



PASIR RIS CREST SECONDARY SCHOOL
Preliminary Examination
Secondary Four Express

CANDIDATE
NAME

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CLASS

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INDEX
NUMBER

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Physics
Paper 1 Multiple Choice

6091/01
26 August 2024

1 hour

Additional Materials: Multiple-Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, glue or correction fluid.

Write your name, class and index number on all the work you hand in.

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 separate Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Any rough working should be done in this booklet.

The use of an approved scientific calculator is expected, where appropriate.

For Examiner's Use
40
Parent's Signature

- 1 A car driver brakes with uniform deceleration when he sees a stop line 15 m ahead. The car stops at the stop line in 3.0 s.

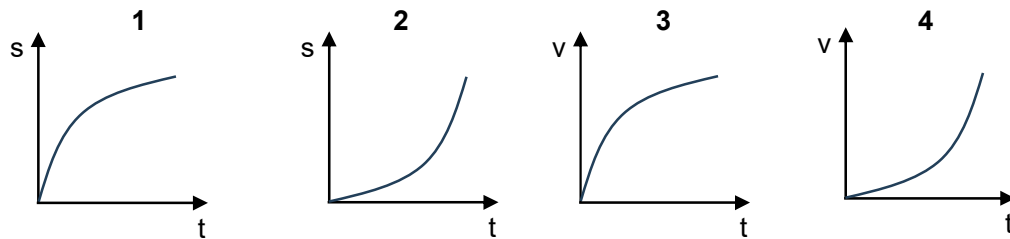
What is the speed of the car when the driver sees the stop line?

- A** 5.0 m/s **B** 10 m/s **C** 20 m/s **D** 45 m/s

- 2 A parachutist falls from an airplane. As he falls, he experiences air resistance. The parachute is not opened yet.

Graph 1 and 2 are displacement-time graphs.

Graph 3 and 4 are velocity-time graphs.



Which graphs describe the motion of the parachutist?

- A** 1 and 3
B 1 and 4
C 2 and 3
D 2 and 4
- 3 An astronaut initially weighs 800 N on the Earth. He travels to the Moon and does some physical work daily. He weighs 120 N on the Moon after a month.

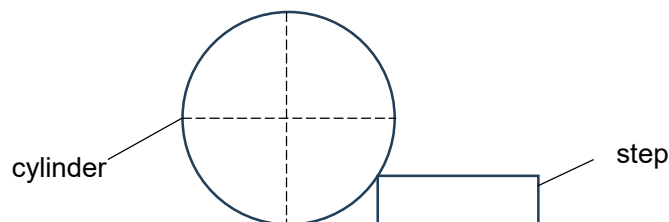
The gravitational field strength on the Moon is 1.6 N/kg.

The gravitational field strength on the Earth is 10 N/kg.

How much mass is lost by the astronaut?

- A** 0 kg **B** 5 kg **C** 20 kg **D** 68 kg

- 4 An uniform cylinder of weight 30 N is placed next to a step as shown.



The radius of the cylinder is 50 cm and the height of the step is 20 cm.

What is the minimum force required to move the cylinder up the step?

- A** 12 N **B** 15 N **C** 20 N **D** 30 N

- 5 A pushing force moves an object of mass 4.0 kg at an acceleration of 2.0 m/s^2 along a rough horizontal surface where the frictional force is 6.0 N .

What is the pushing force acting on the object?

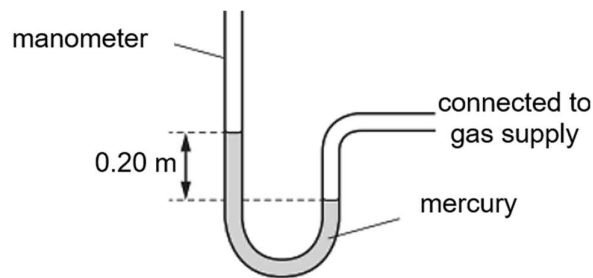
- A** 2.0 N **B** 6.0 N **C** 8.0 N **D** 14 N

- 6 An alloy is made up of copper and tin. The copper has a volume of 40 cm^3 and a density of 9.0 g/cm^3 . The tin has a volume of 10 cm^3 and a density of 7.3 g/cm^3 .

What is the density of the alloy?

- A** 8.2 g/cm^3 **B** 8.5 g/cm^3 **C** 8.7 g/cm^3 **D** 8.9 g/cm^3

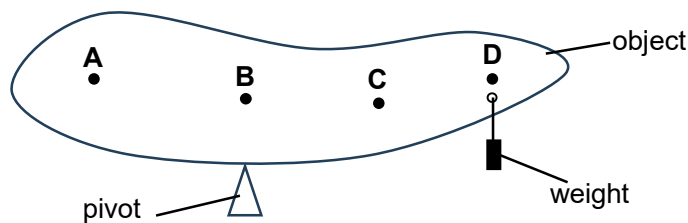
- 7 A manometer is connected to a gas supply as shown. The atmospheric pressure is 76 cm Hg . The density of mercury is $13\,600 \text{ kg/m}^3$. The gravitational field strength is 10 N/kg .



What is the pressure of the gas?

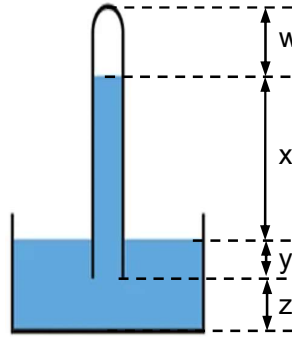
- A** 27 kPa **B** 100 kPa **C** 110 kPa **D** 130 kPa

- 8 A non-uniform object is balanced on a pivot when a weight is suspended on the object as shown.



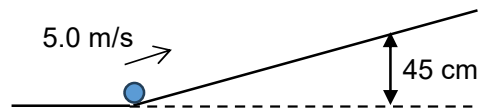
Which point is likely to be the centre of gravity of the object?

- 9 A barometer contains water.



If w , x , y and z are measured in metres, the atmospheric pressure in metres of water measured by the barometer is

- A** x **B** $w + x$ **C** $x + y$ **D** $x + y + z$
- 10 A ball of mass 1.0 kg rolls up a long and smooth ramp. At the bottom of the ramp, the speed of the ball is 5.0 m/s .



The gravitational field strength is 10 N/kg .

What is the speed of the ball when it is at 45 cm above the bottom of the ramp?

- A** 0 m/s **B** 4.0 m/s **C** 5.0 m/s **D** 16 m/s
- 11 Energy is transferred electrically to a motor, which has an efficiency of 75% . The useful output energy from the motor is 90 kJ .

How much non-useful output energy is wasted from the motor?

- A** 23 kJ **B** 30 kJ **C** 68 kJ **D** 120 kJ
- 12 A cyclist accelerates up a hill.

The energy in the chemical potential store of the cyclist is transferred to

- A** gravitational potential store and internal store of the cyclist.
B kinetic store and internal store of the cyclist.
C gravitational potential store and kinetic store of the cyclist.
D gravitational potential store, kinetic store and internal store of the cyclist.

13 What happens to a fixed mass of gas when the gas is cooled at a constant volume?

- A** The average volume of the particles decreases.
- B** The average mass of the particles decreases.
- C** The average speed of the particles decreases.
- D** The average separation of the particles decreases.

14 A mug of hot coffee is left on a table.

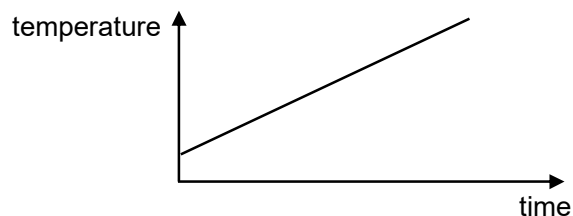
Energy is transferred out from the hot coffee by

- A** conduction only.
- B** conduction and convection only.
- C** radiation only.
- D** conduction, convection and radiation.

15 Which statement describes the evaporation of a liquid?

- A** It occurs at any temperature and throughout the liquid.
- B** It occurs at any temperature and only on the surface of the liquid.
- C** It occurs at a fixed temperature and throughout the liquid.
- D** It occurs at a fixed temperature and only on the surface of the liquid.

16 The graph shows how the temperature of water varies with time when heated.



Which row describes the changes in the kinetic and potential energy of the water particles when the temperature of the water increases?

	kinetic energy	potential energy
A	constant	constant
B	constant	increases
C	increases	constant
D	increases	increases

- 17 Latent heat and specific latent heat have different definitions.

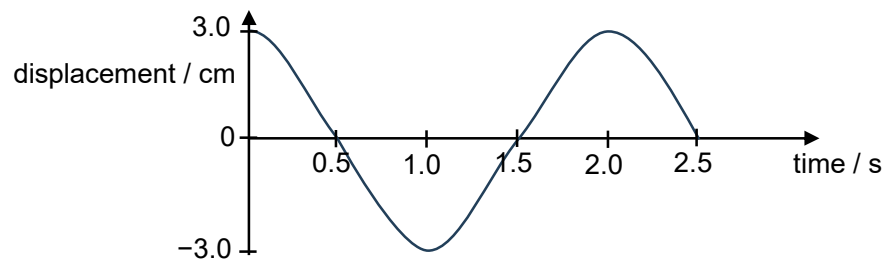
Which statement describes the difference?

- A Latent heat involves 1 kg of material, specific latent heat does not.
- B Latent heat involves a change in state, specific latent heat does not.
- C Specific latent heat involves 1 kg of material, latent heat does not.
- D Specific latent heat involves a change in state, latent heat does not.

- 18 Which surface is the best emitter of radiation?

- A black and rough surface
- B black and smooth surface
- C white and rough surface
- D white and smooth surface

- 19 The diagram shows a graph of wave motion.



What is the frequency of the wave?

- A 0.5 Hz
- B 1.0 Hz
- C 1.5 Hz
- D 2.0 Hz

- 20 It takes 20 s to generate 50 complete wavelengths in a ripple tank, The wavelength of each wave is 3.0 cm.

What is the speed of the wave?

- A 1.2 cm/s
- B 2.5 cm/s
- C 3.0 cm/s
- D 7.5 cm/s

- 21 Two notes of different pitch but the same loudness are played on a musical instrument.

Which statement about the note of higher pitch is correct?

- A It has a smaller wavelength.
- B It has a larger wavelength.
- C It has a lower speed in air.
- D It has a higher speed in air.

- 22** A student stands at point P between two walls as shown and claps once.

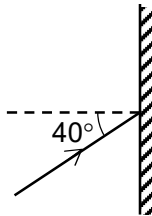


The speed of sound is 320 m/s in air.

What is the time interval between the first and second echo heard by the student?

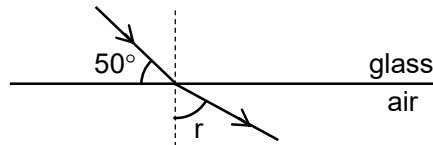
- A** 0.25 s **B** 0.50 s **C** 0.75 s **D** 1.0 s
- 23** Which wave is used to disinfect water?
- A** infrared
B ultraviolet
C X-rays
D gamma rays

- 24** The diagram shows a ray of light striking on a plane mirror.



Through which angle does the direction of the ray of light change?

- A** 40° **B** 80° **C** 100° **D** 280°
- 25** A ray of light travels from glass and refracts into air. The refractive index of the glass is 1.5.



What is angle r?

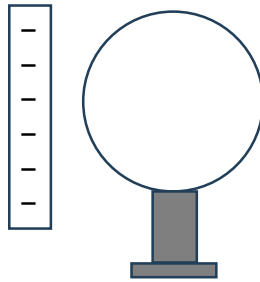
- A** 25° **B** 33° **C** 60° **D** 75°

- 26** A student rubs a rod with a cloth. Both the rod and the cloth become charged. The rod becomes negatively charged.

What happens to the cloth?

- A** It gains protons.
- B** It gains electrons.
- C** It loses protons.
- D** It loses electrons.

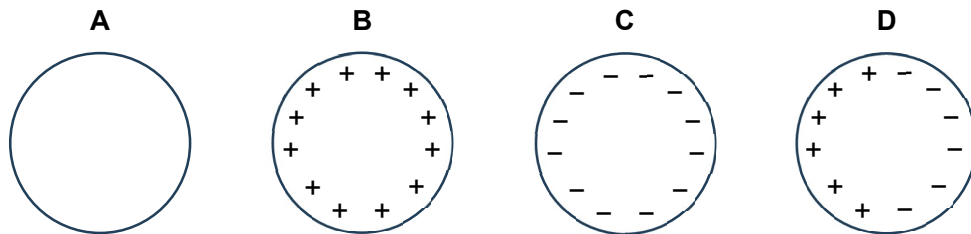
- 27** A negatively charged rod is brought near an uncharged sphere on the left side.



Next, three steps are carried out on the sphere in the following order.

1. The right side of the sphere is earthed by touching it with a finger.
2. The rod is removed.
3. The finger is removed.

What is the final charge on the sphere?

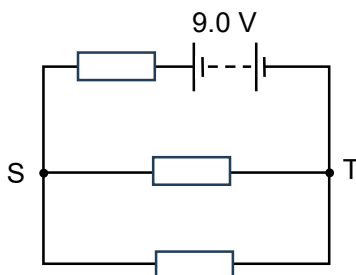


- 28** The potential difference across a conductor is 6.0 V.

How much energy is transferred to the conductor electrically when 50 C of charge flows through it?

- A** 0.12 J
- B** 8.3 J
- C** 150 J
- D** 300 J

- 29** The diagram shows a battery connected to three identical resistors.



What is the potential difference across ST?

- A** 1.5 V **B** 3.0 V **C** 4.5 V **D** 9.0 V
- 30** A light dependent resistor and a negative temperature coefficient thermistor are connected in series.

Which conditions give the least resistance?

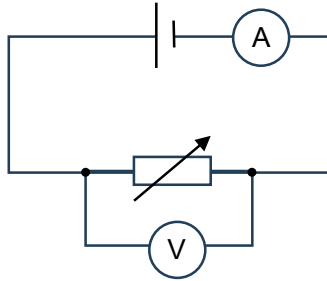
	light condition	temperature
A	bright	low
B	bright	high
C	dark	low
D	dark	high

- 31** Four $3.0\ \Omega$ resistors can be connected in different combinations to provide different resistance values.

Which resistance value is obtained from the combinations of four $3.0\ \Omega$ resistors?

- A** $2.0\ \Omega$ **B** $3.0\ \Omega$ **C** $6.0\ \Omega$ **D** $10\ \Omega$

- 32** The circuit shows a dry cell connected to a variable resistor.



The resistance of the variable resistor increases.

What happens to the ammeter and voltmeter readings?

	reading on ammeter	reading on voltmeter
A	decreases	no change
B	decreases	increases
C	no change	no change
D	no change	increases

- 33** The total energy consumption of two identical lamps is 0.10 kWh. Each lamp is marked “10 W, 240 V”.

How long have the two lamps been operated at normal brightness?

- A** 0.50 hour **B** 2.0 hours **C** 5.0 hours **D** 10 hours

- 34** An appliance is designed to draw a current of 2.0 A from the mains supply. The appliance is switched off and is connected to a fuse rated at 10 A.

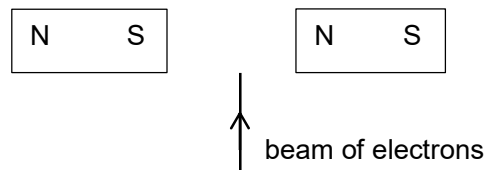
What happens when the appliance is switched on?

- A** The appliance draws more current.
B The appliance does not work.
C The appliance gets overheated.
D The appliance works normally.

- 35 Which row describes the properties of iron and steel correctly?

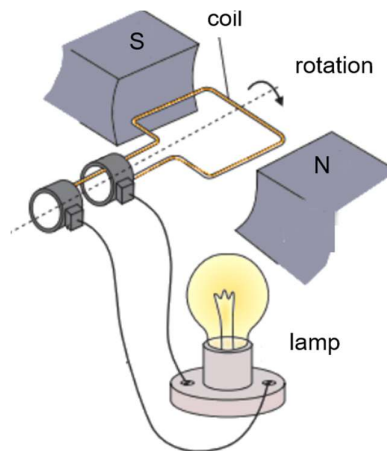
	iron	steel
A	easy to magnetise	easy to demagnetise
B	easy to magnetise	hard to demagnetise
C	hard to magnetise	easy to demagnetise
D	hard to magnetise	hard to demagnetise

- 36 The diagram shows a beam of electrons entering a region between two magnets.



In which direction will the beam of electrons be deflected?

- A** to the left of the diagram
 - B** to the right of the diagram
 - C** into the plane of the diagram
 - D** out of the plane of the diagram
- 37 The diagram shows a lamp connected to an a.c. generator.

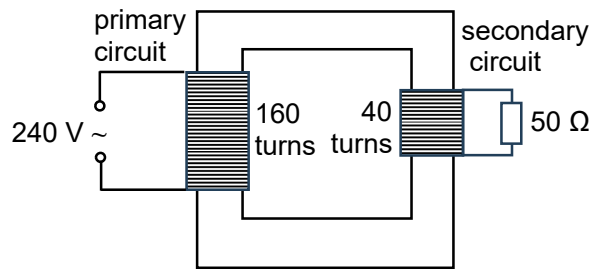


A student suggests four methods to increase the brightness of the lamp

Which method **does not** increase the brightness of the lamp?

- A** increase the number of turns in the coil
- B** increase the strength of the magnet
- C** increase the period of the rotation of the coil
- D** decrease the electrical resistance of the coil

- 38 The diagram shows an ideal transformer connected to a $50\ \Omega$ resistor.



What is the current in the primary circuit?

- A** 0.30 A **B** 1.2 A **C** 1.5 A **D** 3.3 A
- 39 A nucleus undergoes β -decay.
- What is the change in its atomic number?
- A** decreases by 1
B decreases by 2
C increases by 1
D remains the same
- 40 A radioactive source, with an initial count rate of 800 counts per second, is used in an experiment. One hour later, the count rate becomes 100 counts per second.
- Which of the following sources is used in the experiment?
- A** a source with a half-life of 5 minutes
B a source with a half-life of 10 minutes
C a source with a half-life of 15 minutes
D a source with a half-life of 20 minutes

End of Paper