

南译在了中学校

Nanyang Girls' High School

End-of-Year Examination 2022 Secondary 4

PHYSICS

Paper 1 Multiple Choice

Tuesday 11 October

No Additional Materials are required

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

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

Write your name, register number and class on the Question Paper and on the Answer Sheet in the spaces provided.

There are **thirty** 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** in the spaces provided 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.

Take the acceleration due to gravity g (or gravitational field strength) to be 10 m s⁻² (or 10 N kg⁻¹) near the Earth's surface.

This document consists of **11** printed pages and 1 blank page.

45 minutes

0845 - 0930

1 The figure on the left shows the reading of a vernier caliper when the jaws are closed. The figure on the right shows the reading of the same vernier caliper when it measures the diameter of a rod.



What is the actual diameter of the rod?

- A 5.79 cm
- **B** 5.83 cm
- **C** 5.89 cm
- **D** 5.93 cm
- 2 A table tennis ball is released from rest such that it falls vertically to the ground and bounces back upwards.

Which velocity-time graph best represents this motion? Assume air resistance is negligible, and take the downward direction as positive.



3 A ticker-tape timer is used to investigate the movement of a toy car. The frequency of the timer is 50 Hz and a portion of the tape is shown below.



What is the average acceleration of the toy car?

Α	400 cm s ⁻²	В	1900 cm s ⁻²
С	2200 cm s ⁻²	D	2500 cm s ⁻²

4 A brick is placed on a balance X and then on a balance Y.



What is measured by each balance?

	balance X	balance Y
Α	mass	mass
В	mass	weight
С	weight	mass
D	weight	weight

5 Two boxes A and B, of masses 2.0 kg and 4.0 kg respectively, are placed on a smooth horizontal floor. The boxes are given a horizontal push of 24 N as shown.



What is the normal contact force that box B exerts on box A?

Α	8 N	В	12 N
С	16 N	D	24 N

A box is dragged along a horizontal floor by a 70 N force as shown in the diagram. The box 6 moves with a constant speed to the right.



7 The diagram shows a balancing toy pivoted on a stand. If the toy is tilted slightly, it does not topple over but returns to its original position.



What is the position of the centre of gravity of this toy?

Α inside a weight

Α

С

- В above the pivot
- С exactly at the pivot
- D below the pivot
- 8 A lamp which operates with electrical power of 40 W has an efficiency of 30%.

How much useful energy can this lamp produce in two minutes?

Α	0.10 J	В	6.0 J
С	24 J	D	1 400 J

9 Consider the mercury barometer in the diagram below.



What is the pressure at point X inside the mercury?

Α	300 mm Hg	В	600 mm Hg
С	760 mm Hg	D	900 mm Hg

10 The diagram shows an object O viewed using two plane mirrors M_1 and M_2 . A person looks into the mirrors as shown.

At which position is the image of O seen?



11 The diagram shows an incident ray striking a plane mirror MN.



What is the angle of reflection if the angle between the incident ray and the reflected ray is 70° ?

Α	20°	В	30°
С	35°	D	55°

[Turn over

12 A beam of white light splits into several colours when it passes through a glass prism. Two of these colours are shown below.



Which statement accounts for this phenomenon?

- A Red light is slower than violet light in glass.
- **B** The refractive index of glass is smaller for red light than for violet light.
- **C** Red light has a smaller angle of refraction than violet light when it enters glass.
- **D** Red light has a smaller critical angle than violet light in glass.
- 13 Which row shows parts of the electromagnetic spectrum in order of increasing wavelength?

	shortest		→ longest
Α	radio waves	microwaves	X-rays
В	radio waves	X-rays	microwaves
С	X-rays	microwaves	radio waves
D	X-rays	radio waves	microwaves

14 A wave source of frequency 4.0 Hz produces waves.

What is the speed and wavelength of these waves?

	speed	wavelength
Α	8.0 cm s ⁻¹	0.020 cm
В	10 cm s ⁻¹	0.40 cm
С	12 cm s ⁻¹	3.0 cm
D	16 cm s⁻¹	64 cm

15 A sound wave from a flute has a smaller amplitude than that from a violin. The sound wave from the flute has a shorter period than that from the violin.

Which instrument produces the louder sound and which instrument produces the sound of higher pitch?

	louder	higher pitch
Α	flute	flute
В	flute	violin
С	violin	flute
D	violin	violin

16 A man stands between two cliffs as shown in the diagram and claps his hands once.



Assuming that the speed of sound in air is 340 m s⁻¹, what will be the time interval between the first two echoes?

Α	0.34 s	В	0.68 s
С	0.93 s	D	1.2 s

17 A battery moves a charge of 650 mC around circuit in 0.20 minutes.

What is the current in the circuit?

Α	54 mA	В	3.3 A
С	54 A	D	3300 A

18 Four identical light bulbs, P, Q, R and S, are connected in a circuit as shown below.



Which row shows the brightness of the light bulbs in the correct order from the dimmest to the brightest?

	dimmest -		 brightest
Α	Q	R	Р
В	R	Q	Р
С	Р	R	Q
D	Р	S	Q

19 A 12 V battery is connected to resistors as shown in the diagram below.



What is the current through the ammeter?

Α	1.3 A	В	1.6 A
С	4.6 A	D	7.6 A

20 A light-dependent resistor and a thermistor are connected in series to a battery. The thermistor's resistance decreases as temperature rises.



Which conditions will give the largest potential difference across the thermistor?

A dark and coldB dark and hotC bright and coldD bright and hot

- 21 Which statement is true about an electrical fuse?
 - **A** A fuse allows a high current through the circuit without overheating.
 - **B** A fuse adjusts its resistance to regulate the amount of current in the circuit.
 - **C** A fuse disconnects the circuit when the temperature is high.
 - **D** A fuse protects the wiring and appliance from overheating.
- 22 The power produced in a resistor is *P*.

If the voltage across the resistor is halved, what is the power produced in the resistor?

Α	<u>P</u> 4	В	<u>P</u> 2
С	2P	D	4 <i>P</i>

23 Which effect can only be observed if a metal bar is a magnet?

- A The metal bar repels the pointer on a compass.
- **B** The metal bar attracts a magnet.
- **C** The metal bar repels an iron nail.
- **D** The metal bar attracts another metal bar.
- 24 Two current carrying wires, P and Q are arranged as shown.
 - wire P

• wire Q

What is the direction of the force on each wire?

	wire P	wire Q
Α	to the left	to the left
В	to the left	to the right
С	to the right	to the left
D	to the right	to the right

What is the efficiency of the transformer?

Α	13%	В	30%
С	36%	D	83%

26 The gas in a closed vessel of constant volume is heated.

What happens to the molecules of the gas?

- **A** The average force between molecules decreases.
- **B** The rate of collision of the molecules with the vessel increases.
- **C** The kinetic energy of the molecules decreases.
- **D** The average separation of the molecules increases.
- 27 What is a necessary assumption when calibrating an unmarked liquid-in-glass thermometer using the ice point and steam point of water?
 - **A** The liquid has a fixed boiling point.
 - **B** The liquid has a fixed freezing point.
 - **C** The liquid has uniform density.
 - **D** The liquid expands uniformly.
- **28** Equal masses of oil and water are heated to 90 °C and then allowed to cool under identical conditions.

Which statement explains why oil cools faster than water?

- A Oil has a lower specific latent heat than water.
- **B** Oil has a lower specific heat capacity than water.
- **C** Oil has a higher boiling point than water.
- **D** Oil has a lower density than water.

29 Which wall material and exterior colour will most likely help a house located in a hot and sunny country stay cool during the day?

	wall material	exterior colour
Α	poor conductor	light
В	poor conductor	dark
С	good conductor	light
D	good conductor	dark

30 A gas stove is used to heat some water in a metal pan.

Which row describes the main mode of thermal transfer through the metal pan and throughout the water?

	metal pan	water
Α	convection	conduction
В	radiation	conduction
С	conduction	convection
D	conduction	conduction

END OF PAPER

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