

## 南洋女子中学校 NANYANG GIRLS' HIGH SCHOOL

## End-of-Year Examination 2011 Secondary Three

PHYSICS

Paper 1Multiple ChoiceMondayAdditional materials: Multiple Choice Answer Sheet

17 October 2011

45 minutes 0845 - 0930

## READ THESE INSTRUCTIONS FIRST

Do not open this booklet until you are told to do so.

Write in soft pencil.

Do not use staples, paper clips, highlighters, glue or correction fluid. Write your name, class and register number on the Multiple Choice Answer Sheet provided.

There are **thirty** 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 sheet.

## **INFORMATION FOR CANDIDATES**

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 gravitational field strength near Earth's surface, g = 10 N/kg

	This document consists of <b>13</b> printed pages.	
Setters: AJL, BN, TWL	NANYANG GIRLS' HIGH SCHOOL	[Turn over

1 Which of the following correctly describes time, distance and displacement as vector or scalar quantities?

	Time	Distance	Displacement
Α	scalar	scalar	scalar
В	scalar	scalar	vector
С	vector	scalar	vector
D	vector	vector	vector



Α	7.42 mm	В	7.92 mm
С	8.42 mm	D	10.42 mm

- It takes 42.4 s for a simple pendulum to swing from P to Q and back again to P twenty 3 times. What is the frequency of the pendulum?
  - Α 0.024 Hz В 0.274 Hz С 0.472 Hz D
  - 2.12 Hz



- 4 Which of the following best defines acceleration?
  - Α The rate of increase of speed
  - В The rate of change of velocity
  - С The total change in speed over time
  - D The total change in velocity over time

5 A body X of mass *m* is dropped from a height, *h*. At the same time, another body Y of mass 3*m* is dropped from a height 3*h*.

Which one of the following statements is true?

- **A** Y will eventually overtake and pass X.
- **B** As they fall, the distance between them decreases.
- **C** As they fall, the distance between them remains constant.
- **D** As they fall, the distance between them increases.
- 6 The graph below shows how displacement of an object changes with time.



Which section of the graph shows the object moving with decreasing velocity?

Α	Р	В	Q
С	R	D	S

7 A trolley is released from rest at the top of a ramp. As it moves down the ramp, it pulls a ticker-tape through a 50 Hz ticker timer. The diagram below shows the tape obtained.

1	.0m ↔	m			<u>← 10.0</u>	mm →
	• •	٠	٠	٠	•	•

What is the acceleration of the trolley?

- **A**  $3.8 \text{ m/s}^2$  **B**  $4.5 \text{ m/s}^2$
- **C** 5.6 m/s<sup>2</sup> **D** 10 m/s<sup>2</sup>

8 A girl decides to go for a jog around home before meeting her friends at the playground.

The bold line in the diagram below shows the path taken by the girl as she leaves the house and jogs towards the playground. The curved paths are arcs of two circles, of radii 200 m and 250 m, centred at *O*.



It is known that the girl took 5.0 min to jog from her home to the playground according to the path indicated.

What is her average velocity?

Α	1.07 m/s	В	3.57 m/s
С	64.0 m/s	D	214 m/s

**9** Car A is at rest in front of a traffic light. As the light turns green, Car A accelerates forward. At the exact same instant, Car B overtakes Car A at the traffic light.

Both cars continue to accelerate uniformly. After T seconds, Car A catches up with Car B.

Which of the following graphs best describe the motion of the two cars after passing the traffic light?



**10** A man standing at the edge of a cliff tosses a ball vertically upwards. The ball reaches a highest point and then falls to the bottom of the cliff.

Which of the following velocity-time graphs describes the motion of the stone from the moment it leaves the man's hand, assuming that the effects of air resistance are **significant**?



Read the following paragraph and use the information given to answer questions 11 and 12.

The Lunar Roving Vehicle (LRV) was an electric vehicle designed to give astronauts extra mobility when conducting missions on the Moon. It was made largely of aluminium, a relatively light metal, so as to reduce the overall mass of the vehicle. As a result, the LRV had a mass of 210 kg when empty.

Gravitational field strength on the Moon: 2 N/kg Gravitational field strength on Earth: 10 N/kg

11 How did the mass and weight of the LRV change on the Moon as compared to when it was on Earth?

	Mass of the LRV	Weight of the LRV
Α	Reduced	Reduced
В	Same as on Earth	Reduced
С	Reduced	Same as on Earth
D	Same as on Earth	Same as on Earth

**12** Suppose that the LRV broke down, and had to be pushed back to the spacecraft by the astronauts.

Ignoring the resistive effect of friction and air resistance, calculate the force needed to give the LRV a horizontal acceleration of  $1.0 \text{ m/s}^2$  on the Moon and on Earth.

	Force required on the Moon	Force required on Earth
Α	42 N	42 N
В	42 N	210 N
С	210 N	42 N
D	210 N	210 N

**13** A painter is standing on a plank supported at points A and B.



Which of the following forces is not acting on the plank?

A Weight of the plank B Normal contact force at A

D

- **C** Weight of the painter
- Normal contact force due to can of paint
- 14 The four forces acting on an aircraft while it is flying are



An aircraft is flying such that it is losing height at a constant rate but gaining forward speed.

Which of the following is true?

	vertical forces	horizontal forces
Α	L < W	T > R
В	L = W	T > R
С	not possible to determine	T > R
D	L < W	T = R

**15** A car is accelerating along a road in the direction shown. The wheel shown is connected to the engine.



In which direction is the force of friction exerted by the road on the car tyre?

- **16** A book of mass 0.50 kg is placed on a table of mass 5.0 kg. What is the magnitude and direction of the force exerted by the book on the table?
  - A5.0 N upwardsB50 N upwards
  - C 5.0 N downwards D 50 N downwards
- **17** Which of the following forces **cannot** be obtained from the addition of a 5.0 N force and a 8.0 N force?

Α	3.0 N	В	8.0 N
С	13.0 N	D	15.0 N

**18** The diagram below shows the remaining portion of a uniform rectangular lamina where a quarter of the lamina (Section **R**) has been cut off.



Which section does the centre of gravity of the above object lie in?

Α	Р	В	Q
С	R	D	S

**19** The diagram below shows a boy standing on a uniform beam of negligible weight balanced on two supports, **P** and **Q**.



Which of the following graphs best describes the magnitude of the normal reaction force acting at P as the boy walks from P to Q?



20 The diagram below shows a fishing rod (left) and an enlarged view of the axle (right) used to reel the fishing line in when the angler catches a fish.



The axle consists of a wheel of radius 5 cm and a handle of length 16 cm.

What is the minimum force, **F**, needed to reel in a fish of mass 1.2 kg, assuming that all the force exerted goes into overcoming the weight of the fish?

Α	0.38 N	В	0.57 N
С	3.8 N	D	12 N

21 The diagram below shows two possible routes, **L** and **M**, to get to the top **P** of a mountain. A climber climbs to the top using both routes and compares them. It is assumed that he always treks at a **constant speed**.



Which one of the following statements regarding the two routes is correct?

- A Route L will require more work done against gravity.
- **B** Route **M** will cause the climber to lose more kinetic energy through the climb.
- **C** The climber gains an equal amount of gravitational potential energy for both routes.
- **D** The climber loses an equal amount of kinetic energy for both routes.

**22** A 2.0 kg box, initially at rest, is pulled by a constant 5.0 N force along a rough surface for 6.0 s. The constant friction force acting on the box is 2.0 N.



What is the gain in kinetic energy of the box after 6.0 s?

Α	36 J	В	60 J
С	81 J	D	225 J

- **23** An object is 15.0 cm in front of a plane mirror. If this object is then moved a further 10.0 cm away from the mirror, what will be the distance between the image and the object?
  - **A** 5.0 cm
  - **B** 10.0 cm
  - **C** 25.0 cm
  - **D** 50.0 cm
- 24 The diagram shows an illuminated object **O** placed in front of a plane mirror **AB**. **X** is the image of **O**.



Which of the following statements describing the diagram is **correct**?

- **A** X is brighter than O.
- **B** X is smaller than O.
- **C** X will move closer towards the mirror if O is placed closer to the mirror.
- **D** X will move further away from the mirror if O is placed closer to the mirror.

**25** An experiment is carried out to determine the refractive index of a glass block as shown below. The angle of incidence i and the angle of refraction r are measured.

Which one of the following graphs if plotted would give a straight line through the origin?

- A sin i plotted against sin r.
- **B** i plotted against r.
- **C** sin i plotted against r.
- **D** i plotted against sin r.



**26** A ray of red light travels in air and strikes a triangular glass prism at an angle of incidence 45°. The critical angle of red light for the glass is 42°.

Which of the following diagrams best shows the path of the ray?



**27** A converging lens has focal length of 10.0 cm. An object is placed at a distance of 20.0 cm to the left of the lens as shown below.



The image produced is

- A real and 10.0 cm to the right of the lens.
- **B** real and 20.0 cm to the right of the lens.
- **C** virtual and 10.0 cm to the left of the lens.
- **D** virtual and 20.0 cm to the left of the lens.

**28** A boy wants to capture the image of a distant object on a screen using a converging lens as shown below.



29 Which type of electromagnetic radiation travels at the highest speed through a vacuum?

Α	Gamma rays	В	Light waves
С	Radio waves	D	All have the same speed

**30** Which of the following type of electromagnetic waves is **NOT** normally used for communication?

Α	visible light	В	microwaves
С	radio waves	D	gamma rays

**End of Paper**