Chapter 34 Motion

Ordinary & higher level | Edco Exploring Science (Revised Edition)

PHYSICS

Chapter 34 Theory Questions

Name: Date:

1 Which two fundamental ideas in physics are used to describe motion?

(a) time

(b) distance 2(5)

2 (a) Write down the definition of speed.

Speed is distance traveled divided by time taken.

(b) Write down the formula used to measure speed.

$S = D/T$ 2(5)

3 A cyclist travels a distance of 36 m in 8 seconds.

(a) What is the speed of the cyclist in m/s? $S = D/T = 36/8 = 4.5$ m/s

(b) What distance would the cyclist travel in 1 hour? $60 \times 60 = 3600$ s in 1 hour

$D = 4.5(3600) = 16200$ m 2(5)

4 A car is travelling at 50 km/hr.

(a) What is the speed of the car in m/s? 50 km/h $= (50{,}000/3600)$ m/s $= 13.\dot{8}$ m/s

(b) How long would it take the car to travel 400 km? $400 = 8(50) \Rightarrow 8$ hours 2(5)

5 (a) Write down the definition of acceleration.

acceleration is change in velocity divided by time

(b) What are the standard units of acceleration?

m/s^2 or ms^{-2} 2(5)

6 A car increases its speed from 11 m/s to 17 m/s in 5 seconds.

What is the acceleration of the car? $a = (17-11)/5 = 1.2$ m/s^2 (10)

7 A motorcyclist increases her speed from 40 km/hr to 60 km/hr in 3 seconds. $3s = \frac{3}{3600} = \frac{1}{1200}$ hr

(a) What is her acceleration in km/hr? * $a = (60-40)/(1/1200) = 24000$ km/h^2

(b) What is her acceleration in m/s? * $a = (50/9)/3 = 1.85\dot{1}$ m/s^2 2(5)

$60-40 = 20$ km/h $= \frac{50}{9}$ m/s

* units incorrect

8 Write down two pieces of information that can be found from a distance-time graph.

(a) Velocity at a time

(b) position at a time 2(5)

9 If the distance-time graph for an object is a straight line, then the speed of the body is the same as a concept from mathematics.

(a) What is the mathematical concept?

they are directly proportional ⇒ uniform motion

(b) Why is it much more difficult to find the speed of an object if its graph is not a straight line?

motion isn't uniform

2(5)

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* 10 (a) What is meant by deceleration?

negative acceleration

slowing down

(b) What mathematical symbol is used to indicate deceleration?

a 2(5)

Higher level only

10 (a) What is the difference between speed and velocity?

speed - distance divided by time.

Velocity - speed in a particular direction.

(b) How can an object have a constant speed and still have a change in velocity?

its direction is changing. 2(5)

Chapter 35 Force and Motion

Ordinary & higher level | Edco Exploring Science (Revised Edition)

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Chapter 35 Theory Questions

Name: Date:

1 (a) What is the definition of force? Force causes acceleration. (4)

(b) Write down two effects that a force can have on a body.

make it speed up (or slow down) (3)

make it change shape (3)

2 (a) Name the scientist who described three laws of motion.

Isaac Newton

(b) What is the unit of force?

Newton 2(5)

3 Write down five different kinds of force.

(a) Weight (Gravity)

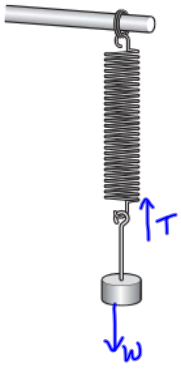
(b) Friction

(c) Magnetic

(d) Electrical

(e) Push / Pull 5(2)

4 Use arrows to show the forces acting on the mass in the diagram.



(10)

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5 (a) What is friction? a force caused by surfaces rubbing off of each other, it acts against motion. (4)

(b) Name a situation in which friction is an advantage and one where it is a disadvantage.

Advantage Car breaks. (3)

Disadvantage Wind resistance slowing a car when you want it to move efficiently. (3)

6 (a) What is lubrication? It reduces friction by smoothing surfaces causing friction. eg.. oil is a lubricant.

(b) Give an example of a machine in which lubrication is used. Car uses oil 2(5)

7 (a) Write down an equation relating force and acceleration. $F = ma$

(b) What is the weight of a body? force of gravity. $W = mg$ ($g \approx 10\ m/s^2$) $W = 10m$ 2(5)

* 8 Why is the weight of a body different at sea-level and at the top of Mount Everest? Very small difference Force of gravity is less. (10)

9 (a) Calculate the force that is needed to give a mass of 5 kg an acceleration of 3 m/s. $F = ma$ $F = (5)(3) = 15\ N$

(b) What acceleration does a force of 20 N give a body of mass 4 kg? $F = ma$ $20 = 4a \Rightarrow a = 5\ m/s^2$ 2(5)

10 State Hooke's Law. The extension of a spiral spring is directly proportional to the force causing it. (10)

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Higher level only

8 (a) Write down an equation connecting weight to mass.

$W = Mg$ or $W = 10m$ $(g \approx 10\ m/s^2)$ (4)

(b) Calculate the force of gravity on the following objects:

(i) a bag of sugar of mass 2 kg $W = 10m = 10(2) = 20N$ (3)

(ii) a person of mass 60 kg $W = 10(60) = 600\ N$ (3)

Mandatory Activity 22 Questions

To investigate the relationship between the extension in a spring and the restoring force

(Text book page 261)

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1 In this activity, what piece of apparatus is used to measure the stretch or extension in the spring? metre stick

2 What piece of apparatus is used to measure the force put on the spring?

newton spring (or scales)

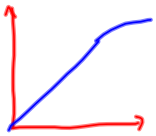
3 The extension in the spring when a force is put on it is not the length of the spring.

What do you have to subtract from the length of the spring to find the extension?

the starting length of the spring

4 Name the two quantities that are plotted on the axes of a graph.

x-axis: Force *y*-axis: Extension



5 When you plot your measurements what kind of a graph do you get?

Straight line

6 The graph illustrates a law. Who is the law named after?

Hooke's Law

7 State the law that is illustrated in this activity.

The extension of a spring is proportional to the force causing it.

Chapter 36 Turning Effect of Forces, Levers

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Chapter 36 Theory Questions

Name: Date:

1 Lifting a ladder in the middle is much easier than lifting it at one end. Why?

easier to hold in centre because of no turning effect. (10)

2 Define the centre of gravity of a body.

point through which the weight of a body appears to act. (10)

3 Name the two properties that make buildings and vehicles stable.

(a) Low centre of gravity

(b) Wide base 2(5)

4 Complete the following statements.

(a) An object is in stable equilibrium if after a slight movement it will return to its origional position.

(b) An object is in unstable equilibrium if topples easily 2(5)

5 Give an everyday example of a body

(a) in stable equilibrium a table

(b) in unstable equilibrium bicycle not moving 2(5)

6 Define the terms:

(a) lever a rigid body free to rotate about a fulcrum

(b) fulcrum - pivot or hinge 2(5)

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7 Give five everyday examples of levers.

(a) crow bar

(b) Sicssors

(c) door handle

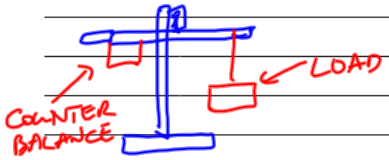
(d) Steering wheel

(e) wheel barrow 5(2)

8 State the law of the lever.

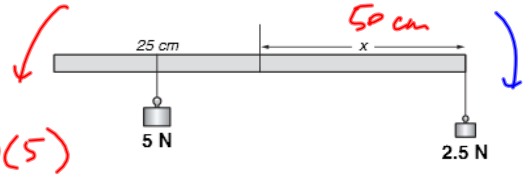
If a lever is balanced then the clockwise moments equal the anti-clockwise moments. (10)

9 Describe how the law of the lever is illustrated by a crane lifting a load.



(10)

10 A metre stick is suspended at its centre. A 5 N weight is placed at the 25 cm point to the left of the centre. Where would you put the 2.5 N weight to balance the metre stick?



50 cm

$x(2.5)$

$50(2.5)$

$= 125$ Ncm

$(25)(5)$

$= 125$ Ncm

(10)

$\frac{125}{2.5} = 50$

Chapter 37 Pressure

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Chapter 37 Theory Questions

Name: Date:

1 (a) Define pressure.

force divided by Area.

(b) Write down an equation that connects force and pressure.

$P = F/A$ 2(5)

2 (a) What is the unit of pressure? Pascal (Pa)

(b) The unit is named after which scientist? Pascal 2(5)

3 (a) What pressure is exerted by a force of 50 N on an area of 2 m^2?

$P = F/A = 50/2 = 25$ N/m^2 (or Pa)

(b) What pressure is exerted by a force of 20 N on the bottom of a square box with 10 cm sides? $P = F/A = 20/100 = 1/5$ N/cm^2 2(5)

Area $100\,cm^2$ 10 cm 10cm

4 The pressure on the bottom of a rectangular box is 0.2 N/cm^2. The length of the box is 30 cm and the width is 10 cm. Find:

(a) the area of the bottom of the box.

$A = LB = (30)(10) = 300$ cm^2

(b) the force on the bottom of the box.

$P = F/A$ $0.2 = F/300$ $F = 300(0.2) = 60N$ 2(5)

300 cm^2 30cm 10cm

5 Name two other materials apart from solids that exert pressure.

(a) AIR

(b) WATER 2(5)

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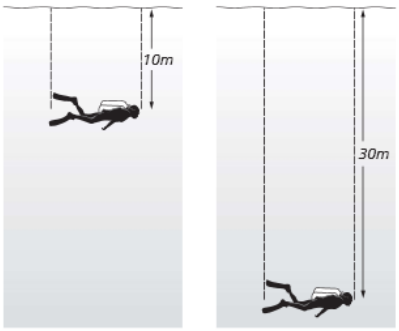
6 Explain why a diver at a depth of 30 m in water experiences a greater pressure than a diver at 10 m.

pressure increases with depth.

(10)



7 (a) What are pistons used for in machines?

transfer pressure

(b) Name an industrial machine that uses pistons.

train

2(5)

8 A 50 N force is applied to a piston with an area of 10 cm^2. If this pressure is transferred to a piston of area 250 cm^2, what is the force on the larger piston?

$P = F/A = 50/10 = 5\ N/cm^2$

$P = F/A \quad F = PA = (250)(5) = 1250\ N$

(10)

9 (a) What is the cause of atmospheric pressure?

the weight of air

(b) Why is the atmospheric pressure in Dublin greater than in Mexico City?

Mexico City is at altitude. Air pressure reduces with altitude.

2(5)

* 10 (a) How does a mercury barometer measure atmospheric pressure?

by the height it rises in the tube

(b) Name one instrument that uses a barometer.

Altimeter

2(5)

Higher level only

10 (a) What do the lines on a weather chart show?

Air pressure

(5)

(b) Name the type of weather that is usually associated with:

(i) low pressure wet

(3)

(ii) high pressure clear, fair

(2)

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