GCSE Physics Topic 6 AQA: Waves
Exam Questions/Mock Exam Questions
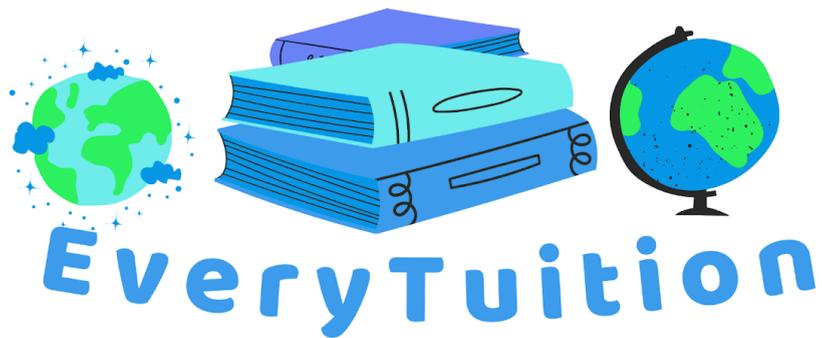
(It would still be recommended to answer the foundation tier questions for triple science and higher tier to ensure you have good understanding).

Q1.
 Ben shines a torch at a mirror.

(a) State the law of reflection.

_____

[1]

(b) Draw and label the incident ray, reflected ray, and normal on a diagram of reflection.

_____

[2]

[Total: 3 marks]

Q2.
 Tom is revising properties of waves.

(a) Write the equation that links wave speed, frequency, and wavelength.

_____

[1]

(b) A wave has a frequency of 50 Hz and a wavelength of 2 m.
 Calculate the wave speed.

_____

_____

[2]

[Total: 3 marks]

Q3.
 Harry drops a pebble into a pond.

(a) State whether the waves produced are transverse or longitudinal.

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_____

[1]

(b) Explain why.

_____

_____

[2]

[Total: 3 marks]

Q4.
 Jack listens to music.

(a) State the type of wave that sound is.

_____

[1]

(b) Explain how sound waves travel through air.

_____

_____

[2]

[Total: 3 marks]

Q5.
 Luke is looking at electromagnetic waves.

(a) State the range of the electromagnetic spectrum in order of increasing wavelength.

_____

_____

[3]

(b) Which electromagnetic wave has the shortest wavelength?

_____

[1]

[Total: 4 marks]

Q6.
 Ethan measures a sound wave.

The speed of sound in air is 340 m/s.
 The frequency of a sound is 170 Hz.

Calculate the wavelength.

_____

_____

[2]

[Total: 2 marks]

Q7.
 Oliver is revising refraction.

(a) State what happens to the speed of light when it enters glass from air.

_____

[1]

(b) State what happens to the direction of the light ray when it enters glass at an angle.

_____

[1]

[Total: 2 marks]

Q8.
 Sam investigates a wave on a string.

The wave has a frequency of 5 Hz and a wavelength of 0.8 m.

(a) Calculate the wave speed.

_____

[2]

(b) Explain how increasing the frequency affects the wavelength if the speed stays the same.

[2]

[Total: 4 marks]

Q9.
 Daniel investigates echoes.

(a) Explain how an echo is formed.

[2]

(b) Sound travels at 340 m/s. The echo of a clap is heard 2 seconds later.
 Calculate the distance to the reflecting surface.

[3]

[Total: 5 marks]

Q10.
 James is revising electromagnetic radiation.

(a) Name one use of infrared radiation.

[1]

(b) Name one risk of too much ultraviolet radiation.

_____

[1]

[Total: 2 marks]

Q11.
 William looks at seismic waves.

(a) Name the two types of seismic waves.

_____

_____

[2]

(b) State one difference between them.

_____

_____

[2]

[Total: 4 marks]

Q12.
 Charlie looks at frequency.

(a) State what is meant by the frequency of a wave.

_____

[1]

(b) A wave has a frequency of 250 Hz.
 How many waves pass a point in 2 seconds?

_____

_____

[2]

[Total: 3 marks]

Q13.
 Jacob is revising electromagnetic waves.

(a) State one property shared by all electromagnetic waves.

_____

[1]

(b) Microwaves are used for cooking food.
 Explain why microwaves are suitable for this use.

_____

_____

[2]

[Total: 3 marks]

Q14.
 Noah looks at waves on water.

(a) State what happens to the wave when it passes into deeper water.

_____

[1]

(b) Explain why refraction happens when water waves enter deeper water.

_____

_____

[2]

[Total: 3 marks]

Q15.
 Alex is looking at ultrasound.

(a) State one use of ultrasound in medicine.

[1]

(b) Explain why ultrasound is safer than X-rays for scanning.

_____

_____

[2]

[Total: 3 marks]

Higher Tier

Q16.
 Ben shines a laser at a glass block.

(a) Define refraction.

_____

_____

[2]

(b) Explain why light bends when it enters the glass at an angle.

_____

_____

[3]

[Total: 5 marks]

Q17.
 Tom investigates water waves in a ripple tank.

(a) Describe how he could use the ripple tank to measure wave speed.

_____

_____

[3]

(b) The waves have a frequency of 12 Hz and a wavelength of 0.05 m.
 Calculate the wave speed.

_____

_____

[2]

[Total: 5 marks]

Q18.
 Harry is revising seismic waves.

(a) State two differences between P-waves and S-waves.

_____

_____

[2]

(b) Explain how evidence from seismic waves led to the discovery of the Earth's core.

_____

_____

[3]

[Total: 5 marks]

Q19.
 Jack uses an oscilloscope to study sound.

(a) Draw a wave on the oscilloscope trace to represent a higher frequency sound compared to the original.

_____

[1]

(b) Draw a wave to represent a louder sound compared to the original.

_____

[1]

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(c) Explain the difference between frequency and amplitude.

_____

_____

[2]

[Total: 4 marks]

Q20.
Luke investigates microwaves.

(a) Give one use of microwaves in communication.

_____

[1]

(b) Explain why microwaves are suitable for satellite communication.

_____

_____

[2]

[Total: 3 marks]

Q21.
Ethan looks at electromagnetic waves.

(a) State the speed of all electromagnetic waves in a vacuum.

_____

[1]

(b) Ultraviolet radiation can cause health risks.
Explain how.

_____

_____

[2]

[Total: 3 marks]

Q22.
 Oliver investigates ultrasound.

(a) Describe how ultrasound waves are used to detect objects underwater.

_____

_____

[2]

(b) A boat sends out an ultrasound pulse. The echo returns in 0.12 s.
 The speed of sound in water is 1500 m/s.
 Calculate the depth of the sea.

_____

_____

[3]

[Total: 5 marks]

Q23.
 Sam is revising X-rays and gamma rays.

(a) State one medical use of X-rays.

_____

[1]

(b) State one similarity between X-rays and gamma rays.

_____

[1]

(c) Explain one reason why gamma rays are more dangerous to humans.

_____

_____

[2]

[Total: 4 marks]

Q24.
 Daniel investigates refraction with a triangular prism.

(a) Describe what happens to white light when it passes through a prism.

_____

_____

[2]

(b) Explain why the colours of light are separated.

_____

_____

[2]

[Total: 4 marks]

Q25.
 James investigates radio waves.

(a) State how radio waves are produced.

_____

[1]

(b) Explain how radio waves can be received by an aerial.

_____

_____

[2]

[Total: 3 marks]

Q26.
William looks at the electromagnetic spectrum.

(a) Arrange the following types of electromagnetic radiation in order of decreasing frequency:
X-rays, visible light, microwaves.

_____

[1]

(b) Explain the relationship between wavelength and frequency.

_____

_____

[2]

[Total: 3 marks]

Q27.
Charlie investigates sound in air.

(a) State what happens to air particles when a sound wave passes.

_____

[1]

(b) The wavelength of a sound is 0.68 m. The speed of sound in air is 340 m/s.
Calculate the frequency of the sound.

_____

_____

[2]

[Total: 3 marks]

Q28.
Jacob looks at infrared radiation.

(a) State one use of infrared radiation in everyday life.

_____

[1]

(b) Explain how infrared radiation is used in this application.

_____

_____

[2]

[Total: 3 marks]

Q29.
 Noah uses a ripple tank to demonstrate refraction.

(a) Describe what happens to the direction of water waves when they move from shallow to deep water.

_____

[1]

(b) Explain why this change happens.

_____

_____

[2]

[Total: 3 marks]

Q30.
 Alex measures sound intensity.

(a) State what happens to the amplitude of a sound wave when the sound gets louder.

_____

[1]

(b) Explain how this relates to energy transferred by the wave.

_____

_____

[2]

[Total: 3 marks]

Q31.

Ben investigates radio communication.

(a) State why radio waves can travel long distances around the Earth.

_____

[1]

(b) Explain how the ionosphere helps radio communication.

_____

_____

[2]

[Total: 3 marks]

Q32.

Tom investigates total internal reflection.

(a) State the conditions needed for total internal reflection.

_____

_____

[2]

(b) Explain why optical fibres use total internal reflection.

_____

_____

[2]

[Total: 4 marks]

Q33.
Harry measures the speed of waves on a string.

The frequency is 20 Hz and the wavelength is 0.25 m.

(a) Calculate the wave speed.

_____

_____

[2]

(b) Describe one method Harry could use to measure the wavelength of the wave.

_____

_____

[2]

[Total: 4 marks]

Q34.
Jack looks at dangers of radiation.

(a) State one harmful effect of gamma radiation on humans.

_____

[1]

(b) Explain why gamma radiation is more penetrating than alpha radiation.

_____

_____

[2]

[Total: 3 marks]

Q35.
Luke investigates echoes.

(a) Explain why an echo takes longer to return when the wall is further away.

_____

_____

[2]

(b) The echo of a shout is heard 0.6 s later. The speed of sound is 340 m/s.
 Calculate the distance to the wall.

_____

_____

[3]

[Total: 5 marks]

Q36.
 Ethan compares ultrasound and infrasound.

(a) State what is meant by infrasound.

_____

[1]

(b) State one use of infrasound.

_____

[1]

[Total: 2 marks]

Q37.
 Oliver looks at seismic evidence.

(a) Explain why S-waves cannot travel through the outer core.

_____

_____

[2]

(b) State one piece of evidence this gives about the Earth's structure.

_____

_____

[1]

[Total: 3 marks]

Q38.
 Sam is revising Doppler effect.

(a) Describe what happens to the frequency of a wave when the source moves towards an observer.

_____

[1]

(b) Explain how this effect provides evidence for the Big Bang theory.

_____

_____

[3]

[Total: 4 marks]

Q39.
 Daniel uses an oscilloscope to measure sound.

The oscilloscope trace shows 5 complete waves in 0.01 s.

Calculate the frequency of the sound.

_____

_____

[2]

[Total: 2 marks]

Q40.
James compares visible light and microwaves.

(a) State one similarity between visible light and microwaves.

_____

[1]

(b) State one difference between visible light and microwaves.

_____

[1]

[Total: 2 marks]

Triple Science

Q41.
William investigates seismic waves.

(a) Explain how P-waves and S-waves provide evidence for the structure of the Earth's core.

_____

_____

_____

[4]

Q42.
Charlie is investigating Doppler shifts.

(a) Explain why the wavelength of light from distant galaxies is red-shifted.

_____

_____

[2]

(b) State how this supports the Big Bang theory.

_____

[2]

[Total: 4 marks]

Q43.
 Jacob investigates wave superposition.

(a) Define constructive interference.

_____

_____

[2]

(b) Define destructive interference.

_____

_____

[2]

[Total: 4 marks]

Q44.
 Noah uses microwaves to measure wavelength.

He sets up a microwave transmitter and receiver.

Describe how he could use this experiment to measure the wavelength of microwaves.

_____

_____

_____

[3]

Q45.
 Alex revises X-rays.

(a) Explain how X-rays are produced.

_____

_____

[2]

(b) State one difference between medical use of X-rays and gamma rays.

_____

_____

[2]

[Total: 4 marks]

Q46.
 Ben is revising diffraction.

(a) State what happens to diffraction when a wave passes through a narrower gap.

_____

[1]

(b) Explain why diffraction effects are more noticeable for radio waves than for visible light.

_____

_____

[3]

[Total: 4 marks]

Q47.
 Tom looks at medical imaging.

Compare the uses of ultrasound and X-rays in medicine.

_____

_____

_____

[4]

Q48.
Harry studies seismic waves.

Explain how earthquake wave patterns provide evidence that the outer core of the Earth is liquid.

_____

_____

_____

[4]

Q49.
Jack looks at radiation hazards.

(a) Explain why gamma radiation is described as ionising.

_____

_____

[2]

(b) Suggest why gamma radiation is used to sterilise surgical instruments.

_____

_____

[2]

[Total: 4 marks]

Q50.
Luke looks at fibre optics.

Explain why total internal reflection is important in fibre optic cables.

_____

_____

_____

[3]

Q51.
 Ethan compares infrasound and ultrasound.

(a) State one property of infrasound waves.

_____

[1]

(b) State one property of ultrasound waves.

_____

[1]

(c) Give one use of infrasound and one use of ultrasound.

_____

_____

[2]

[Total: 4 marks]

Q52.
 Oliver looks at the electromagnetic spectrum.

Explain why gamma rays are more hazardous to human tissue than microwaves.

_____

_____

_____

[3]

Q53.
 Sam looks at red-shift.

(a) Explain what is meant by red-shift.

[2]

(b) State how this gives evidence for an expanding universe.

_____

[2]

[Total: 4 marks]

Q54.
 Daniel investigates resonance.

Explain what resonance is, and give one example.

_____

_____

_____

[3]

Q55.
 James is revising wave speed.

(a) The frequency of a water wave is 4 Hz and the wavelength is 0.75 m.
 Calculate the wave speed.

_____

_____

[2]

(b) Explain why water waves slow down when moving into shallow water.

_____

_____

[2]

[Total: 4 marks]