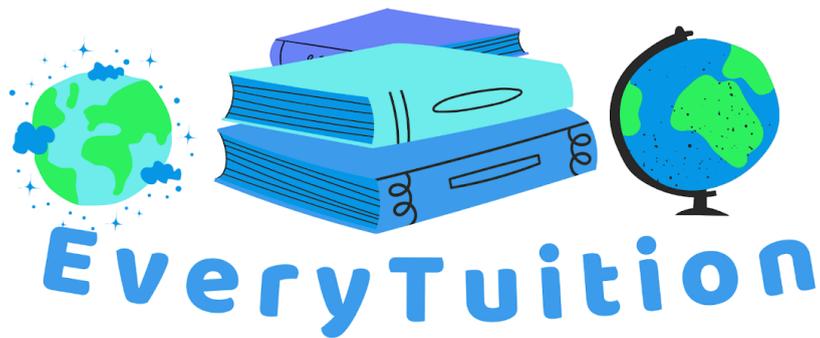


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## **GCSE Physics Topic 5 AQA: Forces**

**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.**

Jack is learning about forces.

(a) State the unit of force.

---

[1]

**Q2.**

Harry pushes a box across the floor.

(a) State one contact force acting on the box.

---

[1]

(b) State one non-contact force acting on the box.

---

[1]

[Total: 2 marks]

**Q3.**

Ben is revising mass and weight.

(a) Write the equation that links weight, mass and gravitational field strength.

---

[1]

(b) A box has a mass of 10 kg. The gravitational field strength is 10 N/kg.  
Calculate the weight of the box.

---

---

[2]

[Total: 3 marks]

**Q4.**

Daniel is looking at resultant forces.

Two forces act on a toy car: 8 N to the right and 3 N to the left.

(a) Calculate the resultant force.

---

[1]

(b) State the direction of the resultant force.

---

[1]

[Total: 2 marks]

**Q5.**

Oliver studies speed.

(a) Write the equation for speed.

---

[1]

(b) A cyclist travels 600 m in 50 s.  
Calculate the average speed.

---

---

[2]

[Total: 3 marks]

**Q6.**

Ethan is learning about vectors.

(a) Explain what is meant by a vector quantity.

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---

[2]

(b) Give one example of a vector quantity.

---

[1]

[Total: 3 marks]

**Q7.**

Sam is revising Hooke's law.

(a) State the equation that links force, spring constant and extension.

---

[1]

(b) A spring has a spring constant of 200 N/m. Its extension is 0.1 m.  
Calculate the force on the spring.

---

---

[2]

[Total: 3 marks]

**Q8.**

Charlie is studying work done.

(a) Write the equation that links work done, force and distance.

---

[1]

(b) A force of 15 N moves a box 2 m.  
Calculate the work done.

---

---

[2]

[Total: 3 marks]

**Q9.**

Noah drops an object.

(a) State the force that causes the object to fall towards the ground.

---

[1]

(b) Explain why the object eventually reaches terminal velocity.

---

---

[2]

[Total: 3 marks]

**Q10.**

Jacob is revising pressure.

(a) Write the equation that links pressure, force and area.

---

[1]

(b) A force of 20 N acts on an area of 2 m<sup>2</sup>.  
Calculate the pressure.

---

---

[2]

[Total: 3 marks]

**Q11.**

William is studying density.

(a) Write the equation for density.

---

[1]

(b) A block has a mass of 500 g and a volume of 0.0002 m<sup>3</sup>.  
Calculate the density.

---

---

[2]

[Total: 3 marks]

**Q12.**

Alex is learning about distance–time graphs.

(a) On a distance–time graph, what does a horizontal line represent?

---

[1]

(b) What does the gradient of the line represent?

---

[1]

[Total: 2 marks]

**Q13.**

Luke is studying velocity–time graphs.

(a) On a velocity–time graph, what does the gradient of the line represent?

---

[1]

(b) What does the area under the line represent?

---

[1]

[Total: 2 marks]

**Q14.**

James is revising momentum.

(a) Write the equation for momentum.

---

[1]

(b) A car of mass 1200 kg moves at 15 m/s.  
Calculate its momentum.

---

---

[2]

[Total: 3 marks]

**Q15.**

Tom investigates stopping distances.

(a) State the two parts of stopping distance.

---

---

[2]

(b) Give one factor that affects braking distance.

---

[1]

[Total: 3 marks]

## Higher Tier

### Q16.

Ben pulls a toy car with a force of 12 N at an angle of  $30^\circ$  to the horizontal.

(a) State what is meant by the term *resultant force*.

---

---

[2]

(b) Explain how the horizontal and vertical components of the force can be calculated.

---

---

---

[3]

[Total: 5 marks]

### Q17.

Harry studies weight and mass.

(a) Write the equation linking weight, mass and gravitational field strength.

---

[1]

(b) A planet has a gravitational field strength of 2.5 N/kg.

A rock on this planet has a mass of 30 kg.

Calculate its weight.

---

---

[2]

[Total: 3 marks]

**Q18.**

James investigates Newton's second law.

(a) State Newton's second law of motion.

---

---

[2]

(b) A resultant force of 50 N acts on a mass of 10 kg.  
Calculate the acceleration.

---

---

[2]

[Total: 4 marks]

**Q19.**

Oliver is testing springs.

(a) Define the term *elastic deformation*.

---

---

[2]

(b) A spring with spring constant 300 N/m is stretched by 0.04 m.  
Calculate the force applied.

---

---

[2]

(c) State what happens to the spring if it is stretched beyond its elastic limit.

---

---

[2]

[Total: 6 marks]

**Q20.**

Ethan measures pressure in a fluid.

(a) State the equation linking pressure, height of column, density and gravitational field strength.

---

[1]

(b) A liquid has a density of  $1000 \text{ kg/m}^3$ . The column of liquid is 5 m high.

$g = 9.8 \text{ N/kg}$ .

Calculate the pressure at the bottom of the column.

---

---

[3]

[Total: 4 marks]

**Q21.**

Jack studies resultant forces.

A car experiences a driving force of 3000 N and a resistive force of 2200 N.

(a) Calculate the resultant force.

---

---

[2]

(b) Explain what will happen to the motion of the car.

---

---

[2]

[Total: 4 marks]

**Q22.**

Luke investigates acceleration.

(a) Write the equation that links final velocity, initial velocity, acceleration and distance.

---

[1]

(b) A car accelerates from 12 m/s to 20 m/s over a distance of 64 m.  
Calculate the acceleration.

---

---

[3]

[Total: 4 marks]

**Q23.**

Jacob studies momentum.

(a) Write the equation for momentum.

---

[1]

(b) A van of mass 2000 kg moves at 12 m/s.  
Calculate its momentum.

---

---

[2]

(c) Explain why momentum is always conserved in collisions.

---

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---

[3]

[Total: 6 marks]

**Q24.**

Tom is learning about inertia.

(a) State what is meant by *inertia*.

---

---

[2]

(b) Explain how the inertial mass of an object can be determined.

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---

[3]

[Total: 5 marks]

**Q25.**

William is looking at distance–time graphs.

(a) On a distance–time graph, state what the gradient of the line shows.

---

[1]

(b) A straight line on a distance–time graph has a gradient of 4.  
State the speed of the object.

---

---

[1]

[Total: 2 marks]

**Q26.**

Charlie looks at velocity–time graphs.

(a) What does the gradient of a velocity–time graph represent?

---

[1]

(b) A car accelerates uniformly from 0 to 25 m/s in 10 seconds.  
Calculate the acceleration.

---

---

[2]

(c) Calculate the distance travelled in this time.

---

---

[2]

[Total: 5 marks]

**Q27.**

Daniel investigates stopping distances.

(a) State the two components of stopping distance.

---

---

[2]

(b) Give two factors that affect a driver’s thinking distance.

---

---

[2]

(c) Explain why braking distance increases if road conditions are poor.

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---

[2]

[Total: 6 marks]

**Q28.**

Alex studies levers.

(a) State one way a lever makes a task easier.

---

[1]

(b) Write the equation that links moment, force and distance.

---

[1]

(c) A spanner applies a force of 40 N at a distance of 0.25 m from a pivot.  
Calculate the moment.

---

---

[2]

[Total: 4 marks]

**Q29.**

Sam is revising pressure in gases.

(a) Explain why gas pressure increases as temperature increases.

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---

[3]

(b) A balloon is heated and expands. State why the pressure inside the balloon does not continue to increase.

---

---

[2]

[Total: 5 marks]

**Q30.**

Noah studies resultant forces.

A resultant force of 600 N acts on a 1500 kg car.

(a) Calculate the acceleration.

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[2]

(b) The same car doubles its mass by pulling a trailer.  
Explain how this affects the acceleration if the force remains the same.

---

---

[2]

[Total: 4 marks]

**Q31.**

James is investigating elastic potential energy.

(a) Write the equation linking elastic potential energy, spring constant and extension.

---

[1]

(b) A spring with a spring constant of 200 N/m is stretched by 0.15 m.  
Calculate the energy stored.

---

---

[2]

[Total: 3 marks]

**Q32.**

Ben is learning about free-body diagrams.

(a) Draw and label the forces acting on a book resting on a table.

---

[2]

(b) Explain why the book does not move.

---

---

[2]

[Total: 4 marks]

**Q33.**

Oliver studies acceleration.

(a) State the equation that links force, mass and acceleration.

---

[1]

(b) A force of 80 N acts on a trolley of mass 20 kg.  
Calculate the acceleration.

---

---

[2]

[Total: 3 marks]

**Q34.**

Jacob studies atmospheric pressure.

(a) Explain why atmospheric pressure decreases with altitude.

---

---

[2]

(b) Suggest why mountaineers may find it difficult to breathe at very high altitudes.

---

---

[2]

[Total: 4 marks]

**Q35.**

Harry investigates force and extension.

He collects data for a spring:

Force (N): 2, 4, 6, 8, 10

Extension (cm): 1.0, 2.0, 3.0, 4.0, 5.0

(a) State the relationship between force and extension.

---

[1]

(b) Calculate the spring constant from the data.

---

---

[2]

(c) Explain why the graph of force against extension is a straight line through the origin.

---

---

[2]

[Total: 5 marks]

**Q36.**

Luke studies resultant forces.

Two forces act on a box: 12 N north and 9 N east.

(a) State how you would calculate the resultant force.

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---

[2]

(b) Calculate the resultant force. (Show your working.)

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---

[3]

[Total: 5 marks]

**Q37.**

William investigates moments.

(a) A 500 N child sits 2 m from the pivot of a seesaw.

Calculate the moment.

---

---

[2]

(b) Another child sits on the other side of the pivot.  
Explain how you could balance the seesaw.

---

---

[2]

[Total: 4 marks]

**Q38.**

Charlie investigates stopping distances.

(a) State one factor that increases thinking distance.

---

[1]

(b) State one factor that increases braking distance.

---

[1]

(c) Explain why high speeds increase overall stopping distance.

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---

[2]

[Total: 4 marks]

**Q39.**

Daniel studies terminal velocity.

(a) Explain why an object falling through air initially accelerates.

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[2]

(b) Explain why the object eventually reaches a constant speed.

---

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[2]

[Total: 4 marks]

**Q40.**

Alex is investigating velocity–time graphs.

A car accelerates uniformly from rest to 30 m/s in 15 s.

(a) Calculate the acceleration.

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---

[2]

(b) Calculate the distance travelled in this time.

---

---

[2]

[Total: 4 marks]

## Triple Science

**Q41.**

Tom investigates moments.

(a) Define the principle of moments.

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[2]

(b) A beam is balanced on a pivot.

Explain what this shows about the clockwise and anticlockwise moments.

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[2]

[Total: 4 marks]

**Q42.**

James investigates atmospheric pressure in liquids.

(a) Explain why pressure increases with depth in a liquid.

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---

[2]

(b) A diver swims to a depth of 20 m. The density of seawater is  $1025 \text{ kg/m}^3$ .

Calculate the pressure due to the water. ( $g = 9.8 \text{ N/kg}$ )

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[3]

[Total: 5 marks]

**Q43.**

Jacob studies pendulums.

(a) State one factor that affects the time period of a pendulum.

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[1]

(b) Explain how the pendulum demonstrates simple harmonic motion.

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[2]

[Total: 3 marks]

**Q44.**

Ben investigates momentum.

Two trolleys collide on a smooth track.

(a) State the principle of conservation of momentum.

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[2]

(b) Trolley A has a mass of 2 kg and a velocity of 3 m/s.

Trolley B has a mass of 1 kg and is stationary.

They stick together after the collision.

Calculate their final velocity.

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[3]

[Total: 5 marks]

**Q45.**

Oliver investigates car crashes.

(a) Explain how seat belts reduce the risk of injury using ideas of force, momentum and time.

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[3]

(b) Explain why crumple zones are also used.

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---

[2]

[Total: 5 marks]

**Q46.**

William studies pressure in gases.

(a) State the equation linking pressure and volume for a fixed mass of gas at constant temperature.

---

[1]

(b) A gas has a pressure of 200 kPa and a volume of 1.5 m<sup>3</sup>.  
Calculate the new pressure if the volume is reduced to 0.5 m<sup>3</sup>.

---

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[3]

[Total: 4 marks]

**Q47.**

Luke investigates atmospheric pressure.

(a) Explain why suction cups stick to a window.

---

---

[2]

(b) State why the force due to atmospheric pressure is not usually noticed.

---

---

[2]

[Total: 4 marks]

**Q48.**

Ethan studies floating and sinking.

(a) State the condition required for an object to float in a liquid.

---

[1]

(b) Explain why a ship floats even though it is made of steel.

---

---

[2]

[Total: 3 marks]

**Q49.**

Daniel investigates elastic potential energy.

(a) Write the equation for elastic potential energy.

---

[1]

(b) A spring with  $k = 250 \text{ N/m}$  is stretched by  $0.20 \text{ m}$ .  
Calculate the energy stored.

---

---

[2]

[Total: 3 marks]

**Q50.**

Harry investigates pressure in a liquid.

(a) Explain why an object experiences upthrust when placed in a liquid.

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---

[2]

(b) State Archimedes' principle.

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---

[2]

[Total: 4 marks]

**Q51.**

Alex studies atmospheric pressure in weather.

(a) Explain why weather balloons expand as they rise in the atmosphere.

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[2]

(b) A balloon has a volume of  $1.0 \text{ m}^3$  at  $100 \text{ kPa}$ .  
If the pressure falls to  $25 \text{ kPa}$ , calculate the new volume.

---

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[3]

[Total: 5 marks]

**Q52.**

Jacob investigates fluid pressure.

(a) Write the equation linking pressure, force and area.

---

[1]

(b) A piston with area  $0.02 \text{ m}^2$  experiences a pressure of  $300 \text{ kPa}$ . Calculate the force acting on it.

---

---

[2]

[Total: 3 marks]

**Q53.**

Tom studies terminal velocity of objects falling in fluids.

(a) Explain why a parachutist reaches terminal velocity after jumping.

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[2]

(b) Explain why opening the parachute reduces the terminal velocity.

---

---

[2]

[Total: 4 marks]

**Q54.**

Charlie investigates levers.

(a) Explain how levers are force multipliers.

---

---

[2]

(b) A lever applies a force of  $50 \text{ N}$  at a distance of  $0.4 \text{ m}$  from the pivot. Calculate the moment.

---

---

[2]

[Total: 4 marks]

**Q55.**

Sam studies pressure in gases.

(a) State one way to increase the pressure of a fixed mass of gas.

---

[1]

(b) Explain why increasing the temperature of a gas increases its pressure.

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[2]

[Total: 3 marks]