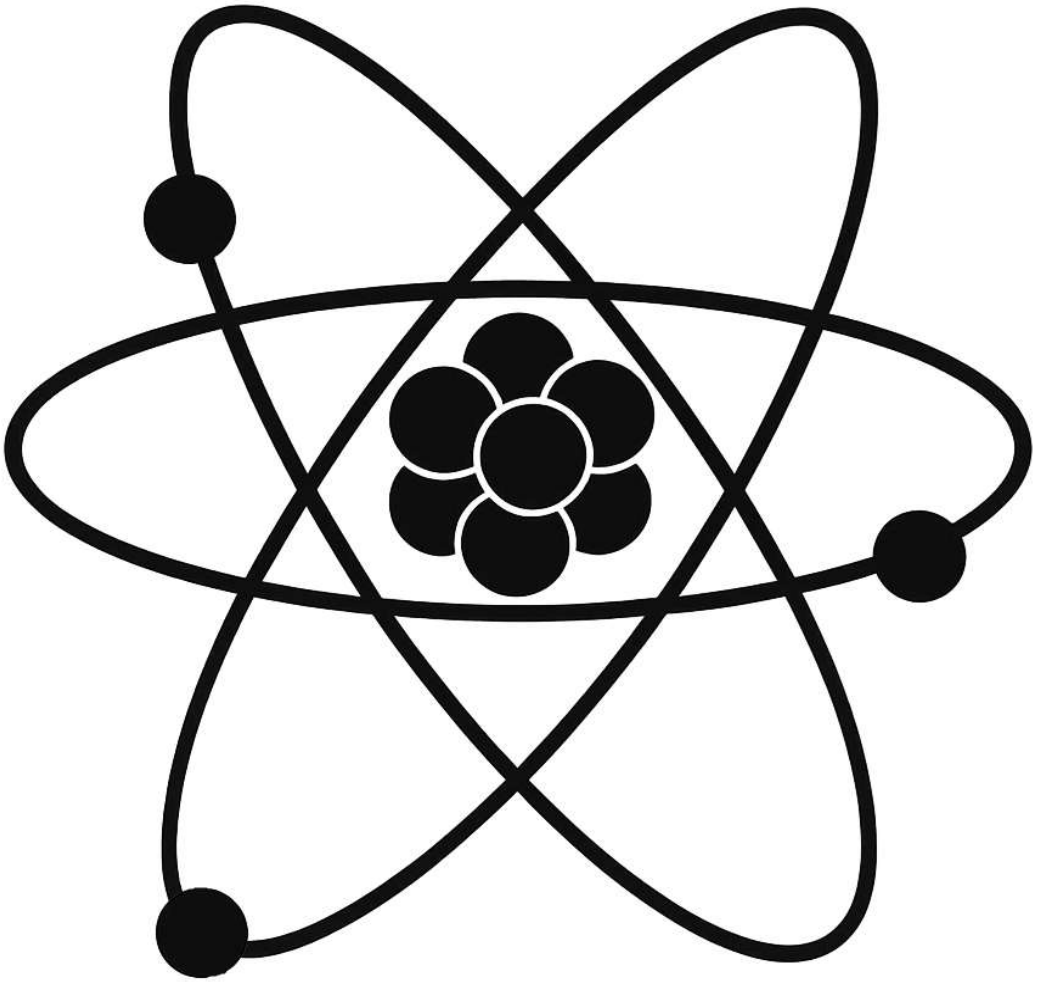
0625 IGCSE Physics
Mini-Drill Questions
Assessment Test Prep



Multiple Choice Questions

0606/21/ON/2024

1 A student uses a metre ruler to measure the length of a sheet of paper.

Which measurement is shown to the nearest millimetre?

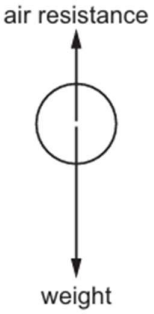
A 0.2932 m **B** 0.293 m **C** 0.29 m **D** 0.3 m

2 A rocket travels with an average speed of 6 km / s for 2 minutes.

What is the distance travelled by the rocket?

A 12 km **B** 50 km **C** 720 km **D** 12 000 km

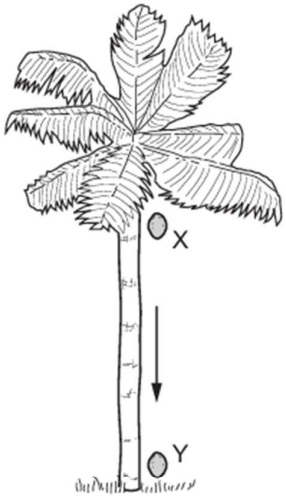
3 The diagram shows the vertical forces acting on a ball as it falls vertically through the air. The ball does not reach terminal velocity.



Which row describes what happens to the resultant force on the ball and what happens to the acceleration of the ball as it falls through the air?

	resultant force	acceleration
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

4 A coconut falls from a palm tree. At X, it has just started falling. Y is the point just before it hits the ground.



What is the acceleration of the coconut at X?

(Air resistance can be ignored.)

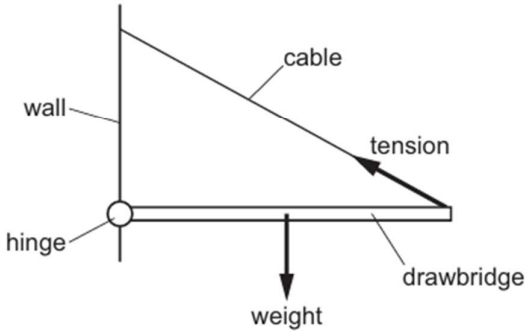
A zero

B less than that at Y

C the same as that at Y

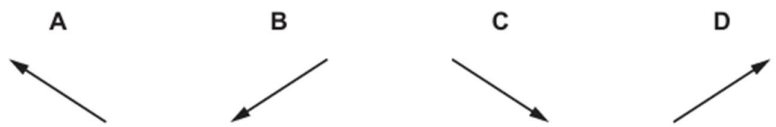
D more than that at Y

6 The diagram shows a drawbridge that is attached to a wall by a hinge at one end and a cable at the other.



The weight of the drawbridge and the tension in the cable are represented by the labelled arrows in the diagram. There is a third force at the hinge, which is not shown. The drawbridge is in equilibrium.

Which arrow shows a possible direction for the force at the hinge?



7 Which equation gives the momentum change of an object?

A momentum change = $\frac{\text{force}}{\text{area}}$

B momentum change = force × distance

C momentum change = force × $\frac{\text{distance}}{\text{time}}$

D momentum change = force × time

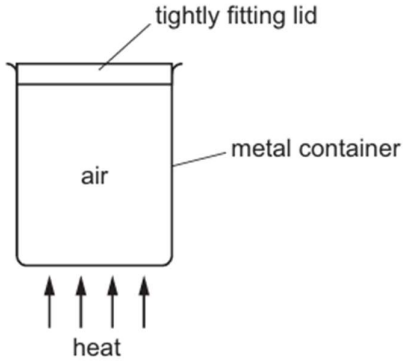
11 An elephant of weight 45 000 N stands with all four feet on the floor.

The average pressure on the floor due to the elephant foot in contact with it is 34 000 Pa.

What is the area of each foot of the elephant?

A 0.19 m^2 **B** 0.33 m^2 **C** 0.76 m^2 **D** 1.3 m^2

12 Some air is trapped inside a metal container with a tightly fitting lid.



The container is heated strongly behind a safety screen. The lid is blown off by the increased pressure of the air inside the container.

What causes the increase in pressure of the air inside the container?

A Each air particle expands and takes up more room.

B The air particles move more quickly.

C The number of particles inside the container increases.

D The volume occupied by the air decreases.

14 A student measures the mass of water in an open container over two hours. The container is kept in a warm room. The results are in the table.

time / hours	mass of water / g
0.0	33.9
0.5	30.6
1.0	27.6
1.5	24.9
2.0	22.5

Why does the mass of the water change?

A The water evaporates.

B The water freezes.

C The water condenses.

D The water boils.

15 A 1 kg block of aluminium requires more thermal energy to raise its temperature by 1 °C than a 1 kg block of copper requires.

Why is this?

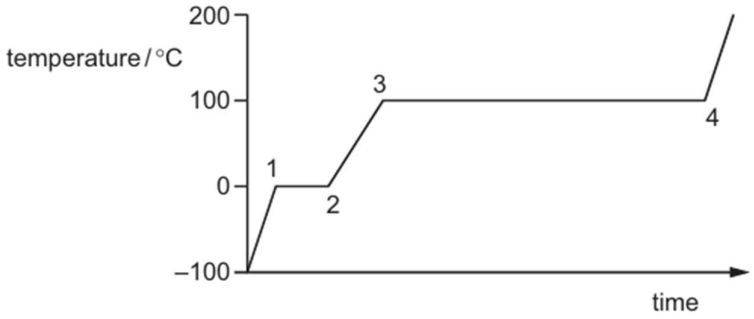
A Aluminium is a better conductor of thermal energy than copper.

B Aluminium is a poorer conductor of thermal energy than copper.

C Aluminium has a higher specific heat capacity than copper.

D Aluminium has a lower specific heat capacity than copper.

16 A block of ice is at a temperature of –100 °C. Energy is supplied at a constant rate. The graph shows how its temperature changes.



At which points have the ice completely changed state to water and all the water completely changed state to steam?

	completely changed to water	completely changed to steam
A	1	3
B	1	4
C	2	3
D	2	4

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1 Two forces with magnitudes F_1 and F_2 act on an object at right angles to each other.

What is the magnitude of the resultant force?

A $\sqrt{F_1^2 + F_2^2}$ **B** $\sqrt{F_1} + \sqrt{F_2}$ **C** $\sqrt{F_1^2} + \sqrt{F_2^2}$ **D** $\sqrt{F_1 + F_2}$

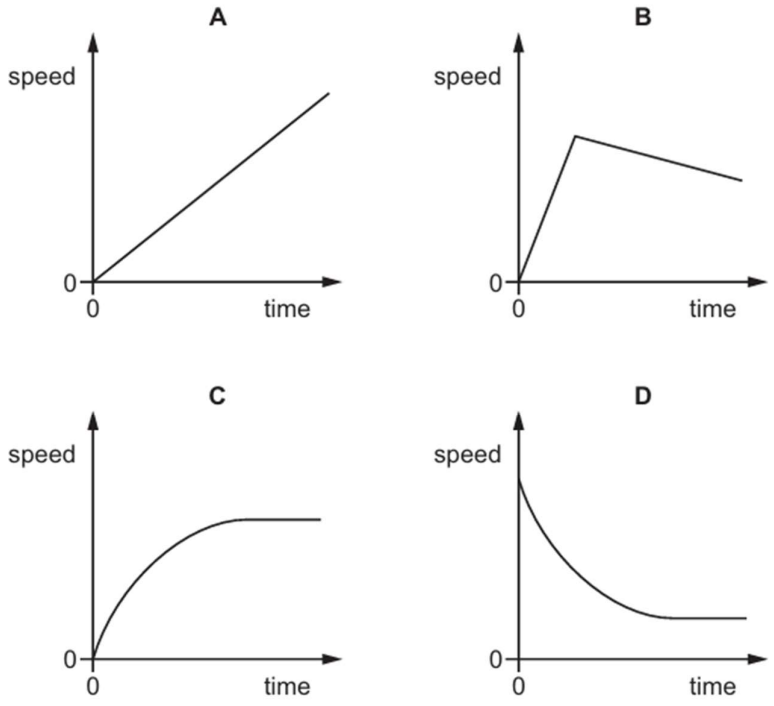
2 A boy takes 30 minutes to cycle a distance of 8.0 km. He then walks a further distance of 2.0 km in 15 minutes.

What is his average speed?

A 4.5 km/h **B** 5.6 km/h **C** 12 km/h **D** 13 km/h

3 A small, light ball is dropped from the top of a tall building.

Which graph shows how the speed of the ball changes with time?



4 Which statement about gravitational field strength is **not** correct?

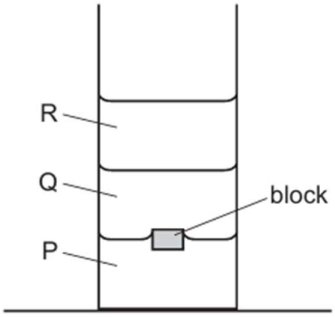
A It changes the mass of an object.

B It is equivalent to the acceleration of free fall.

C It is measured in N / kg.

D Its magnitude is different on other planets in our Solar system.

5 Three liquids P, Q and R have different densities and do not mix. The liquids are placed in a measuring cylinder and allowed to settle. A small block is then dropped into the measuring cylinder and comes to rest, as shown.



Which statement about the density of the block is correct?

A It is equal to the density of Q.

B It is greater than the density of P.

C It is greater than the density of R.

D It is less than the density of Q.

7 Which expression can be used to determine the impulse on a tennis ball?

A force × time

B $\frac{\text{momentum}}{\text{time}}$

C mass × initial velocity

D mass × acceleration

11 Some altimeters use the change in air pressure to measure height.

If the pressure is 100 kPa at sea level on a particular day, what will the pressure be at the top of an 830 m hill?

(Take the density of air to be constant at 1.3 kg / m^3.)

A 1.1 kPa **B** 11 kPa **C** 89 kPa **D** 110 kPa

12 Water can exist in three states: solid (ice), liquid (liquid water) and gas (steam).

In which states is the motion of the water particles **only** vibrational?

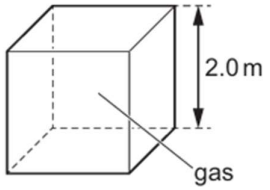
A liquid water and ice

B liquid water only

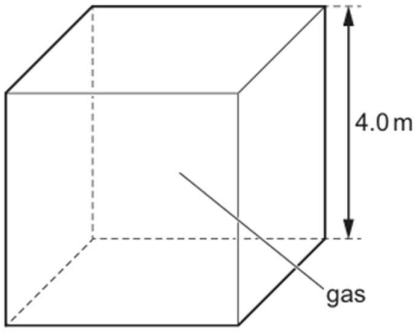
C ice only

D steam only

13 A cube has sides 2.0 m long. The cube contains a gas at a pressure of 8000 N/m^2.



A second cube has sides 4.0 m long. This cube contains the same mass of the same gas as the first cube, at the same temperature.



What is the pressure of the gas in the second cube?

A 1000 N/m^2 **B** 4000 N/m^2 **C** 16 000 N/m^2 **D** 64 000 N/m^2

14 Which row gives the correct name for each change of state shown?

	gas to liquid	liquid to solid	solid to liquid
A	condensation	melting	solidification
B	condensation	solidification	melting
C	evaporation	melting	solidification
D	evaporation	solidification	melting

15 In an experiment to measure specific heat capacity, a block of aluminium is heated and its rise in temperature is measured.

The internal energy gained by the block is ΔE. The mass of the block is m. The rise in temperature of the block is ΔT.

Which expression gives the specific heat capacity of aluminium?

A $\frac{m}{\Delta E \Delta T}$ **B** $\frac{m\Delta T}{\Delta E}$ **C** $\frac{\Delta E}{m\Delta T}$ **D** $\frac{\Delta E \Delta T}{m}$

16 Which statement about the transfer of thermal energy is correct?

A All metals conduct thermal energy equally well.

B Convection can only occur in solids or liquids.

C Convection occurs in liquids because hot liquid is more dense than cold liquid.

D The radiation that transfers thermal energy is a type of electromagnetic radiation.

Theory/Written Questions

0606/41/ON/2024

2 A drag car is a racing car that is powered by a rocket engine.

A drag car accelerates uniformly from rest until it reaches the finishing line. The engine is then switched off and a parachute opens. The car decelerates until it stops.

Fig. 2.1 shows a drag car decelerating after a race.

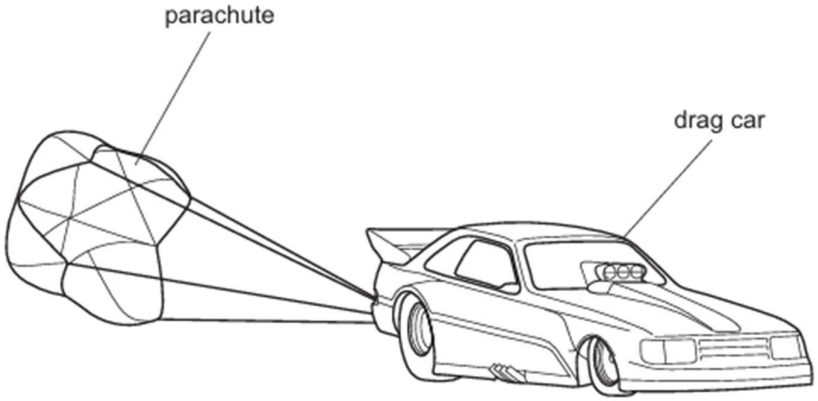


Fig. 2.1

This drag car has a mass of 1400 kg.

Fig. 2.2 is the speed–time graph for the car during a race on a straight horizontal track.

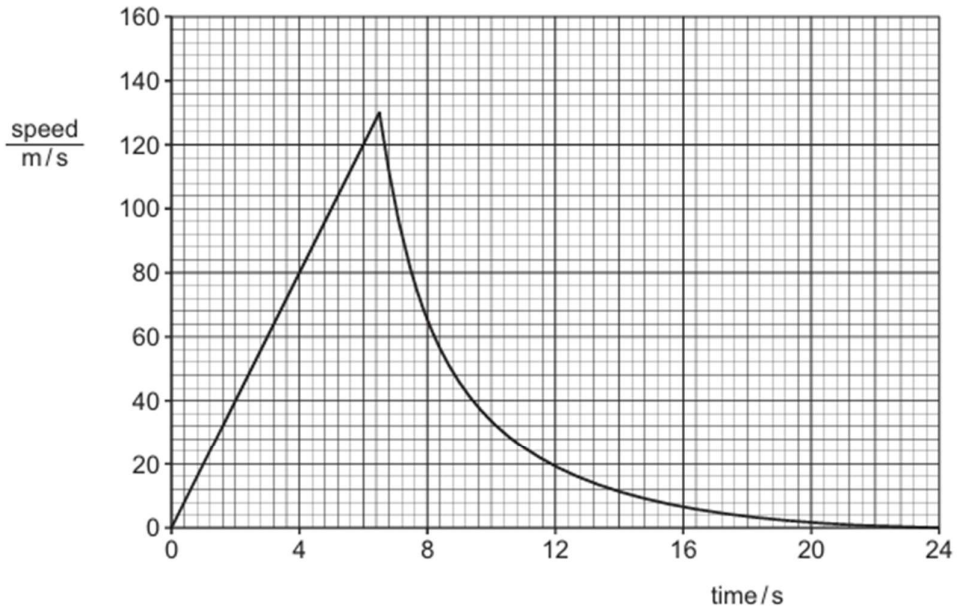


Fig. 2.2

The car reaches its maximum speed of 130 m/s at a time of 6.5 s.

(a) **(i)** Calculate the maximum momentum of the car during the race.

maximum momentum = ... [2]

(ii) State the feature of Fig. 2.2 that represents the distance travelled by the car.

.....

..... [1]

(iii) Determine the distance travelled by the car in the first 6.5 s.

distance = ... [2]

(b) The parachute opens at 6.5s and the car decelerates.

Describe how Fig. 2.2 shows that, after 6.5 s:

(i) the car decelerates

.....

..... [1]

(ii) the deceleration of the car is **not** constant.

.....

..... [1]

(c) Describe the energy transfer that takes place as the car slows down.

.....

..... [2]

[Total: 9]

4 **(a)** Describe an experiment to determine the specific heat capacity of aluminium. You may draw a diagram.

Include in your answer:

- the measurements made
- any equations needed.

.....

.....

.....

..... [4]

(b) An aluminium dish is initially at room temperature. Boiling water is poured into the aluminium dish as shown in Fig. 4.1.

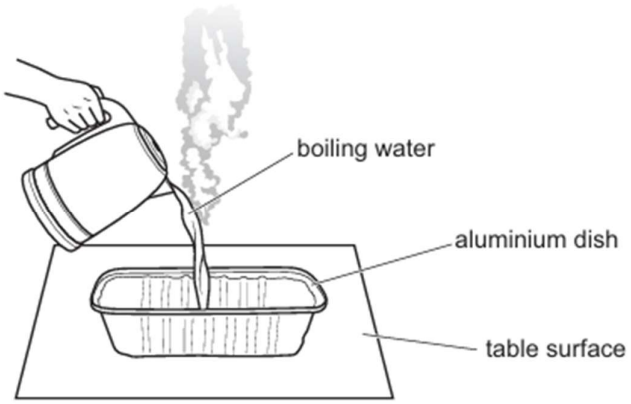


Fig. 4.1

(i) Explain why, after a short time, the dish and the water are the same temperature.

.....

.....

.....

..... [3]

(ii) Explain, in terms of its particles, why the aluminium expands as the boiling water is poured into the dish.

.....

.....

..... [2]

(iii) The water in the dish evaporates.

Explain, in terms of the water molecules, what is meant by evaporation.

.....

.....

..... [2]

[Total: 11]

0606/42/ON/2024

1 **(a)** A rocket has an initial mass of 7.4×10^6 kg.

(i) Calculate the initial weight of the rocket.

weight = ... [1]

(ii) Define, in words, the term weight.

.....

..... [1]

(b) Fig. 1.1 shows part of the speed-time graph for the rocket as it leaves the ground and travels into space.

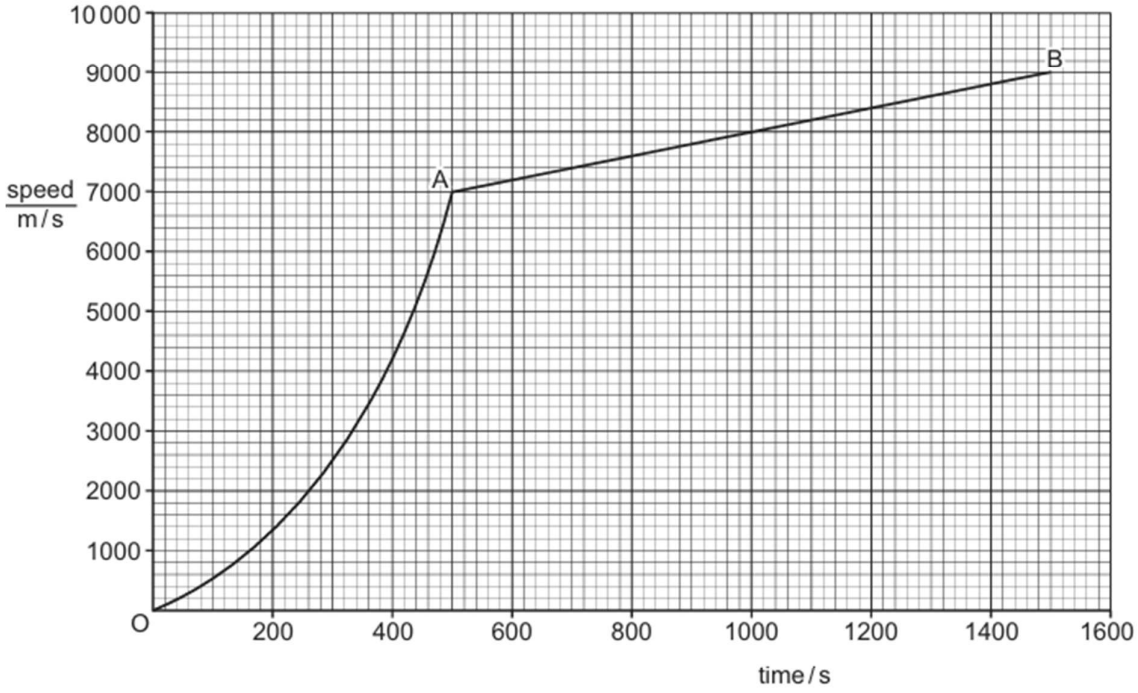


Fig. 1.1

(i) Describe the motion of the rocket:

From O to A .....

From A to B .....

[2]

(ii) Draw a tangent to the graph at time = 400 s and use this to calculate the acceleration of the rocket at this time. Show your working.

acceleration = ... [2]

(c) Rockets are used to launch satellites into space. When the satellite is released, the rocket returns to the Earth.

Explain in terms of forces why the rocket reaches terminal velocity as it travels through the atmosphere back to the Earth.

.....

.....

..... [2]

[Total: 8]

4 Fig. 4.1 shows a pressure cooker on an electric heating element. The cooker has a tight-fitting lid.

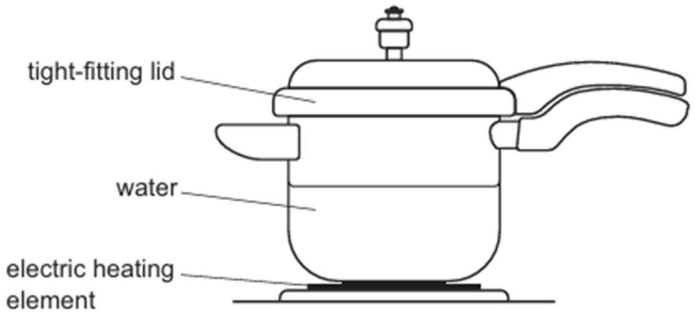


Fig. 4.1

(a) The pressure cooker is half-full of water. As the water is heated some water evaporates before the water boils.
Describe **two** differences between evaporation and boiling of the water in the cooker.

.....

.....

..... [2]

(b) As the water is heated, the pressure of the gas inside the cooker increases.
Explain this increase in pressure in terms of particles.

.....

.....

.....

.....

..... [4]

[Total: 6]

5 On a sunny day, the temperatures of a black tarmac road and the air above the road increase.

(a) Explain why the surface temperature of the tarmac increases.

.....

.....

..... [2]

(b) State the method of thermal energy transfer from the tarmac to the air **immediately** above the road.

..... [1]

(c) State the main method of thermal energy transfer from the air immediately above the road to the rest of the air.

..... [1]

(d) Explain why the surface temperature of the tarmac is higher than the surrounding air temperature.

.....

.....

..... [2]

[Total: 6]

Answers

Multiple Choice Questions

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1. B
2. C
3. A
4. C
6. D
7. D
11. B
12. B
14. A
15. C
16. D

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1. A
2. D
3. C
4. A
5. C
7. A
11. C
12. C
13. A
14. B
15. C
16. D

Theory/Written Questions

0625/41/ON/2024

Question	Answer	Marks
2(a)(i)	1.8×10^5 kg m / s **OR** 1.8×10^5 N s	**A2**
	$p = mv$ **OR** (p =) mv **OR** 1400×130	C1
2(a)(ii)	(scaled) area under the (graph) line	**B1**
2(a)(iii)	420 m	**A2**
	$\frac{1}{2}v_{max}t$ **OR** $\frac{1}{2} \times 130 \times 6.5$ **OR** $\frac{1}{2}bh$	C1
2(b)(i)	gradient is negative **OR** speed decreases	**B1**
2(b)(ii)	gradient is changing **OR** line / graph / it is a curve / curved	**B1**
2(c)	(from) kinetic (energy store)	**B1**
	to internal / thermal (energy store as final store)	**B1**

Question	Answer	Marks
4(a)	1 Any one method to transfer measurable amount of thermal energy for $\Delta\theta$: (a) to aluminium block (with electrical heater) (b) from aluminium block to known liquid (c) from known liquid to insulated aluminium (calorimeter) (d) to known liquid and aluminium (calorimeter)	**B1**
	2 Determination of energy transferred for $\Delta\theta$, to match workable method in 1: (a) Use of $E = Pt$ **OR** $E = IVt$ (b) Use of $E = mc\Delta\theta$ with s.h.c. of known liquid (c) Use of $E = mc\Delta\theta$ with s.h.c. of known liquid (d) Use of $E = Pt$ **OR** $E = IVt$ **AND** $E = mc\Delta\theta$ (with known s.h.c. of liquid)	**B1**
	3 Any one measurement from: • initial and final temperature / temperature change • time (of heating) • mass of aluminium	**B1**
	4 $c = E / m\Delta\theta$ **OR** (c =) $E / m\Delta\theta$	**B1**
4(b)(i)	Any three from: 1 (net) transfer of energy from higher temperature to lower temperature **OR** (net) transfer of energy from water / to dish 2 (energy transfer) by conduction **OR** aluminium is a good conductor (of thermal energy) 3 temperature of water decreases **AND** temperature of dish increases 4 no (net) transfer of energy when temperature of dish = temperature of water	**B3**
4(b)(ii)	(particles) gain energy in kinetic store (as temperature of aluminium increases)	**B1**
	(average) separation of (aluminium) particles increases **OR** (aluminium) particles move further apart owtte	**B1**
4(b)(iii)	(water) molecules with more/enough energy escape from the surface	**A2**
	escape of more energetic molecules (from water) **OR** (molecules) leave from the surface	C1

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Question	Answer	Marks
1(a)(i)	7.3×10^7 N	**B1**
1(a)(ii)	(weight is) the gravitational force on a mass / an object (with mass) **OR** (weight is) the effect of a gravitational field on a mass	**B1**
1(b)(i)	(from O to A) increasing acceleration	**B1**
	(from A to B) constant / uniform acceleration	**B1**
1(b)(ii)	tangent drawn at time = 400 s	**M1**
	$\Delta y / \Delta x$ from candidate's tangent seen **AND** 17 m / s^2 ⩽ acceleration ⩽ 23 m / s^2	**A1**
1(c)	resistive force / air resistance / drag increases as velocity increases	**B1**
	until gravitational force is balanced by air resistance (at terminal velocity) OR until resultant / net force is zero (at terminal velocity)	**B1**

Question	Answer	Marks
4(a)	boiling happens at a specific temperature **OR** evaporation happens at a range of temperatures **OR** evaporation happens at any temperature (below the boiling point)	**B1**
	evaporation happens at the surface of the water OR boiling happens throughout the water	**B1**
4(b)	*any **four** from:* 1 (as the water is heated) the number of gas particles increases 2 (particles) gain internal / kinetic energy 3 (there are) more frequent collisions between particles and surface / wall / lid of the cooker 4 (each) collision (of particles) is harder / exerts more force (on cooker surface) **OR** greater change of momentum when particles collide (on cooker surface) 5 pressure ∝ (total) force (of collisions) **OR** pressure = force / area	**B4**

Question	Answer	Marks
5(a)	(tarmac / it) absorbs infrared radiation (emitted from the Sun)	**A2**
	(tarmac / it) absorbs radiation / infrared (emitted from the Sun)	C1
5(b)	conduction	**B1**
5(c)	convection	**B1**
5(d)	*any **two** from:* 1 black / tarmac is a better absorber (of radiation) than air 2 tarmac is a poor emitter (at low / this temperature) 3 thin layer of tarmac / very large volume / column of air above road	**B2**

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