



Cambridge O Level

PHYSICS

5054/12

Paper 1 Multiple Choice

May/June 2024

1 hour

You must answer on the multiple choice answer sheet.

You will need: Multiple choice answer sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

INSTRUCTIONS

- There are **forty** questions on this paper. Answer **all** questions.
- For each question there are four possible answers **A**, **B**, **C** and **D**. Choose the **one** you consider correct and record your choice in soft pencil on the multiple choice answer sheet.
- Follow the instructions on the multiple choice answer sheet.
- Write in soft pencil.
- Write your name, centre number and candidate number on the multiple choice answer sheet in the spaces provided unless this has been done for you.
- Do **not** use correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- Take the weight of 1.0 kg to be 9.8 N (acceleration of free fall = 9.8 m/s^2).

INFORMATION

- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.

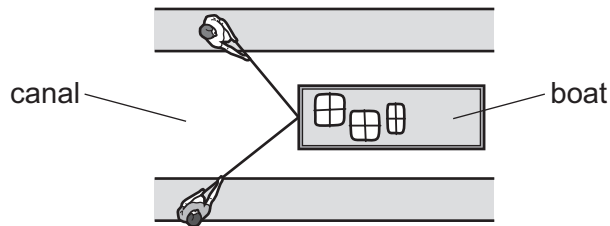
This document has **16** pages. Any blank pages are indicated.



1 What is measured using a micrometer?

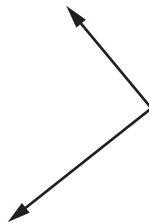
- A area
- B current
- C length
- D mass

2 Two people pull on ropes to move a boat along a canal.

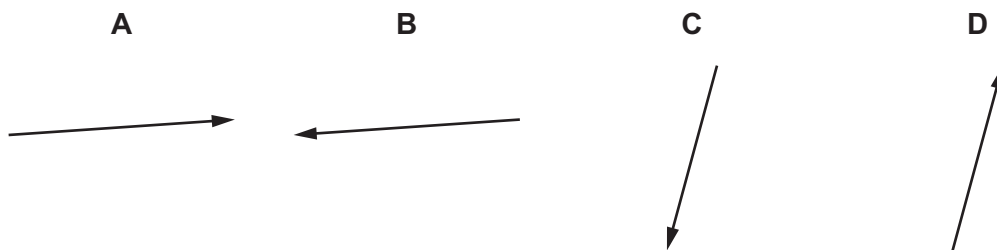


The boat moves at a constant velocity.

The vector diagram for the tension in the ropes is shown.

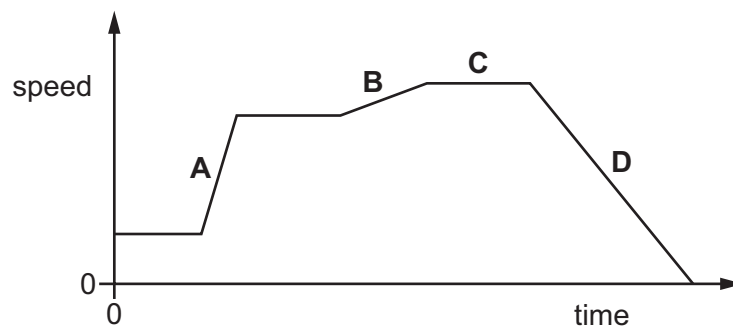


Which vector is the drag acting on the boat?



3 The graph shows how the speed of a car travelling in a straight line changes with time.

Which section shows the largest acceleration?



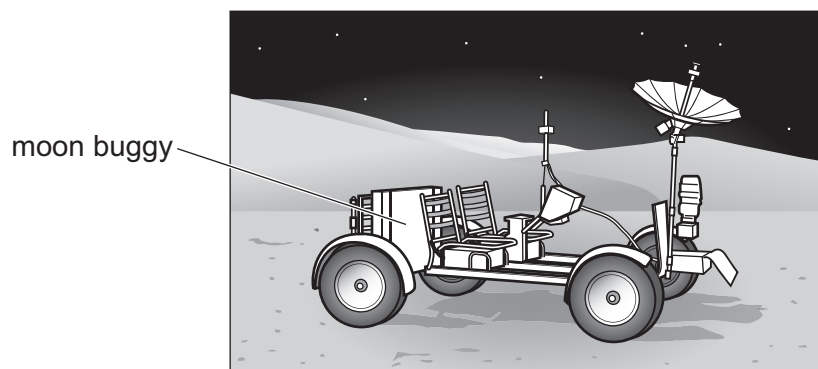
- 4 A man walks along a path from X to Y. The diagram shows the path from above.



The man measures the distance he walks and the time taken.

Which quantity can be calculated using this data only?

- A acceleration
 - B average speed
 - C average velocity
 - D power
- 5 Which property of an object determines its resistance to a change from its state of rest or motion?
- A its mass
 - B its shape
 - C its surface area
 - D its volume
- 6 The diagram shows a moon buggy used by astronauts.



The mass of the moon buggy on the Earth is 210 kg. The gravitational field strength on the Moon is $\frac{1}{6}$ of that on the Earth.

What is the weight of the moon buggy on the Moon?

- A zero B 35 N C 210 N D 340 N

- 7 A car travels along a road. The force on the car due to the engine is 800 N.

The motion of the car depends on the value of the total resistive force R .



Which row shows the motion of the car for the given value of R ?

	value of resistive force R/N	motion
A	500	deceleration
B	800	acceleration
C	900	deceleration
D	1000	acceleration

- 8 Four of the gravitational forces that act between objects in the Solar System are listed.

P the force on the Moon due to the Earth

Q the force on the Earth due to the Sun

R the force on the Earth due to the Moon

S the force on the Moon due to the Sun

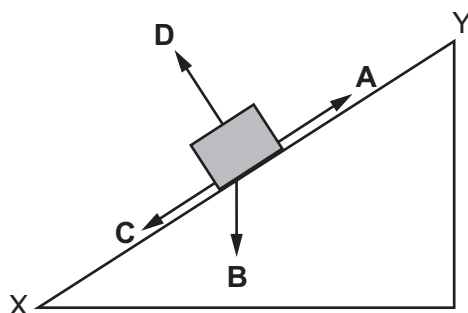
Which two forces are a Newton's third law pair?

- A** P and Q **B** P and R **C** Q and S **D** R and S

- 9 A box is moved up a rough slope from X to Y.

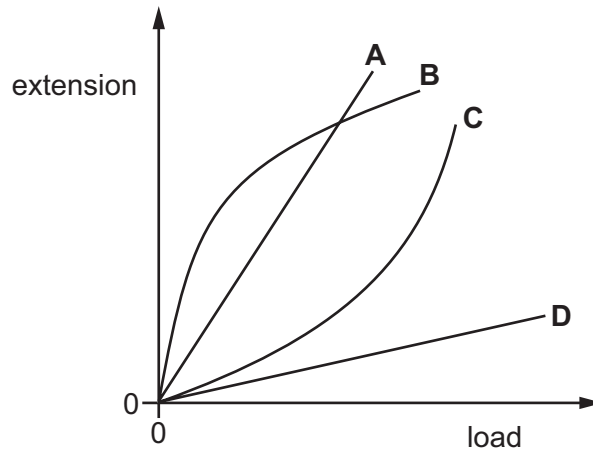
The diagram shows four forces acting on the box.

Which force is the force due to friction on the box?



- 10 The graph shows how the extension of four different threads depends on the load attached.

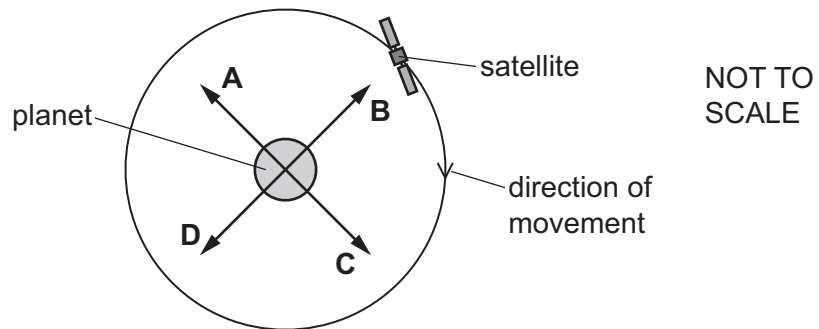
Which thread is the most difficult to stretch over the range of loads shown?



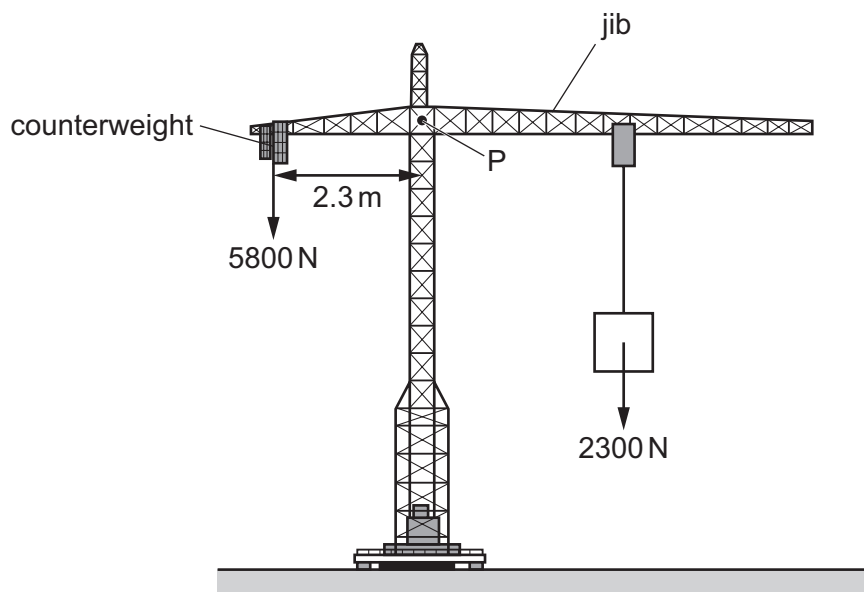
- 11 A satellite orbits a planet in a circular path as shown. It has constant speed.

There is a force on the satellite due to the planet.

In which direction is the force on the satellite when it is in the position shown?



- 12** A crane has a 5800 N counterweight positioned 2.3 m from the tower along a horizontal jib. The centre of gravity P of the crane jib is marked.



What is the horizontal distance between the 2300 N load and P so that there is no moment about P?

- A** 0.91 m **B** 3.5 m **C** 5.8 m **D** 8.1 m
- 13** A car of mass 750 kg travels 400 m at 25 m/s. It then accelerates to 35 m/s and travels a further 400 m.
- What is the change in the momentum of the car due to acceleration?
- A** 7500 kg m/s
B 24 000 kg m/s
C 45 000 kg m/s
D 75 000 kg m/s
- 14** A ball is dropped from rest at the top of a building. Air resistance is negligible.
- The velocity of the ball is 14 m/s when it hits the ground.
- What is the height of the building?
- A** 2.9 m **B** 10 m **C** 20 m **D** 40 m

15 Which energy source is available constantly over a 24-hour period?

- A natural gas
- B solar cells
- C tidal
- D wind

16 A 15W lamp is turned on for 30 minutes. It wastes 7000 J of energy.

What is the efficiency of the lamp?

- A 0.26 B 0.35 C 0.59 D 0.74

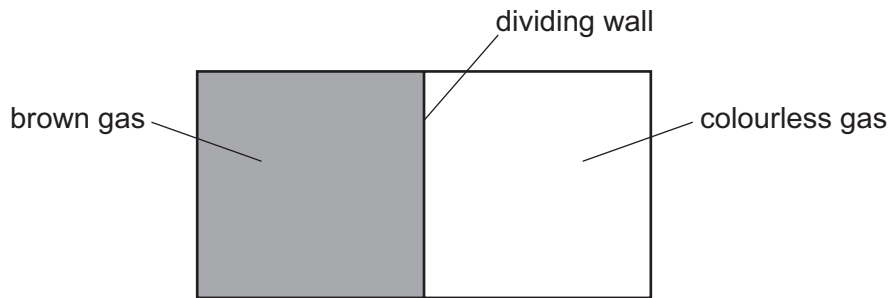
17 Which quantity is **not** measured in joules (J)?

- A gravitational potential energy
- B latent heat
- C power
- D work

18 Which description of a liquid is correct?

- A fixed shape, fixed volume
- B fixed shape, variable volume
- C variable shape, fixed volume
- D variable shape, variable volume

- 19** A transparent box has a dividing wall in its middle. It contains two different gases, one in each half, as shown.



The dividing wall is removed. The box is left for a long time. The gases do not react.

What is then seen in the box?

- A** brown gas on the right and colourless gas on the left
 - B** pale brown gas throughout
 - C** several distinct clouds of colourless and brown gas throughout
 - D** colourless gas on the right and brown gas on the left
- 20** A bottle containing a cold liquid is placed on a table on a warm day. Drops of water form on the outside of the bottle.

Which process causes the drops to form?

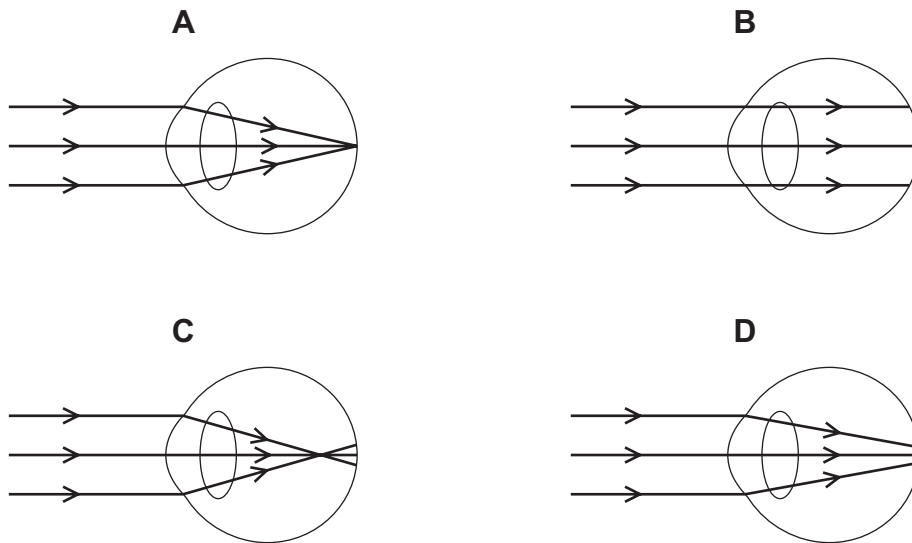
- A** condensation
 - B** conduction
 - C** convection
 - D** evaporation
- 21** What is the specific heat capacity of a liquid?
- A** the difference between the boiling temperature and the melting temperature of the liquid
 - B** the energy required to change the state of 1 kg of the liquid
 - C** the energy required to heat 1 kg of the liquid through 1 °C
 - D** the increase in temperature of the liquid when it is heated
- 22** Which statement about infrared radiation is correct?
- A** In a vacuum, infrared radiation travels at the speed of light.
 - B** Infrared radiation is a longitudinal wave.
 - C** Infrared radiation has a higher frequency than ultraviolet radiation.
 - D** White surfaces are better emitters of infrared radiation than black surfaces.

23 The speed of sound in air is 330 m/s.

Which sound is classed as ultrasound?

- A** a sound with a wavelength of 250 cm
- B** a sound with a wavelength of 25 cm
- C** a sound with a wavelength of 2.5 cm
- D** none of the above

24 Which diagram shows how light from a distant object forms an image in a normal eye?



25 The colour of visible light is related to the wavelength of the light.

Which list of colours is in order of increasing wavelength?

- A** blue → green → yellow → red
- B** blue → green → red → yellow
- C** green → red → yellow → blue
- D** red → yellow → green → blue

26 A thin converging lens is used as a magnifying glass.

Which row gives the nature of the image produced and an expression that is the linear magnification?

	nature of image	expression for linear magnification
A	real	$\frac{\text{image length}}{\text{object length}}$
B	real	$\frac{\text{object length}}{\text{image length}}$
C	virtual	$\frac{\text{image length}}{\text{object length}}$
D	virtual	$\frac{\text{object length}}{\text{image length}}$

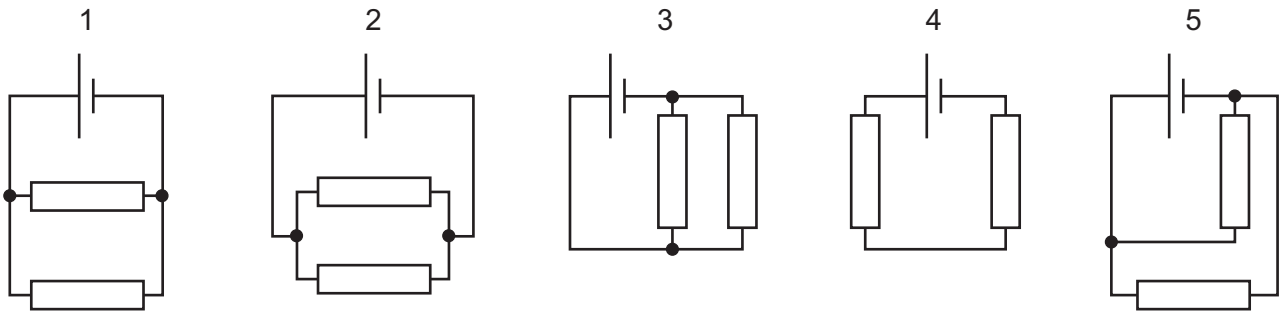
27 Which application is **not** a use for ultrasound?

- A** cleaning jewellery
- B** scanning an unborn baby
- C** sonar
- D** sterilising water

28 Which equation is correct for potential difference (p.d.)?

- A** p.d. = voltage $\times$ current
- B** p.d. = $\frac{\text{energy}}{\text{time}}$
- C** p.d. = $\frac{\text{work done}}{\text{charge}}$
- D** p.d. = $\frac{\text{current}}{\text{resistance}}$

29 The diagrams show five electrical circuits. All of the resistors shown are identical.



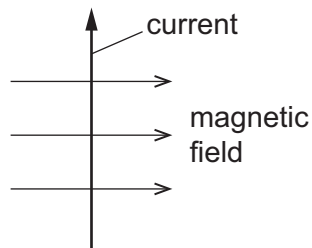
Which circuits have equal resistance?

- A** 1, 2, 3 and 5
B 1, 2, 4 and 5
C 1, 3, 4 and 5
D 2, 3, 4 and 5
- 30 Which electrical appliance uses the heating effect of electricity?
- A** a cell phone (mobile phone)
B a fan
C a hairdryer
D a lawnmower
- 31 How many kilowatt-hours of energy are used by a 1000 W heater connected to a 230 V supply for 30 minutes?
- A** 0.30 kWh **B** 0.50 kWh **C** 30 kWh **D** 120 kWh
- 32 Which safety precautions must be taken when wiring an electrical kettle that has a stainless-steel outer casing?
- A** It must be earthed and have a fuse in the live wire.
B It must be earthed and have a fuse in the neutral wire.
C It needs a fuse in the live wire but does **not** need to be earthed.
D It needs a fuse in the neutral wire but does **not** need to be earthed.

33 What is the purpose of the earth wire in a plug connected to an appliance?

- A** to complete the circuit so that the appliance works
- B** to conduct thermal energy so that the appliance does not get too hot
- C** to prevent a person getting a shock
- D** to protect the appliance from a current that is too large

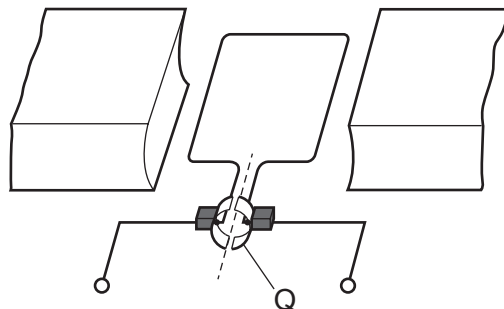
34 The diagram shows a wire carrying a current in a magnetic field.



What is the direction of the force on the wire?

- A** left to right
- B** right to left
- C** into the page
- D** out of the page

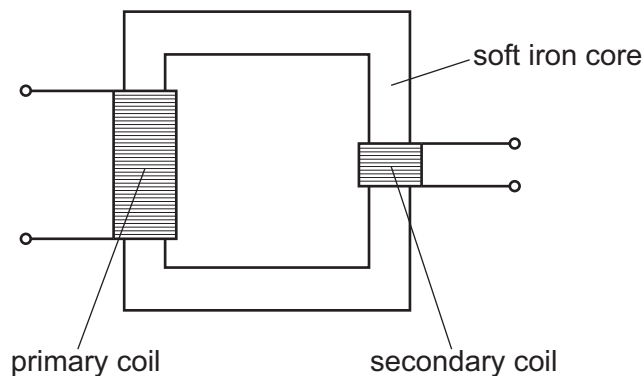
35 The diagram shows a simple d.c. motor.



What is the part labelled Q?

- A** a coil
- B** a magnet
- C** a slip ring
- D** a split-ring commutator

36 The diagram shows a transformer.



A student writes four statements about how the transformer works.

- 1 An alternating voltage across the primary coil induces an unchanging voltage across the secondary coil.
- 2 An alternating voltage across the primary coil produces a changing magnetic field in the iron core.
- 3 A changing magnetic field in the iron core induces an alternating voltage across the secondary coil.
- 4 An unchanging voltage across the primary coil produces a changing magnetic field across the secondary coil.

Which statements explain how the transformer works?

- A** 1 and 2 **B** 1 and 4 **C** 2 and 3 **D** 3 and 4

37 Which particle has the smallest mass?

- A** alpha particle
B electron
C neutron
D proton

38 Which two atoms are isotopes of the same element?

atom	number of neutrons	number of protons
1	22	12
2	22	14
3	25	13
4	24	14

- A** 1 and 2 **B** 1 and 4 **C** 2 and 4 **D** 3 and 4

39 Four types of ionising radiation are listed.

- alpha particles
- beta particles
- X-rays
- gamma rays

Which types of radiation can be emitted from the unstable nuclei of a radioactive material?

- A** alpha particles, beta particles and gamma rays
- B** alpha particles and beta particles only
- C** gamma rays only
- D** X-rays and gamma rays

40 What is the nuclear reaction that powers the Sun?

- A** the fission of hydrogen into helium
- B** the fission of helium into hydrogen
- C** the fusion of hydrogen into helium
- D** the fusion of helium into hydrogen

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