AQA Combined Science GCSE Trilogy

Physics Paper 2 AO1 Questions

Forces

1. What is the difference between a scalar and a vector quantity?
2. An arrow can represent a vector quantity. What do the arrow's length and direction represent?
3. What is a force?
4. Give 4 examples of contact forces.
5. Give 3 examples of non-contact forces.
6. Is force a scalar or a vector quantity?
7. Draw a force diagram to show the forces acting on a book at rest on a shelf.
8. What is weight?
9. What causes us to feel the force of gravity at the Earth's surface?
10. What two factors affect the weight experienced by an object?
11. What unit is weight measured in?
12. Calculate the weight experienced by a 50kg mass at the Earth's surface.
13. What is an object's centre of mass?
14. Which instrument can be used to measure weight?
15. What is a resultant force?
16. What is the resultant force acting on a car whose engine provides 1500N of motive force and it experiences 1100N of drag?
17. (HT) Draw a free body diagram to show the 3 forces acting on a rising bubble of gas in a glass of fizzy drink.
18. (HT) What does 'resolving' a force mean?
19. What is work done?
20. What is the equation for calculating work done?
21. What unit is work done measured in?
22. How many Newton-metres is 12 Joules equivalent to?
23. When work is done by a car's brakes to slow a car down using friction, what happens to the temperature of the brake discs?
24. What is the difference between elastic and inelastic deformation?
25. What is the extension of an elastic object, such as a spring, directly proportional to?
26. What is the equation that defines this relationship?
27. What are the units of the spring constant?
28. What form of energy is stored in a spring when it is stretched?
29. How much elastic potential energy is stored in a spring extended by 0.3m with a spring constant of 1.5N/kg? ($E_p = ½ k e^2$)
30. What is distance?
31. What is displacement?
32. What is speed?
33. What might affect the walking speed of a person?
34. What is the typical walking speed of a person?
35. What is the typical running speed of a person?
36. What is the typical cycling speed of a person?
37. What is the typical speed of a car in m/s?
38. What is the typical cruising speed of a passenger aeroplane?

39. What is the typical value of the speed of sound in m/s?
40. What is the equation that links distance travelled, speed and time?
41. What is the average speed of a cyclist who covers 180m in 30 seconds?
42. What is velocity?
43. What is the difference between velocity and speed?
44. How can you calculate the speed of an object from a distance-time graph?
45. (HT) How can you calculate the acceleration of an object from a distance-time graph?
46. What is acceleration?
47. What are the units of measurements for acceleration?
48. What is the equation for calculating acceleration?
49. When is an object decelerating?
50. What is the acceleration due to gravity at the Earth's surface?
51. How can acceleration be calculated from a velocity-time graph?
52. (HT) How can the distance travelled be calculated from a velocity-time graph?
53. What is the final velocity of an object that accelerates from rest with an acceleration of $2m/s^2$ over a distance of 10m? ($v^2 = u^2 + 2as$)
54. What is terminal velocity?
55. What is Newton's first law?
56. (HT) What is inertia?
57. What is Newton's second law?
58. What is the magnitude of force experienced by an object of mass 20kg accelerated at $2m/s^2$?
59. (HT) What is inertial mass?
60. What is the symbol for approximate value or approximate answer?
61. What is Newton's third law?
62. What is the stopping distance of a vehicle?
63. What is the thinking distance of a braking vehicle?
64. What is the braking distance of a braking vehicle?
65. What is the typical reaction time of a person?
66. Which factors can affect the braking distance of a vehicle?
67. What is the equation that defines momentum?
68. What units is momentum measured in?
69. What is the principle of conservation of momentum?

Waves

1. What are the 2 types of wave?
2. Ripples on the surface of water are examples of which type of wave?
3. Sound waves are an example of which type of wave?
4. What are the differences between the 2 types of wave?
5. Define the following wave related terms:
    a. Amplitude
    b. Wavelength
    c. Frequency
    d. Period
6. What is the equation that links time period to frequency?
7. What is the unit of frequency?
8. What is the frequency of a wave with a time period of 5 seconds?
9. What is wave speed?
10. What is the equation that links wave speed, frequency and wavelength?
11. Sketch a diagram of a wave with a high amplitude and high frequency.

12. Sketch a diagram of a wave with a low amplitude and low frequency.
13. How could you measure the speed of sound in air?
14. How could you measure the speed of ripples on the surface of water?
15. What are electromagnetic waves?
16. What are the groups of the electromagnetic spectrum?
17. Order these groups in order of increasing frequency.
18. Which group of the electromagnetic spectrum do our eyes detect waves of?
19. (HT) What causes refraction?
20. Draw a ray diagram to show refraction of a light wave at the boundary between glass and air.
21. (HT) How are radio waves produced?
22. (HT) What can be created when radio waves are absorbed by a conductor?
23. What causes gamma rays to be emitted from an atom?
24. Which groups of the electromagnetic spectrum can have hazardous effects on human body tissue?
25. What is measured in millisieverts?
26. How many millisieverts are in 40 sieverts?
27. What are the potential consequences of exposure to ultraviolet radiation?
28. What are the potential consequences of exposure to X-rays or gamma rays?
29. What do we use radio waves for?
30. What do we use microwaves for?
31. What do we use infrared radiation for?
32. What do we use visible light for?
33. What do we use ultraviolet light for?
34. What do we use X-rays and gamma rays for?

Magnetism & Electromagnetism

1. How do you define where the poles of a magnet are?
2. Is the force between two like poles attractive or repulsive?
3. Is the force between two unlike poles attractive or repulsive?
4. What is the difference between a permanent and an induced magnet?
5. Is the force arising from induced magnetism attractive or repulsive?
6. What is the magnetic field of a magnet?
7. How do you decide the direction of a magnetic field at any point?
8. How does a magnetic compass work?
9. Draw the magnetic field of a typical bar magnet.
10. What is produced when a current flows through a conducting wire?
11. How can the strength of the magnetic field of a wire be increased?
12. What is a solenoid?
13. What is the shape of the magnetic field of a solenoid like?
14. What is the difference between an electromagnet and a solenoid?
15. Draw the magnetic field pattern for a straight current carrying wire and for a solenoid.
16. (HT) What is the motor effect?
17. (HT) Which 3 quantities are related using Fleming's left-hand rule?
18. (HT) Which factors can affect the size of the force experienced by a current carrying conductor in a magnetic field?
19. (HT) What are the units of magnetic flux density?
20. (HT) What is the magnetic flux density of the uniform magnetic field which exerts a force of 5N on a 0.6m length of wire carrying 0.2A? (F = BIL)
21. (HT) Describe the likely motion of a coil of wire carrying a current in a uniform magnetic field.

Practical Knowledge Needed:

- Which instrument can be used to measure the weight acting on an object?
- How could you find the spring constant of a spring experimentally?
- How could you investigate the relationship between the force on a spring and its extension?
- What would you need to measure in order to find the speed of an object?
- Describe an experiment that could be carried out to investigate the effect of varying the force applied to an object of constant mass on its acceleration.
- Describe an experiment that could be carried out to investigate the effect of varying an object's mass could have on the acceleration provided by applying a constant force.
- Describe an experiment using light gates and data loggers that could be done to verify the principle of conservation of momentum.
- How could you measure the speed of sound in air?
- How could you measure the speed of ripples on the surface of water?
- What is the best apparatus to measure the speed, frequency and wavelength of waves in a ripple tank?
- How could you investigate how the amount of infrared radiation absorbed by a black surface is different to that absorbed by a silver surface?
- How can you plot the magnetic field pattern of a bar magnet using a compass?
- How can you use a compass to show the magnetic effect of a current?

Maths Skills Needed:

- What is the symbol for proportionality?
- What is the symbol for approximate value?
- Convert 0.16m to cm.
- Convert 50 km/h into m/s.
- Plot the distance-time graph of the following data:

Time (s)	Distance (m)
1	2
2	4
3	6
4	8
5	10
6	10
7	10
8	10
9	10
10	15
11	20
12	25
13	30
14	35
15	40

- Identify the section(s) of the graph where the object is stationary.
- Calculate the gradient of the sloped sections of the graph to find the speeds in those sections.
- Estimate how the distance required for a road vehicle to stop in an emergency varies over a range of typical speeds.