



Time: 1 hour

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Instructions to candidates

Look at the left hand side of your answer sheet. Ensure that your name, the school/centre name and subject paper are **printed**. Also ensure that the subject code, paper number, centre code, your examination number and the year are **printed** and **shaded**. Do not change the already printed information.

Write your **name**, **centre number** and **candidate number** on the answer sheet in the spaces provided unless this has already been done for you.

There are **forty (40)** questions in 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 Answer Card provided.

Information for candidates

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

Any rough work should be done in this question paper.

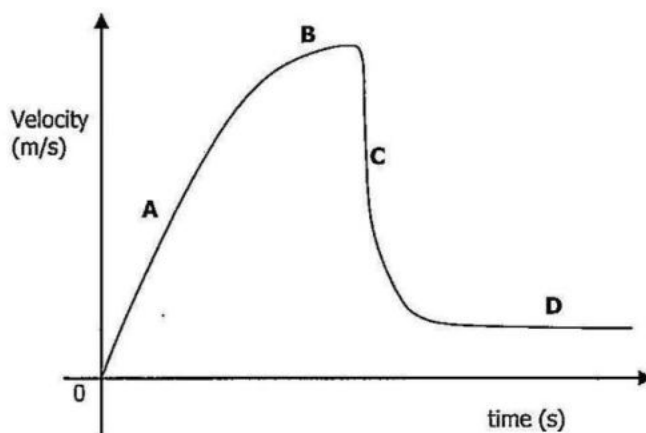
Cell phones are not allowed in the examination room.

- 1 A Grade 10 pupil has been asked to measure the volume of a piece of wire accurately. The wire is about 1m long and 2mm in diameter.

Which measuring instruments should the pupil use?

	Length	Diameter
A	Meter rule	Micrometer
B	Meter rule	Vernier Calipers
C	Micrometer	Vernier Calipers
D	Vernier Calipers	Micrometer

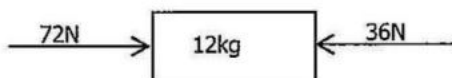
- 2 The velocity-time graph for a falling sky diver is shown below. As he falls, the sky diver spreads out his arms and legs and then opens his parachute.



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Which part **A**, **B**, **C** or **D** of the graph shows the sky diver falling with terminal velocity?

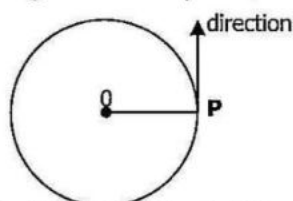
- 3 The diagram shows the forces acting on a packing case of mass 12kg.



What is the resultant force and acceleration produced?

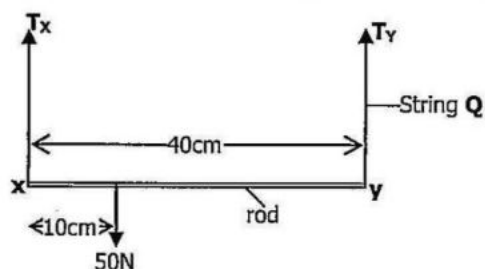
	Resultant Force	Acceleration
A	36N	0.3m/s^2
B	36N	3.0m/s^2
C	108N	9.0m/s^2
D	108N	30.0m/s^2

- 4 The diagram shows particle **P** moving in a circular path at a constant speed.



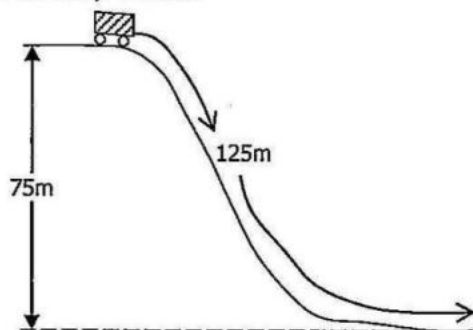
Which statement about **P** is correct?

- A** A force of constant size acts on **P** in the direction of motion.
 - B** A force of constant size acts on **P** towards **O**.
 - C** The force of **P** varies in size as it moves around the circle.
 - D** There is no resultant force acting on **P**.
- 5 A light rigid rod 40cm long is supported horizontally at its end by two vertical strings. A weight of 50N is attached to the rod a distance of 10cm from end **x** as shown.



What is the tension in string **Q**?

- A** 12.5N
 - B** 25.5N
 - C** 50.0N
 - D** 400.5N
- 6 The diagram shows an object of total mass 2500kg descending from rest at the top of a steep incline.



What is the loss of potential energy as a result of descending the incline?

Assume $g = 10\text{m/s}^2$.

- A** $1.875 \times 10^6\text{J}$
- B** $2.750 \times 10^6\text{J}$
- C** $7.500 \times 10^6\text{J}$
- D** $8.750 \times 10^6\text{J}$

- 7** A simple machine of velocity ratio 5 is used to lift a load of 600N through a vertical distance of 20m. If the machine is 80% efficient, what is the effort applied?

A 150N
B 200N
C 300N
D 400N

- 8** An Eskimo stands on snow wearing snow shoes. The mass of the Eskimo is 40kg and the snow shoes have a total area of 5m^2 in contact with the snow (gravitational field strength is 10N/kg).

What pressure does the Eskimo exert on the snow?

A 8.0N/m^2
B 40.0N/m^2
C 50.0N/m^2
D 80.0N/m^2

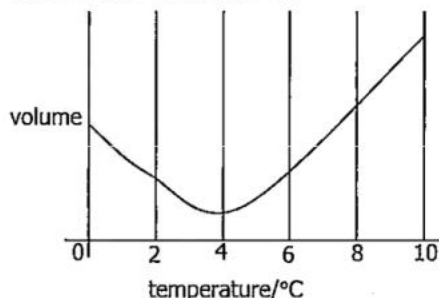
- 9** Which row best describes how the molecules move in solids, liquids and gases?

	Solids	Liquids	Gases
A	Fixed positions	Only vibrate	Move about freely
B	Slowly in all directions	Quickly in all directions	Very quickly in all directions
C	Vibrate about mean position	Move about	Move about freely
D	Vibrate in one direction only	Vibrate in two directions	Vibrate in all directions

- 10** The temperature at which the particles which make up substances have their lowest possible energy is ...

A 0°C .
B 0K .
C -100°C .
D -273K .

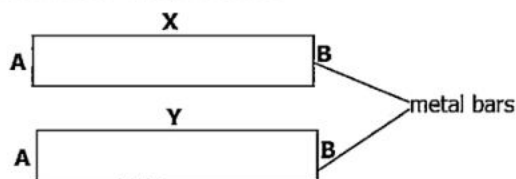
- 11** The diagram shows how the volume of 1kg of water varies with temperature between 0°C and 10°C.



What happens to the volume and density of the water as the temperature rises from 0°C to 4°C?

	Volume	Density
A	Increases	Decreases
B	Increases	Increases
C	Decreases	Decreases
D	Decreases	Increases

- 12** The diagram shows two metal bars **x** and **y** of the same size. The bars are initially at the same temperature.



Equal amounts of heat are supplied to end **A** of both bars. End **A** of bar **X** appears red hot while end **A** of bar **Y** remains unchanged.

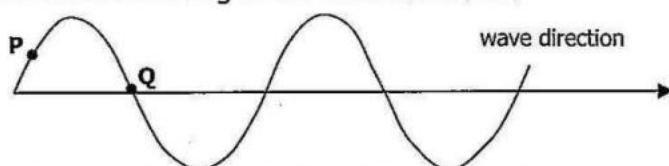
Which statement is correct?

- A** Bar **X** is a better conductor of heat than bar **Y**.
- B** Bar **Y** is a better conductor of heat than bar **X**.
- C** The two metal bars conduct heat equally.
- D** End **B** of bar **Y** is colder than end **B** of bar **X**.
- 13** A piece of aluminium of mass 0.5kg is heated to 100°C and then placed in 0.4kg of water at 10°C. If the resulting temperature is 30°C, what is the specific heat capacity of aluminium? Take specific heat capacity of water as 4 200 J/kg°C.
- A** 960 J/kg°C
- B** 4 200 J/kg°C
- C** 8 400 J/kg°C
- D** 33 600 J/kg°C

- 14** A boy standing in wind in a wet swimming suit feels much colder than when the suit was dry. This is because ...

A he loses latent heat as water evaporates from his body.
B he gains latent heat as water evaporates from his body.
C the wet swimming suit conducts more heat than the dry one.
D his body is now directly in contact with cold air.

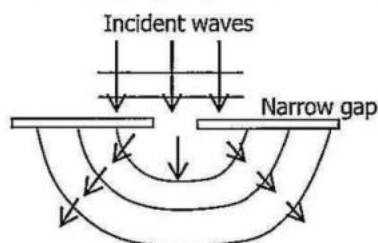
- 15** The diagram shows a transverse wave on a string with two points, **P** and **Q** marked. The wave is moving in the direction shown.



In which direction will **P** and **Q** move next?

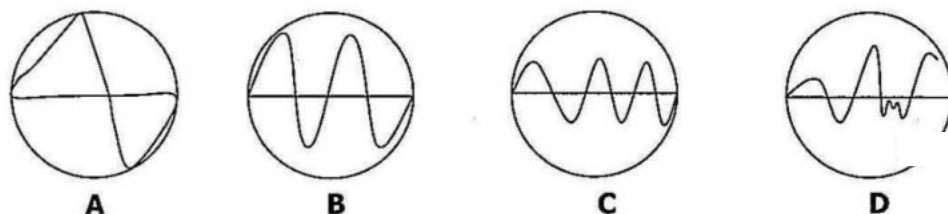
	P	Q
A	moves to the right	does not move
B	moves upwards	moves downwards
C	moves downwards	does not move
D	moves upwards	moves to the right

- 16** Which property of waves is being demonstrated in the diagram below?

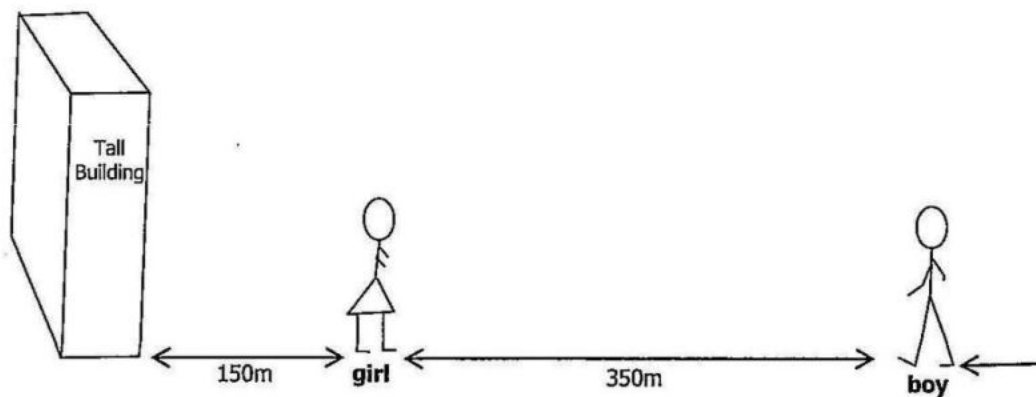


A Refraction
B Diffraction
C Bending of waves
D Constructive interference

- 17** A note of sound is produced on a keyboard. Its characteristics are that it is louder and has lower pitch. Which of the following waveforms represents this note of sound?

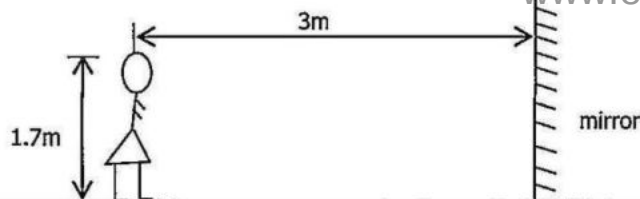


- 18** The diagram shows a girl standing 150m in front of a tall building. She fires a shot using a starting pistol. A boy, standing 350m from the girl, hears two bangs 1 second apart.



From this information, what is the speed of sound in air?

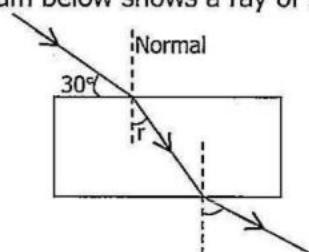
- A** 300m/s
 - B** 350m/s
 - C** 500m/s
 - D** 650m/s
- 19** A girl stands 3.0m in front of a plane mirror as shown below.



How far from the girl is her image?

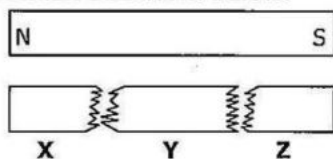
- A** 3.0m
- B** 3.7m
- C** 4.5m
- D** 6.0m

- 20 The diagram below shows a ray of light entering a glass block of refractive index 1.51.



What is the angle of refraction in the glass?

- A 20°
 B 30°
 C 35°
 D 60°
- 21 A pupil breaks down a bar magnet into three equal parts without disturbing its position as shown below.

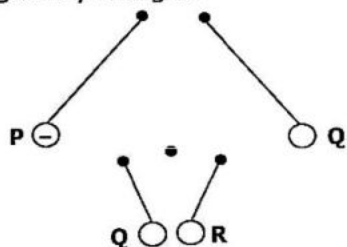


Which diagram shows the poles in **X**, **Y** and **Z**?

- A
- B
- C
- D

- 22 Which statement describes an example of induced magnetism?
- A Two north poles repel each other, but a north pole attracts a south pole.
 B A bar magnet swinging freely comes to rest pointing north-south.
 C A bar magnet attracts a piece of soft iron.
 D A bar magnet loses its magnetism if it is repeatedly dropped.

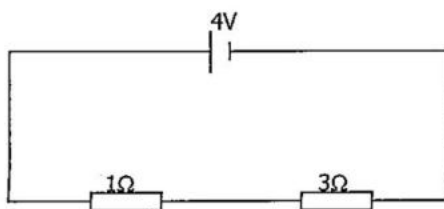
- 23 Three charged objects **P**, **Q** and **R** are suspended by insulated threads. Object **P** is negatively charged.



What could be the charges on **Q** and on **R**?

- | | Q | R |
|----------|----------|----------|
| A | Positive | Positive |
| B | Positive | Negative |
| C | Negative | Positive |
| D | Negative | Negative |

- 24 The diagram shows a 4V battery connected in series with 1Ω and 3Ω resistors.

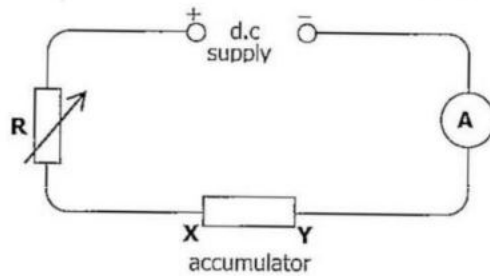


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How much charge and current flows in the circuit in 1 minute?

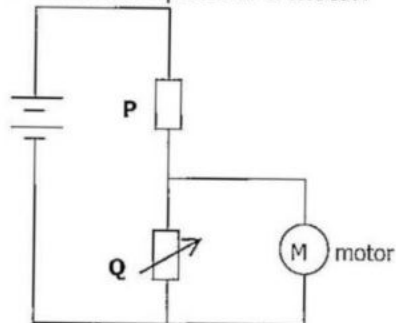
- | | CURRENT | CHARGE |
|----------|----------------|---------------|
| A | 1A | 1C |
| B | 1A | 60C |
| C | 2A | 60C |
| D | 4A | 30C |

- 25 The diagram below shows a charging circuit for an accumulator.



Which statement is correct?

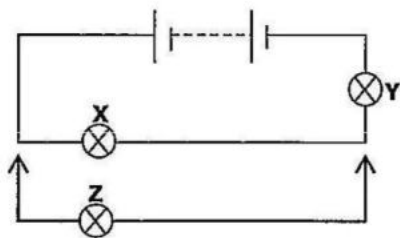
- A When freshly made, each accumulator has an e.m.f of about 12V.
 - B X represents the positive (red terminal) side of the accumulator.
 - C Y represents the positive (red terminal) side of the accumulator.
 - D X represents the negative (black or blue terminal) side of the accumulator.
- 26 In the circuit shown below, resistors P and Q act as a potential divider used to control the speed of a motor.



What is the potential divider for? To vary the ...

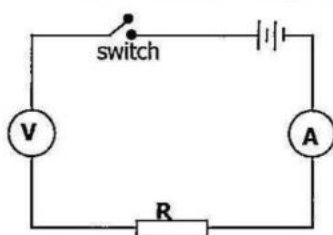
- A resistance of the motor.
- B e.m.f of the battery.
- C potential difference across the motor.
- D current through P.

- 27 The diagram below shows identical lamps **X** and **Y** connected in series with a battery. The lamps light with normal brightness.

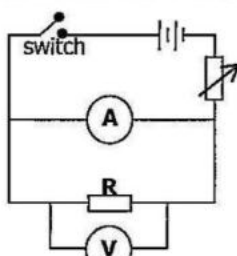


A third lamp **Z** is connected in parallel with lamp **X**. What happens to the brightness of lamp **Y**?

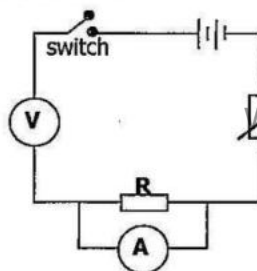
- A Brighter than normal.
 - B Normal as before.
 - C Dimmer than normal.
 - D Very dim (cannot be seen)
- 28 Which circuit diagram can be used to verify ohm's law?



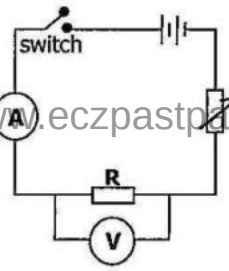
A



B



C

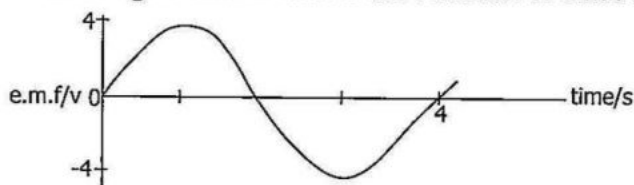


D

- 29 An immersion water heater is marked 240V, 2kW and it is operated for 180 minutes. If the cost of 1 unit (kWh) of electricity is K5.00 what is the cost of running this water heater?

- A K6.00
- B K10.00
- C K15.00
- D K30.00

- 30 The diagram below shows the variation of e.m.f of a simple a.c generator with time.



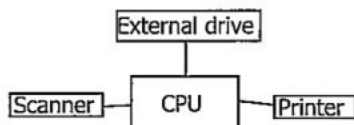
What is the frequency of the a.c generator?

- A 4 s
 - B 4 Hz
 - C 0.75 Hz
 - D 0.25 Hz
- 31 A moving coil loudspeaker ...
- A receives sound from a microphone.
 - B receives sound from the speaker through the cables.
 - C receives audio-frequency electric currents produced in the wires.
 - D produces audio-frequency electric currents in the speech coil.
- 32 Which statement is correct? Heat engines ...
- A are always more than 100% efficient.
 - B change fuel into mechanical energy.
 - C change heat energy into mechanical energy.
 - D change mechanical energy into heat energy.
- 33 Thermionic emission is the loss of ...
- A heat by hot objects.
 - B electrons by protons.
 - C electrons by heated metal surfaces.
 - D heat by electrons.
- 34 A capacitor of capacitance $10 \times 10^{-6}\text{F}$ is charged by a battery of 6V. How much charge is stored on each plate?
- A $2 \times 10^{-6}\text{C}$
 - B $9 \times 10^{-5}\text{C}$
 - C $6 \times 10^{-5}\text{C}$
 - D $1 \times 10^{-4}\text{C}$

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- 35 Which of the following is a basic memory unit used in computers?
- A Bistable
 - B Astable
 - C Control unit
 - D Arithmetic logic unit
- 36 Which of the following can be used to produce a series of voltage pulses?
- A Voltmeter
 - B Cathode ray oscillography
 - C Bistable circuits
 - D Astable circuits

- 37 The diagram shows a sketch computer system.



Which of the components above processes data?

- A Scanner
 - B Printer
 - C CPU
 - D External drive
- 38 Uranium -238 (${}_{92}^{238}\text{U}$) emits one beta particle to form a new daughter element whose symbol is **Np**. Which of the following is the correct decay equation?
- A ${}_{92}^{238}\text{U} \rightarrow {}_{90}^{234}\text{Np} + {}_{-1}^0e$
 - B ${}_{92}^{238}\text{U} \rightarrow {}_{91}^{236}\text{Np} + {}_{-1}^0e$
 - C ${}_{92}^{238}\text{U} \rightarrow {}_{92}^{238}\text{Np} + {}_{-1}^0e$
 - D ${}_{92}^{238}\text{U} \rightarrow {}_{93}^{238}\text{Np} + {}_{-1}^0e$
- 39 A radioactive substance has a half-life of 15 minutes. If the original mass is 10kg, what mass remains undecayed after 1 hour?
- A 625g
 - B 740g
 - C 820g
 - D 960g

- 40** How do the nucleon number and proton number of two isotopes of an element compare?

	Nucleon number	Proton number
A	different	different
B	different	same
C	same	different
D	same	same

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