implications of these • Communicates ideas in a basic form using general scientific terms	3–4
• Demonstrates a limited knowledge of the physics related to either problem identified • States an aspect of the problems or an implication • Communicates simple ideas	1–2

Section II

Question 33 (a) (i)

Criteria	Marks
• Identifies THREE properties studied in geophysics	1

Question 33 (a) (ii)

Criteria	Marks
• Correctly outlines the shape of Earth • Shows how the period at sea level varies with latitude • States that the period varies inversely with the value of g and that g increases if closer to the centre	3
• Any TWO of the above	2
• Any ONE of the above	1

Question 33 (a) (iii)

Criteria	Marks
• Correct substitution into the TWO formulae to determine ratio	2
• Correct substitution in the formula	1

Question 33 (b)

Criteria	Marks
• Provides a coherent, extensive and detailed discussion, explaining steps in going from initial measurement to final result. Discussion may mention gravimetric surveys, steps included in data reduction, Earth properties, satellite paths, structure and function of gravimeter	5–6
• Provides satisfactory but not extensive discussion of how gravity data obtained and the uses to which it is put	3–4
• Shows limited understanding of how gravity data obtained and uses to which it is put	1–2

Question 33 (c) (i)

Criteria	Marks
• Provides features or characteristics of the properties of S AND P waves	2
• Provides a correct statement about ONE type of wave	1

Question 33 (c) (ii)

Criteria	Marks
• Identifies the THREE properties that can be deduced from the equations	3
• Identifies TWO of the properties	2
• Identifies ONE of the properties	1

Question 33 (c) (iii)

Criteria	Marks
• Indicates why the path of the P-wave is incorrect • Indicates why the path of the S-wave is incorrect	2
• Indicates why the path of the P-wave is incorrect OR • Indicates why the path of the S-wave is incorrect	1

Question 33 (d)

Criteria	Marks
• Demonstrates thorough knowledge and understanding of the plate tectonics theory • Describes thoroughly the evidence supporting plate tectonics • Shows how this overcame the initial reluctance to accept the notion of continental movement • Demonstrates coherence and logical progression and includes correct use of scientific principles and ideas	5-6
• Demonstrates sound knowledge and understanding of the plate tectonics theory • Describes some evidence supporting plate tectonics theory • Communicates some scientific principles and ideas in a clear manner	3-4
• Demonstrates a basic knowledge of the plate tectonic theory • Outlines a supporting piece of evidence of the plate tectonic theory • Communicates ideas in a basic form using general scientific terms	1-2

Question 34 (a)

Criteria	Marks
• Relates the detection of different X-ray intensities after the X-rays pass from one side of the hand to the other with greater absorption of X-rays by bone than by soft tissues	3
• Describes the passage of X-rays through the hand and either the absorption by bone or the detection by film or detector	2
• Identifies ONE part of the process by which X-rays produce an image	1

Question 34 (b) (i)

Criteria	Marks
• States ONE advantage AND ONE disadvantage	2
• States ONE advantage OR ONE disadvantage	1

Question 34 (b) (ii)

Criteria	Marks
• Plots points accurately • Draws a smooth curved line showing a half-life of 6 hours	2
• Draws a smooth curved line indicative of an exponential decay, however, points are not correct	1

Question 34 (c) (i)

Criteria	Marks
• States reasons why hydrogen is the main element targeted in the MR imaging process.	2
• States a reason why hydrogen is the main element targeted in the MR imaging process.	1

Question 34 (c) (ii)

Criteria	Marks
• Provides features that include: – RF energy at the Lamor frequency is directed into the body – The RF energy is absorbed by the hydrogen nuclei – RF energy is emitted from the body by the relaxing nuclei when the RF oscillator is turned off	3
• Provides features that include: – RF energy at the Lamor frequency is directed into the body – RF energy is emitted by the relaxing nuclei	2
• Any correct and relevant statement	1

Question 34 (d) (i)

Criteria	Marks
• Calculates z of muscle • Substitutes acoustic impedance data into I_r/I_o formula	3
• Calculates z of muscle • Selects I_r/I_o formula	2
• Calculates z of muscle OR • Selects I_r/I_o formula	1

Question 34 (d) (ii)

Criteria	Marks
• Relates ultrasound frequency change to relative motion of source and detector • States that the frequency change is caused by movement of blood and the rate of flow can be determined from the magnitude and direction of the Doppler shift • Sketches in general terms a diagnostic use of Doppler ultrasound in the heart	4
• Describes a relationship between movement and frequency change and identifies a diagnostic use of Doppler ultrasound	3
• Identifies a feature of Doppler ultrasound and relevant diagnostic use	2
• Identifies a feature or use of Doppler ultrasound OR • Defines the Doppler Effect in general terms	1

Question 34 (e)

Criteria	Marks
• Identifies the most appropriate technology to use • Justifies their choice in terms of the nature of the technique and its ability to detect function • Discounts the other techniques with valid reason(s) • Demonstrates coherence and logical progression and includes correct use of scientific principles and ideas	5–6
• Identifies most appropriate technology and gives a valid reason • Describes the techniques AND/OR their diagnostic uses • Communicates some scientific principles and ideas in a clear manner	3–4
• Identifies most appropriate technology and gives a reason • Outlines the techniques or their diagnostic uses • Communicates ideas in a basic form using general scientific terms	1–2

Question 35 (a) (i)

Criteria	Marks
• Recognises that interferometry is being used and relates the long baseline made possible by the space telescope and ground-based radio telescopes to improved resolution	3
• States that better resolution is possible using HALCA	2
• States that the use of HALCA allowed a greater distance between the ground-based radio telescope and HALCA than would be possible using ground-based radio telescopes alone	1

Question 35 (a) (ii)

Criteria	Marks
• Links the measurements taken at high altitude to TWO reasons for the improved validity of the data	2
• States ONE reason why measurements at high altitude are better than ground-based measurements	1

Question 35 (b) (i)

Criteria	Marks
• Identifies TWO properties of stars that can be deduced from their spectra	2
• Identifies a property of stars that can be deduced from their spectra	1

Question 35 (b) (ii)

Criteria	Marks
• Relates clearly both surface temperature and chemical composition to the corresponding features of stellar spectra	4–5
• Relates both surface temperature and composition to features of the spectrum, without clearly explaining the links	2–3
• Accounts for ONE of the identified properties only	1

Question 35 (c) (i)

Criteria	Marks
• Identifies white dwarfs as the type of star	1

Question 35 (c) (ii)

Criteria	Marks
Provides the features of the relationship by: – Stating that as mass increases, luminosity increases – Stating that as mass increases, lifetime decreases	2
• States ONE correct relationship between mass/luminosity, and mass/lifetime	1

Question 35 (c) (iii)

Criteria	Marks
Shows the difference in the energy production by: – Identifying that stars at W produce energy through fusion – Identifying that stars at Z do not produce appreciable energy through fusion OR – Identifying that stars at Z produce energy through gravitational collapse	2
• Identifies that stars at W produce energy through fusion OR • Identifies that stars at Z do not produce appreciable energy through fusion OR • Identifies that stars at Z produce energy through gravitational collapse	1

Question 35 (c) (iv)

Criteria	Marks
• Indicates that the top left region of the diagram is free of stars • Shows a linear region of stars with a clear bend to the right and up as it moves from bottom right towards the top left	2
• Indicates a region of stars with a clear bend in it OR • Indicates a region of stars in the bottom right corner of the diagram	1

Question 35 (d)

Criteria	Marks
• Identifies THREE advances in measurement technologies and demonstrates thorough knowledge and understanding of how they improve our understanding of celestial objects • Shows clearly the relationship between the advances and specific improvements in understanding that have resulted from them • Demonstrates coherence and logical progression and includes correct use of scientific principles	5–6
• Identifies TWO advances in measurement technology and demonstrates sound knowledge and understanding of advances in measurement technology and how they improve our understanding of celestial objects • Describes the measurement technology and attempts to link this to an advance in understanding OR • Identifies the technology and clearly shows how the technology improved our understanding • Communicates some scientific principles and ideas in a clear manner	3–4
• Demonstrates a basic knowledge of technology used to measure/observe celestial objects • Outlines how our understanding has improved • Communicates ideas in a basic form using general scientific terms	1–2

Question 36 (a)

Criteria	Marks
• Sketches in general terms the relationship between Bohr's atomic model and Planck's equation	3
• Outlines the emission or absorption of photons or the energy levels, and limited to Planck's equation	2
• Provides any relevant information	1

Question 36 (b)

Criteria	Marks
• Correctly substitutes into equation	2
• Uses correct equation but transposes n_i and n_f	1

Question 36 (c)

Criteria	Marks
• Shows clearly how de Broglie explained the stability of electron orbits in hydrogen atoms	3
• Outlines aspects of de Broglie's explanation	2
• Provides any relevant information	1

Question 36 (d)

Criteria	Marks
• Identifies clearly the neutrino and the law of conservation of energy	2
• Identifies either the neutrino or the law of conservation of energy or states a 'third particle carries away some of the energy'	1

Question 36 (e) (i)

Criteria	Marks
• Clearly shows how Chadwick applied the conservation laws by outlining Chadwick's experiment	3
• Describes Chadwick's experiment and the conservation laws	2
• Outlines either Chadwick's experiment or conservation laws	1

Question 36 (e) (ii)

Criteria	Marks
• Sketches in general terms how the properties of neutrons make them useful in scattering experiments by identifying two properties	2
• Identifies ONE property	1

Question 36 (f)

Criteria	Marks
• Provides reasons for the existence of stable isotopes by: – Identifying THREE fundamental forces and their relative sizes/nature of the forces exerted OR – Identifies TWO forces, their relative sizes/nature and relates to stability of nucleus	3
• Describes TWO forces OR • Identifies all of the forces and whether they are attractive or repulsive	2
• Any relevant information about the forces which operate in the atomic nucleus	1

Question 36 (g)

Criteria	Marks
• Demonstrates thorough knowledge and understanding of the contributions of Rutherford, Einstein and Fermi to the development of the atomic bomb • Provides a judgement of the statement • Describes the effect of the atomic bomb on society • Demonstrates coherence and logical progression and includes correct use of scientific principles and ideas	6–7
• Demonstrates sound knowledge and understanding of the contributions of Rutherford, Einstein and Fermi to the development of the atomic bomb • Provides either a judgement of the statement or outlines the effect of the atomic bomb on society • Communicates some scientific principles and ideas in a clear manner	4–5
• Demonstrates a basic knowledge of the contribution of Rutherford AND/OR Einstein AND/OR Fermi to the development of the atomic bomb • Communicates ideas in a basic form using general scientific terms	2–3
• Demonstrates a limited knowledge of Rutherford AND/OR Einstein AND/OR Fermi • Communicates simple ideas	1

Question 37 (a) (i)

Criteria	Marks
• Identifies section A's function correctly	1

Question 37 (a) (ii)

Criteria	Marks
• Determines the resistance of the thermistor at 60ºC • Calculates the voltage V_t in the potential divider	2
• Determines the resistance of the thermistor at 60ºC but not V_t OR • Calculates the voltage V_t in the potential divider but not using the correct resistance	1

Question 37 (a) (iii)

Criteria	Marks
• Identifies the overall function of the circuit • Shows how the circuit output changes depending on the inputs • Identifies and explains the effect of R3	4
• Identifies the overall function of the circuit • Shows how the circuit output changes depending on the inputs OR • Identifies and explains the effect of R3	2–3
• Correct statement about the function of the circuit	1

Question 37 (a) (iv)

Criteria	Marks
• Identifies the output is 0 V for low temperatures • Identifies the output is 5 V for high temperatures • Determines the switching point is greater than 40ºC but less than 45ºC	3
• Identifies the output is 0 V for low temperatures OR • Identifies the output is 5 V for high temperatures OR • Determines the switching point is greater than 40ºC but less than 45ºC	1–2

Question 37 (b)

Criteria	Marks
• Identifies the components of a relay • Outlines the operation of a relay • Provides a diagram to support their answer	3–4
• Identifies the components of a relay OR • Outlines the operation of a relay	1–2

Question 37 (c)

Criteria	Marks
• Determines the truth table for the circuit with correct elements	3
• Draws a truth table with most elements correct	1–2

Question 37 (d) (i)

Criteria	Marks
• Identifies function	1

Question 37 (d) (ii)

Criteria	Marks
• Identifies type	1

Question 37 (e)

Criteria	Marks
• Demonstrates thorough knowledge and understanding of the effect of the rapid development of integrated circuits on society Provides an analysis that identifies that: – integrated circuits have developed rapidly (what has changed and how fast/Moore's Law) – relates the rapid development of electronics in general to ICs – shows that this development has enabled the development of new applications of electronics/ICs • Provides several examples of IC/electronics applications and clearly shows how their rapid advancement has had an impact on society • Demonstrates coherence and logical progression and includes correct use of scientific principles and ideas	5–6
• Demonstrates sound knowledge and understanding of the effect of rapid development of integrated circuits on society • Describes some aspects of IC AND/OR electronics development • Describes ONE application and its impact on society • Communicates some scientific principles and ideas in a clear manner	3–4
• Demonstrates a basic knowledge of integrated circuits • Provides statements related to IC development and applications in society • Communicates ideas in a basic form using general scientific terms	1–2

Physics

2010 HSC Examination Mapping Grid

Question	Marks	Content	Syllabus outcomes
Section I Part A			
1	1	9.2.2.10	H9
2	1	9.2.2.2	H6, H9
3	1	9.2.4.3.5, 9.2.4.2.4, 9.2.4.2.5, 9	H6, H12.4b
4	1	9.2.2.1,8.4.3.2.1	H12.3c, H6, H7
5	1	9.2.2.8, 9.2.2.3.4	H6, H12.4b
6	1	9.2.4.2.3	H8, H11, H12, H14.1f
7	1	9.2.1.3.3	H6, H12.4b
8	1	9.3.2.2.5/6	H9
9	1	9.3.4.3.1	H7, H14.1f
10	1	9.3.3.2.4, 9.3.3.3.4	H7, H9
11	1	9.3.2.2.4, 9.3.2.2.5	H7, H9
12	1	9.1	H12.3c
13	1	9.4.2.2.3	H1, H10
14	1	9.4.2.2.2	H1, H8
15	1	9.4.1.2.5, 9.4.1.3.3, 9.2.2.2.8,	H9, H12.3c, H12.4b
16	1	9.4.1.2.3, 9.4.1.3.2	H9, H12.3c
17	1	9.4.1.2.8	H1, H9
18	1	9.4.4.2.1	H1, H8, H10
19	1	9.4.3.2.2, 9.4.3.2.1, 9.4.3.2.4	H9
20	1	9.3.1.2.4, 9.3.1.2.5	H9, H12.3c
Section I Part B			
21	2	9.2.2.2.12, 9.2.2.2.13	H7, H9
22(a)	1	9.2.2.3.1	H9, H12, H14
22(b)	2	9.2.2.3.1	H9, H12, H14
22(c)	2	9.2.2.3.1	H9, H12, H14
23(a)	2	9.2.4.3.2, 9.2.4.2.4	H6, H9, H14
23(b)	3	9.2.4.5.2	H6, H9, H14
24	3	9.2.2.2.8, 9.2.2.2.10, 9.2.2.3.5	H9
25(a)	2	9.2.2.2.7	H6
25(b)	2	9.2.2.2.7, 9.2.2.2.5	H6, H14
26(a)	2	9.3.2.3.2, 9.3.2.2.4	H9, H14
26(b)	3	9.3.2.2.4, 9.3.2.3.2	H13, H14
27	6	9.4.4.3.5	H4
28	4	9.3.1.2.1, 9.3.1.3.3	H9
29	3	9.4.1.2.9, 9.4.1.2.4	H9

Question	Marks	Content	Syllabus outcomes
30 (a)	2	9.4.3.2.7	H7
30 (b)	3	9.4.3.2.6	H7
31 (a)	2	9.4.2.2.6, 9.4.2.3.4	H7, H8, H14, H10
31 (b)	3	9.4.2.3.3	H7, H8, H10
32	8	9.2.1.2.2, 9.2.3.2.3, 9.2.2.12, 9.2.2.13, 9.3.1.2.3	H6, H7, H9
Section II Question 33 — Geophysics			
(a)(i)	1	9.5.1.2.1	H9
(ii)	3	9.5.1.3.1	H9
(iii)	2	9.5.1.3.1	H9
(b)	6	9.5.2.2.5, 9.5.2.2.6, 9.5.2.2.7, 9.5.2.2.8, 9.5.2.2.9	H9
(c) (i)	2	9.5.3.2.1	H8
(ii)	3	9.5.3.2.5, 9.5.3.2.2	H8
(iii)	2	9.5.3.3.3	H8, H14
(d)	6	9.5.4.2.4, 9.5.4.2.3	H2, H1
Section II Question 34 — Medical Physics			
(a)	3	9.6.2.2.1, 9.6.2.2.4	H8
(b)(i)	2	9.6.3.2.1	H7
(b)(ii)	2	9.6.3.2.1	H7, H13
(c)(i)	2	9.6.4.2.8, 9.6.4.2.3	H8
(ii)	3	9.6.4.2.6, 9.6.4.2.7	H7
(d)(i)	3	9.6.1.3.5	H8. H12.3c
(ii)	4	9.6.1.2.8, 9.6.1.3.3	H8
(e)	6	9.6.1, 9.6.2, 9.6.3	H4, H8, H10
Section II Question 35 — Astrophysics			
(a)(i)	2	9.7.1.2.5	H8
(ii)	2	9.7.1.2.4, 9.7.1.2.2	H14, H8
(b)(i)	2	9.7.3.2.5	H7, H10
(b)(ii)	1	9.7.3.2.3	H7, H10
(c)(i)	1	9.7.6.3.2	H14
(ii)	2	9.7.6.2.1, 9.7.6.2.2, 9.7.6.2.3, 9.7.6.3.2	H7, H9
(iii)	2	9.7.6.2.3, 9.7.6.3.2	H7, H9
(iv)	2	9.7.6.2.5, 9.7.6.3.1, 9.7.6.3.2	H13
(d)	6	9.7.4.3.3, 9.7.1.2.5, 9.7.1.2.5	H14
Section II Question 36 — From Quanta to Quarks			
(a)	3	9.8.1.2.2, 9.8.1.2.4, 9.8.1.2.5	H10
(b)	2	9.8.1.3.2	H10
(c)	3	9.8.2.2.4, 9.8.2.3.1	H8, H10

Question	Marks	Content	Syllabus outcomes
(d)	2	9.8.3.2.6	H7
(e)(i)	3	9.8.3.2.2	H6, H7, H10
(e)(ii)	2	9.8.4.2.3	H7
(f)	3	9.8.3.2.7, 9.8.3.2.8	H10
(g)	7	9.8.4.3.1, 9.8.3.2.9, 9.8.3.2.10, 9.8.3.2.11, 9.8.1.2.1	H1, H8
Section II **Question 37 — The Age of Silicon**			
(a)(i)	1	9.9.2.2.5	H9, H14
(ii)	2	9.9.3.2.4, 9.9.2.3.3	H9, H14
(iii)	4	9.9.6.2.3-6, 9.9.6.2.10	H9
(iv)	3	9.9.6.3.1	H9, H14
(b)	4	9.9.4.2.2	H9
(c)	3	9.9.5.3.1, 9.9.5.2.1, 9.9.5.3.2	H9, H14
(d)(i)	1	9.9.3.2.1	H9
(ii)	1	9.9.4.2.3, 9.9.3.2.1	H9
(e)	6	9.9.1.3.1, 9.9.1.2.3, 9.9.1.2.2, 9.9.7	H3, H4