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GCSE Physics Topic 8 AQA: Space Physics

Exam Questions/Mock Exam Questions

Questions For Foundation, Higher, and Triple Science (scroll down for questions for higher and triple science only):

(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 is looking at planets in the Solar System.

(a) State the name of the planet closest to the Sun.

_____

[1]

(b) State the name of the largest planet in the Solar System.

_____

[1]

[Total: 2 marks]

Q2.

Tom is investigating how planets move.

(a) State the force that keeps planets in orbit around the Sun.

_____

[1]

(b) Explain why the planets do not fly off into space.

_____

_____

[2]

[Total: 3 marks]

Q3.
Harry observes stars in the night sky.

(a) Define a star.

[1]

(b) Explain why some stars appear brighter than others.

[2]

[Total: 3 marks]

Q4.
Jack is studying satellites.

(a) State what is meant by an artificial satellite.

[1]

(b) Give one use of an artificial satellite.

[1]

[Total: 2 marks]

Q5.
Ethan investigates orbits.

(a) State the difference between a geostationary orbit and a polar orbit.

[2]

(b) Explain one advantage of using a polar orbit.

[1]

[Total: 3 marks]

Q6.
Oliver is revising the Moon.

(a) State the force responsible for the Moon orbiting the Earth.

[1]

(b) Explain why the Moon causes tides on Earth.

[2]

[Total: 3 marks]

Q7.
Sam studies space probes.

(a) State one reason why space probes are used instead of humans.

(b) Give one challenge of sending space probes.

[2]

[Total: 2 marks]

Q8.
Daniel investigates the life cycle of stars.

(a) State what a nebula is.

[1]

(b) Explain how a star like the Sun eventually becomes a white dwarf.

[2]

[Total: 3 marks]

Q9.
Jacob looks at gravity in space.

(a) Explain why astronauts feel weightless in orbit.

[2]

[Total: 2 marks]

Q10.
Noah observes comets.

(a) State two parts of a comet.

[2]

(b) Explain why the tail of a comet always points away from the Sun.

[2]

[Total: 4 marks]

Q11.
Alex studies red-shift in distant galaxies.

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

[2]

(b) State what red-shift tells us about the universe.

[1]

[Total: 3 marks]

Q12.
Luke investigates the Big Bang.

(a) State one piece of evidence for the Big Bang.

(b) Explain why this evidence supports the theory.

[2]

[Total: 3 marks]

Q13.
William is learning about planets outside the Solar System.

(a) What is an exoplanet?

_____

[1]

(b) Give one method astronomers use to detect exoplanets.

_____

[1]

[Total: 2 marks]

Q14.
Charlie studies orbits of satellites.

(a) Explain why satellites in low Earth orbit move faster than those in geostationary orbit.

_____

_____

[2]

(b) State one advantage of using geostationary satellites for communication.

_____

[1]

[Total: 3 marks]

Q15.
James observes the night sky.

(a) State one difference between a planet and a star.

_____

(b) State one factor that affects the brightness of a star as seen from Earth.

_____

(c) Explain why the apparent brightness of a star changes over time.

[3]

[Total: 5 marks]

Higher Tier

Q16.
Ben observes planets in the Solar System.

(a) State the force that keeps planets in orbit around the Sun.

[1]

(b) Explain why the orbit of a planet is nearly circular.

[2]

[Total: 3 marks]

Q17.
Tom studies the motion of satellites.

(a) Explain the difference between a geostationary and a low Earth orbit satellite.

[2]

(b) Give one advantage of using low Earth orbit satellites for imaging.

[1]

[Total: 3 marks]

Q18.
Harry observes comets.

(a) Explain why a comet has a tail.

[2]

(b) State two parts of a comet.

[2]

[Total: 4 marks]

Q19.
Jack is investigating red-shift.

(a) Explain what is meant by red-shift in the spectrum of light from distant galaxies.

[2]

(b) Explain what red-shift tells us about the movement of galaxies.

[2]

[Total: 4 marks]

Q20.
Ethan observes stars.

(a) Explain why some stars appear brighter than others.

[2]

(b) State one factor that affects a star's luminosity.

[1]

[Total: 3 marks]

Q21.
Oliver is investigating the life cycle of stars.

(a) Describe the stages in the life of a star similar to the Sun.

[3]

(b) State the final stage of a massive star.

[1]

[Total: 4 marks]

Q22.
Sam studies the life cycle of massive stars.

(a) Explain why massive stars become supernovae.

[2]

(b) State what a supernova can form after it explodes.

[1]

[Total: 3 marks]

Q23.
Daniel investigates orbits.

(a) Explain why satellites remain in orbit around a planet.

[2]

(b) State how the speed of a satellite changes with altitude.

[1]

[Total: 3 marks]

Q24.
Jacob looks at artificial satellites.

(a) State one use of geostationary satellites.

[1]

(b) Explain why geostationary satellites must orbit above the equator.

[2]

[Total: 3 marks]

Q25.
Noah investigates telescopes.

(a) Explain why radio telescopes must be placed in remote areas.

[2]

(b) State one advantage of a space-based telescope over a ground-based telescope.

[1]

[Total: 3 marks]

Q26.
Alex studies exoplanets.

(a) Explain what is meant by an exoplanet.

[1]

(b) Describe one method used to detect exoplanets.

[2]

[Total: 3 marks]

Q27.
Luke investigates the Big Bang.

(a) State one piece of evidence that supports the Big Bang theory.

(b) Explain why this evidence supports the theory.

[2]

[Total: 3 marks]

Q28.
William looks at the Doppler effect in light.

(a) Explain how the wavelength of light changes as a galaxy moves away from Earth.

[2]

(b) Explain why this effect is called red-shift.

[1]

[Total: 3 marks]

Q29.
Charlie is learning about gravity in space.

(a) Explain why astronauts feel weightless in orbit.

[2]

(b) State the force acting on an orbiting satellite.

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[1]

[Total: 3 marks]

Q30.
James studies the effect of gravity on orbits.

(a) Explain why planets move faster when they are closer to the Sun.

---

[2]

(b) State the name of the law that describes this motion.

---

[1]

[Total: 3 marks]

Q31.
Ben investigates space probes.

(a) State one advantage of using a space probe instead of a manned mission.

(b) Give one challenge of sending a space probe.

---

[2]

[Total: 2 marks]

Q32.
Tom studies telescope resolution.

(a) Explain why larger telescopes can see more detail.

[2]

(b) State one factor that limits ground-based telescope observations.

[1]

[Total: 3 marks]

Q33.
Harry investigates the motion of moons.

(a) Explain why moons orbit planets instead of the Sun.

[2]

(b) Give an example of a moon and the planet it orbits.

[1]

[Total: 3 marks]

Q34.
Jack looks at star brightness.

(a) Explain what is meant by apparent brightness.

(b) Explain what is meant by luminosity.

(c) State one factor that affects how bright a star appears from Earth.

[3]

[Total: 3 marks]

Q35.
Ethan observes binary star systems.

(a) Explain why binary stars are important for measuring star masses.

[2]

(b) State what is meant by a light year.

[1]

[Total: 3 marks]

Q36.
Oliver studies red giants.

(a) Explain how a red giant forms from a main-sequence star.

[2]

(b) State one difference between a red giant and a white dwarf.

[1]

[Total: 3 marks]

Q37.
Sam investigates gravitational fields.

(a) Explain why gravitational field strength varies on different planets.

[2]

(b) State the unit of gravitational field strength.

[1]

[Total: 3 marks]

Q38.
Daniel studies orbital periods.

(a) Explain how the mass of a planet affects the orbital period of a satellite.

[2]

(b) Explain how the radius of orbit affects the period.

[2]

[Total: 4 marks]

Q39.
Jacob investigates the expanding universe.

(a) Explain what the observation of red-shift in all galaxies suggests.

[2]

(b) Explain one limitation of this evidence.

[1]

[Total: 3 marks]

Q40.
Noah studies the early universe.

(a) State what cosmic microwave background radiation is.

(b) Explain why it is important evidence for the Big Bang.

[2]

[Total: 3 marks]

Triple Science

Q41.
Alex investigates gravitational potential energy in space.

(a) Derive the equation for gravitational potential energy in terms of mass, gravitational field strength, and height.

[3]

[Total: 3 marks]

Q42.
Luke studies orbital mechanics.

(a) Derive the equation linking orbital speed, gravitational constant, mass of the planet, and orbital radius.

[3]

[Total: 3 marks]

Q43.
William investigates red-shift quantitatively.

(a) State the equation linking velocity, observed wavelength, and rest wavelength.

(b) Calculate the recessional velocity of a galaxy if the observed wavelength is 660 nm and the rest wavelength is 656 nm.

[3]

[Total: 3 marks]

Q44.
Charlie investigates escape velocity.

(a) Derive the formula for escape velocity from gravitational potential energy.

[3]

[Total: 3 marks]

Q45.
James studies binary stars.

(a) Explain how orbital period and separation are used to calculate star masses.

[2]

(b) State one assumption made in this calculation.

[1]

[Total: 3 marks]

Q46.
Ben studies telescope resolution.

(a) Derive the relationship between angular resolution, wavelength, and diameter of a telescope.

[3]

[Total: 3 marks]

Q47.
Tom investigates black holes.

(a) State what is meant by the event horizon of a black hole.

(b) Explain why nothing can escape from inside the event horizon.

[2]

[Total: 3 marks]

Q48.
Harry studies gravitational fields.

(a) Write the equation for gravitational force between two masses.

(b) Explain why gravitational force decreases with distance.

[2]

[Total: 3 marks]

Q49.
Jack studies the expanding universe.

(a) Explain why Hubble's law links velocity and distance of galaxies.

[2]

(b) Calculate the velocity of a galaxy 200 Mpc away, using Hubble's constant of 70 km/s/Mpc.

[2]

[Total: 4 marks]

Q50.
Ethan investigates satellites.

(a) Derive the equation linking centripetal force and gravitational force for a circular orbit.

[3]

[Total: 3 marks]

Q51.
Oliver studies the cosmic microwave background.

(a) Explain why the CMB is evidence for the Big Bang.

[2]

(b) State one limitation of using CMB as evidence.

[1]

[Total: 3 marks]

Q52.
Sam calculates orbital energy.

A satellite of mass 500 kg orbits Earth at 300 km above the surface.

(a) Calculate its gravitational potential energy relative to infinity.

[3]

[Total: 3 marks]

Q53.
Daniel studies space probes.

(a) Explain why probes must escape Earth's gravity.

[2]

(b) Calculate the minimum escape speed from Earth if mass = 5.97×10^{24} kg and radius = 6.37×10^{6} m.

[3]

[Total: 5 marks]

Q54.
Jacob observes orbital periods.

(a) State Kepler's Third Law.

(b) A satellite orbits with radius 2×10^7 m. Calculate the square of its orbital period using Kepler's law.

[3]

[Total: 3 marks]

Q55.

Noah studies gravitational waves.

(a) Explain what gravitational waves are.

[2]

(b) State one method used to detect gravitational waves.

[1]

[Total: 3 marks]