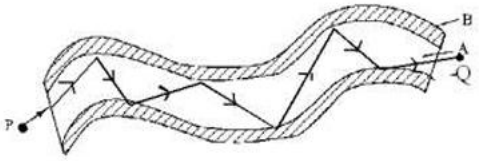
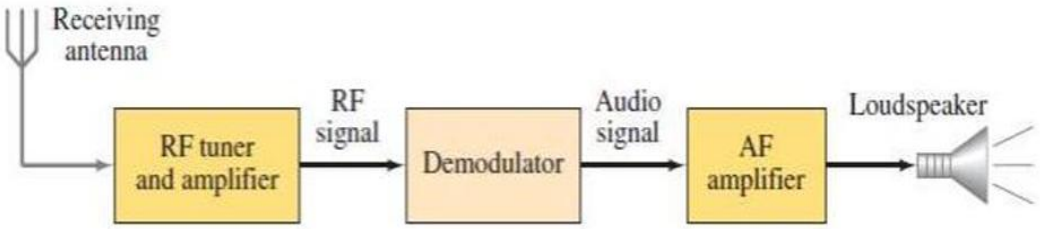
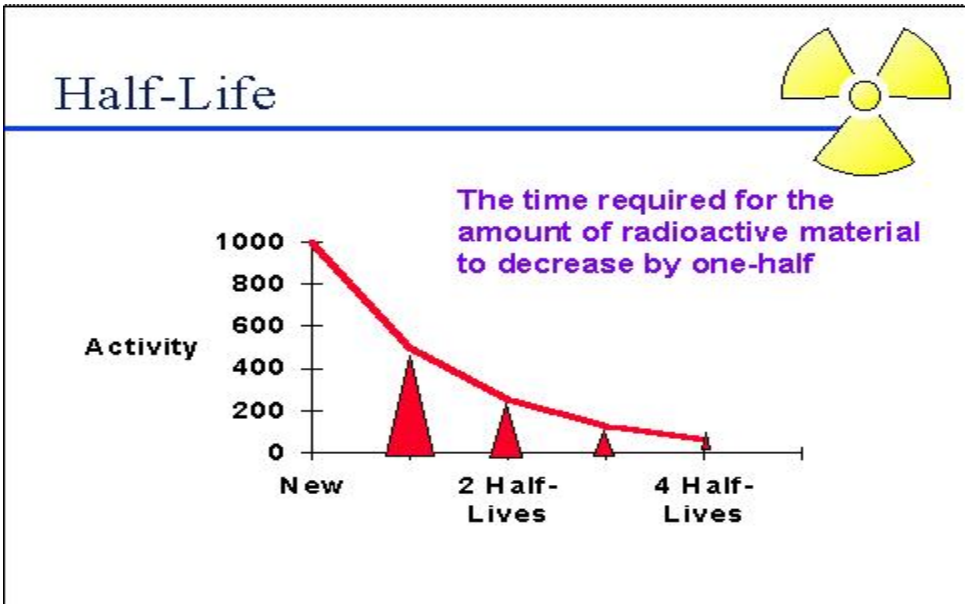
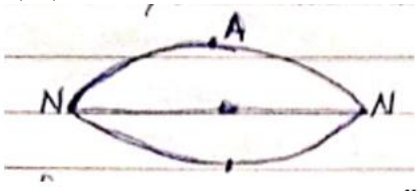
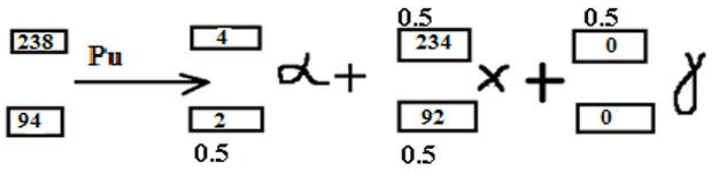
S6 PHYSICS MARKING GUIDE 2023-2024

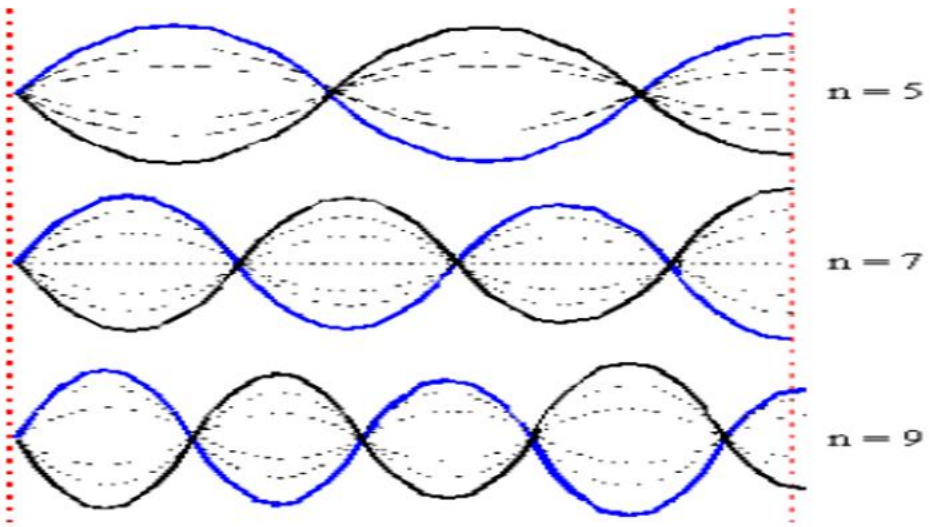
1	D. It uses optical fiber to produce an image of inside the body	
2	(a) Agrophysics is one of the branches of natural sciences dealing with the application of physics in agriculture and environment. It plays an important role in the limitation of hazards to agricultural objects (soils, plants, agricultural products and foods) and to the environment. (b) The atmospheric layer where weather forms and occurs is the Troposphere, that layer closest to the surface of the planet	
3.	(a) Increasing the amplitude of a sound wave will increase the Loudness/Intensity/Energy of sound (b) Most humans can hear from 20Hz to 20KHz. (to 20,000Hz)	
4	a. Nucleon | **Quark composition** proton | **uud (Two up and one down)** neutron | **udd (one up and Two down)** (b) Proton : $+\frac{2}{3}e+\frac{2}{3}e-\frac{1}{3}e=\frac{4}{3}e-\frac{1}{3}e=\frac{3}{3}e=+1e$ proved Neutron: $+\frac{2}{3}e-\frac{1}{3}e-\frac{1}{3}e=\frac{2}{3}e-\frac{2}{3}e=\frac{0}{3}e=0 Charge$ proved	
5.	a.  b. Light undergoes total internal reflection. c) from the Snell's law $n_1 \sin i = n_2 \sin r$ where $r=90^o$ $n=\frac{1}{Sinc}$ $=\frac{1}{Sin42.5}$ $=1.48$	
6.	a) FM Is a frequency of carrier wave varies9(In synchrony) with signal (In synchrony) with displacement of signal b.Advantages: ✓ Less noise ✓ Less interference ✓ Greater bandwidth ✓ better quality Disadvantages: ✓ Short range	

	✓ more transmitters ✓ line of sight more complex circuitry ✓ Greater expense	
6.		
7.	(a) given $T_{1/2}$= 2.6years , Mo=25gr ,$M_{remaining}$= 0.391gr from the formula $M_{remain} = M_O\left(\frac{1}{2}\right)^n \Rightarrow \frac{M_{remain}}{M_o} = \left(\frac{1}{2}\right)^n \Rightarrow \ln\frac{M_{remain}}{M_O} = \ln\left(\frac{1}{2}\right)^n \Rightarrow$ $\ln M_{rem} - \ln M_O = n(\ln 1 - \ln 3)$ $n = \frac{\ln M_{rem} - \ln M_0}{\ln 1 - \ln 2} = \frac{\ln 0.391 - \ln 25}{\ln 1 - \ln 2} = 5.999 \approx 6 \Rightarrow n = 6$ proved $n = \frac{t}{T_{1/2}} \Rightarrow t = n \times T_{1/2}$ $t = 6 \times 2.6\,years = 15.6\,years$ Proved	
8.		
9	 In this question (t½) of C-14 is 5730 years, which means that after 5730 years half of the sample would have decayed and half would be left as it is. After 5730 years (first half life) 800 /2 = 400 mg decays and 400mg remains left. After another 5730 years (two half lives or 11460 years) 400 /2 = 200mg decays and 200mg remains left . After another 5730 years (three half lives) and so on until fifth half-live	

10	Promotion of mining activities. Building of fertile flood plains for agriculture Promotion of tourism due to land forms of mass wasting Promotion of research or study purposes Soil formation due to the exposure of fresh rocks.	
11	- Erosion is defined as the displacement of solids by wind, water, and ice whereas Weathering is defined as the decomposition of rocks, soil, and minerals by direct contact with the atmosphere. /1 - Erosion consists of different types like water, wind, ice, thermal and gravity erosion while weathering consists of different types like physical, chemical, and biological weathering /1 - The eroded materials undergo displacement but the weathered materials do not undergo displacement. /1 - Erosion is caused due to wind, water, ice, and human activities whereas Weathering is caused due to factors like air pressure. /1	
12	a. Albedo can be thought of as the reflectivity of the earth, i.e., how much incoming sunlight is reflected back to space or A dimensionless parameter that describe the degree to which a surface reflects light that strikes it. b. the angle of the Sun above the horizon (solar elevation angle, solar incidence angle), 2) the length of time the surface is exposed to the Sun, and 3) atmospheric conditions,The shape of the earth, The earth's rotation, our seasons, etc	
14	a.No some amount of energy are scatted away and do no reach the destination. b. Poor optical fiber, absorption, leakage in fiber optics, bad connectors used, impurities in the glass fiber, low refractive index and so on. c. Use of different devices such as Repeaters, Regenerators and Optical Amplifiers	
15.	Greenhouse is a structure that is constructed by using any material that allows sunlight to pass through usually plastic or glass.	

	b.carbon dioxide (CO2) methane nitrous oxide fluorinated gases c. -Some gases in the Earth's atmosphere act a bit like the glass in a greenhouse, trapping the sun's heat and stopping it from leaking back into space and causing global warming. -greenhouse effect helps trap heat from the sun, which keeps the temperature on earth comfortable.	
	SECTION B	
16.	(a) i) 1) D /0.5mark 2) B /0.5mark ii) 1) Loudness increases and the pitch stays the same. (1)mark 2) Loudness stays the same and the pitch decreases /(1)mark N.B - Pitch of a sound waves depend on its frequency and frequency is inversely proportional to the wavelength - loudness of a sound wave depends on its amplitude. iii) Sound waves are mechanical waves created by a vibrating object. The vibration of the object set particles in the surrounding medium the vibrational motion thus transporting energy through the medium./1mark (b) (i) stationary waves are called stationary waves are formed by superposition of a forward wave and the reflection wave having the same frequency and the same amplitude without net transfer of energy. /(0.5+0.5)marks Or standing waves are formed in a medium when two waves having equal amplitude and frequency moving in opposite direction along the same time line interference in a confined space. (ii) The musical instruments use resonance to amplify the sound waves, or to make the sound louder, production of sound. /1mark (iii) 1)  (1mark) 2) $f = \frac{v}{2l}$ then v=256x0.791x2=409.992m/s /1 mark c.i. The frequency $f=f_o(\frac{v}{v-v_s})$ so v=29.02m/s /1 mark ii) Measuring the velocity of star, Hubble's law and redshift ultrasound scan /1 mark Doctors use the doppler effect to diagnose heat problems Weather forecasting (the Doppler effect is used by meteorologists to track storms) The doppler effect is used to measure the velocity of detected objects where a radar is fired at a moving target foe example, the particle use radar to detect a speeding	

	vehicle, radio waves are fired using a radar gun at the moving vehicle. (any one point)	
17	a) - A: gamma radiation or /1; -B: alpha radiation /1 - C: beta radiation / 1 b) i)  **/2 marks** ii) The element X is Uranium (U) / **1** C) **i)** The mass defect $\Delta m = (m_p + m_n) - m_C$ $m_p + m_n = 6 \times 1.007825 + (14 - 6) \times 1.008665 = 14.11627amu$ **/1** $\Delta m = 14.11627amu - 14.003242$ a. m. u $= 0.113028$ amu **/1** **ii)** The binding energy $\Delta E = 0.113028$ amu $\times$ 931.5 MeV $= 105.285582$MeV **/1** **iii)** The binding energy per nucleon $E' = \frac{\Delta E}{14} = \frac{105.285582\text{MeV}}{14} = 7.520398714MeV$ **/1**	
18.	**(a)** The ratio of these three frequencies is 175:245:315, or 5:7:9. /1mark **(b)** For a string fixed at both ends, the resonant frequencies are given by $f = n\frac{v}{2l}$ where n = 1, 2, 3, 4, ... /1mark For a string fixed at only one end, the resonant frequencies are given by $f = n\frac{v}{4l}$, where n = 1, 3, 5, 7, 9, ... /1mark Since the given sequence has only odd numbers, we may conclude that the string is fixed at only one end. c)The fundamental frequency is the greatest common factor of the sequence, so f_1 = 35.0 Hz. /1mark d)These are 5th, 7th, and 9th harmonics /1mark	

	 /3marks e)Since $f_1 = \frac{v}{4l}$ /1mark then l=$\frac{125m/s}{4\times35Hz}$=0.893m /1mark	
19.	a) Climate change is a long-term change in temperature and weather patterns. (1 mark) b) i) Carbon dioxide (1 mark) Methane (1 mark) Nitrous oxide (1 mark) Water vapour Fluorinated gases ii) Greenhouse gases such as $CO2$ are the gases in the Earth's atmosphere that trap the sun's heat, stop it from leaking back into space (1 mark) and radiate it toward Earth's surface and cause global warming which is one aspect of climate change. (1 mark) c) Facts related to climate change: - Global warming (1 mark): the Earth's average temperature has risen about $2.12oC$ - - Ocean acidification (1 mark) Extreme events (1 mark): Intense drought, intense rainfall/intense storms, heat waves. - Melting glaciers - Warming oceans -Sea level rise, etc. d) i) limit global temperature changes. (1 mark) Reduction of greenhouse gases emission ii) - - - prevent deforestation (1 mark) roll out electrical vehicles (1 mark) encourage people to use renewable energy instead of charcoal or firewood. (1 mark) - - - - - Deploy hydro and solar energy equipment Introduce vehicle emission standards Improve energy efficiency in industry processes Practice afforestation and reforestation Prohibit the use of refrigerators that contain chlorofluorocarbon (CFCS) e) The negative effect of climate change is not alarming but recently we registered: - Intense drought (1 mark) in NKOMBO sector which experienced a prolonged drought in 2021. This was the case for NDAGO sector in KAYONZA DISTRICT. - - Irregularity in rainfall frequencies in RWANDA (1 mark) Variability in rain intensity in RWANDA	
20	1.B/2marks 2.E/1mark 3.A/2marks 4.F/2marks 5.C/2marks	

	6.D/1mark	

END