

Class	Register Number	Name
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南洋女子中學校
NANYANG GIRLS' HIGH SCHOOL

Mid-Year Examination 2018
Secondary Three

ADVANCED PHYSICS

Section A

Wednesday

Additional materials: Optical Answer Sheet (OAS)

9 May 2018

2 hours
08:45 – 10:45

READ THESE INSTRUCTIONS FIRST

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

Write your name, register number and class in the spaces at the top of this page.

Section A (20 marks)

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

There are **twenty** questions in this section. 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.

Section B (30 marks) & Section C (10 marks)

Printed in a separate document.

INFORMATION FOR CANDIDATES

You are advised to spend no longer than 30 minutes on Section A and no longer than 1 hour on Sections B and C.

Take the acceleration due to gravity to be 10 m s^{-2} or gravitational field strength to be 10 N kg^{-1} .

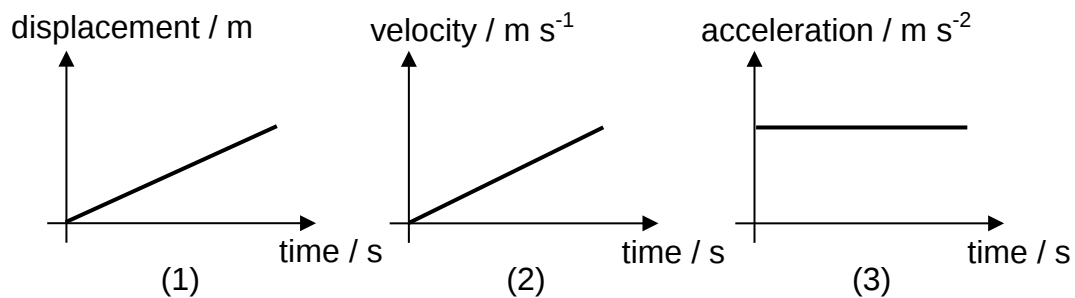
This document consists of **10** printed pages.

Setters: HWQ, STK

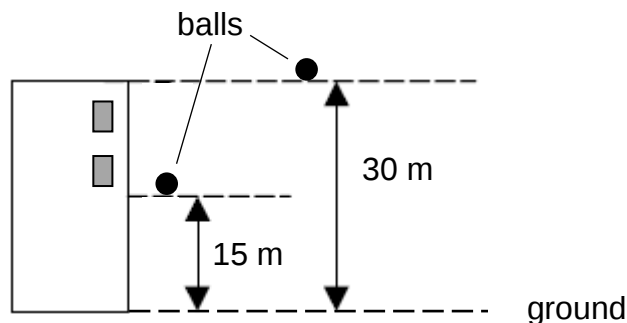
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[Turn over

- 4 Which of the following graph(s) describe a body moving with constant speed in a straight line?



- A (1) only
B (1) and (2) only
C (1) and (3) only
D (2) and (3) only
- 5 Two identical balls are released at the same time as shown in the diagram below. One is released from a height of 30 m while the other is released from 15 m. Assume air resistance is negligible.

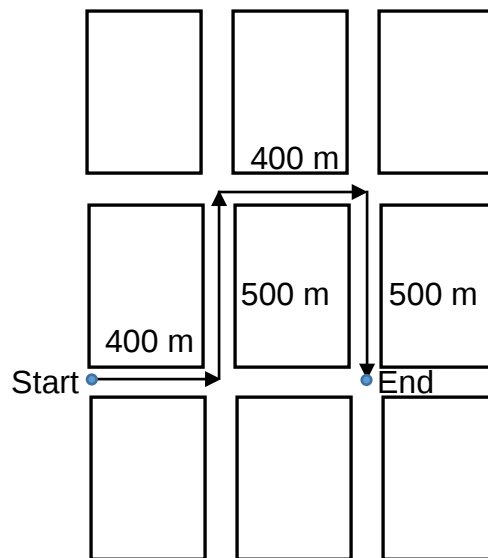


Which quantity is the same for both balls?

- A acceleration
B final velocity
C increase in velocity
D time of travel

Nanyang Girls' High School

6 The figure below shows the route taken by a school bus on a school day. The 9 blocks below are identical.



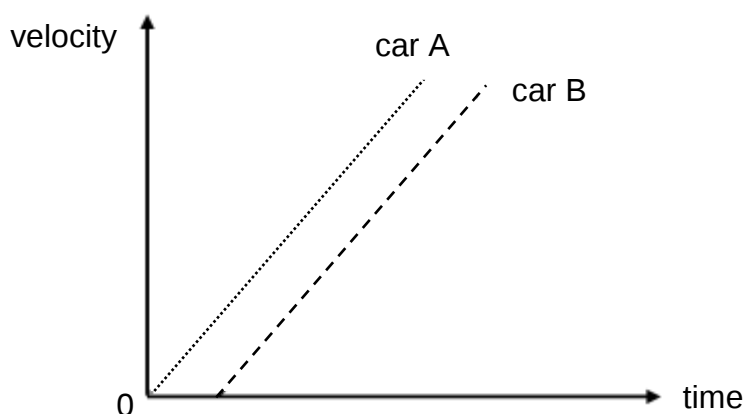
What is the magnitude of the total displacement of the school bus?

- | | | | |
|----------|-------|----------|--------|
| A | 400 m | B | 500 m |
| C | 800 m | D | 1300 m |

- 7 A van travels around a circular path of radius 50 m. It completes one round of the path in 1 minute. What is the distance travelled by the van and its average velocity in that 1 minute?

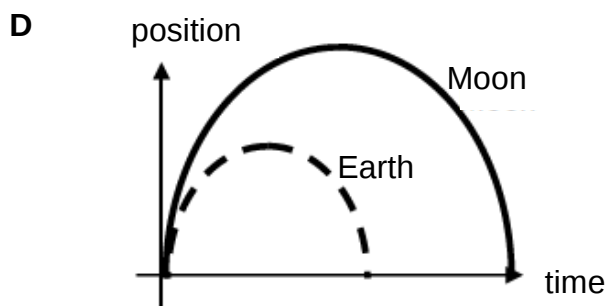
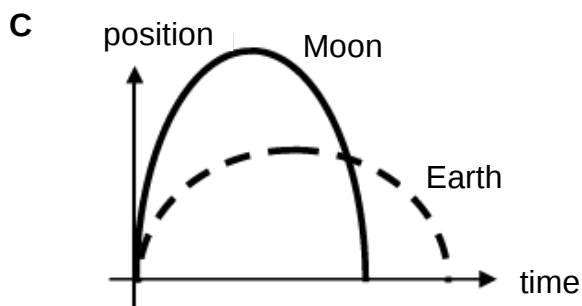
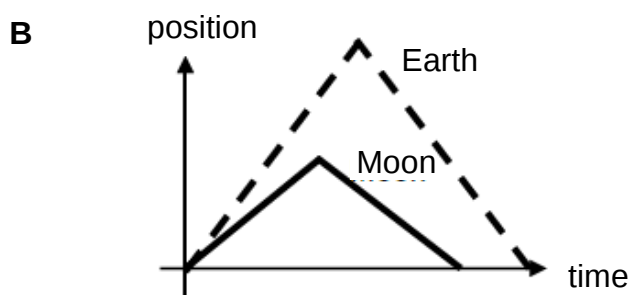
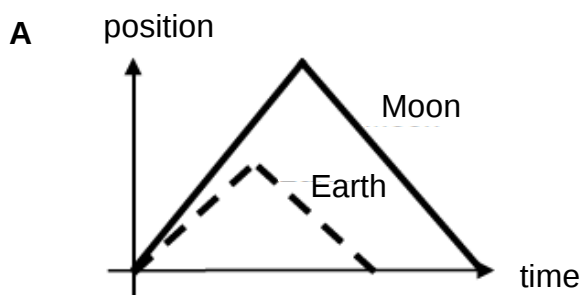
	Distance travelled / m	Average velocity / m s ⁻¹
A	50	0.00
B	314	0.00
C	314	5.23
D	7850	131

- 8 The graph below shows the velocity of two cars (A and B) over a period of time.



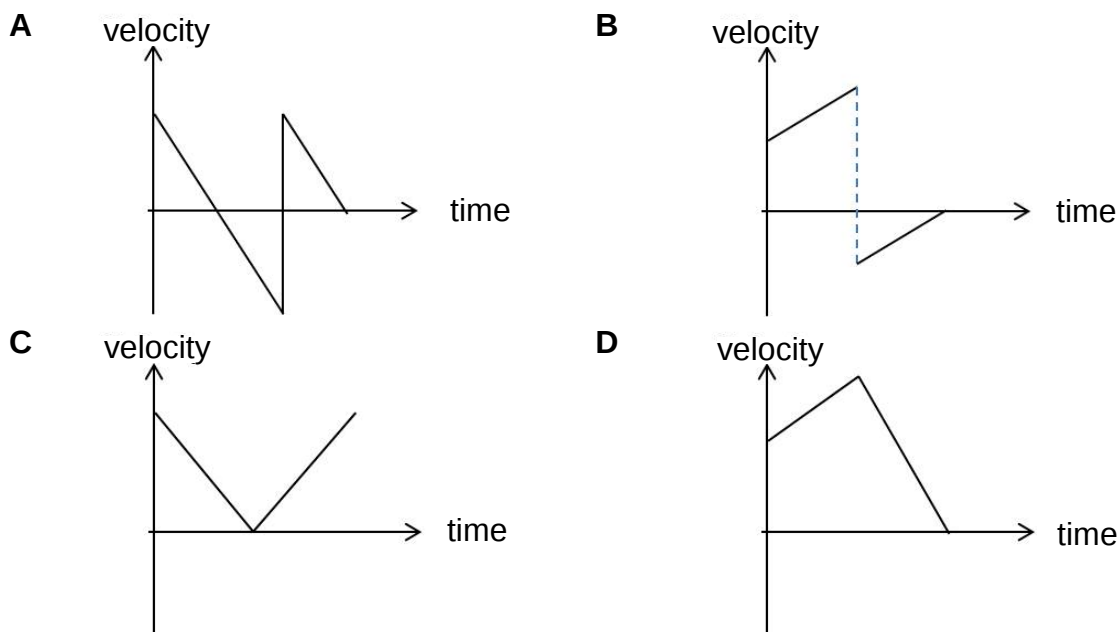
From the information in the graph, which of the following statements is correct?

- A Car A is more powerful than car B.
 - B Car A starts with a lower velocity as compared to car B.
 - C Cars A and B travel with the same acceleration.
 - D Cars A and B travel with constant velocities.
- 9 Two identical rocks were thrown vertically upwards with the same velocity on Earth and on the Moon respectively. Which graph best describes the position of the rock with time?



- 10** A basketball is **thrown** vertically downwards from a height of 10 m above the ground. The basketball bounces after hitting the ground.

Which graph correctly shows how the velocity of the basketball varies with time?

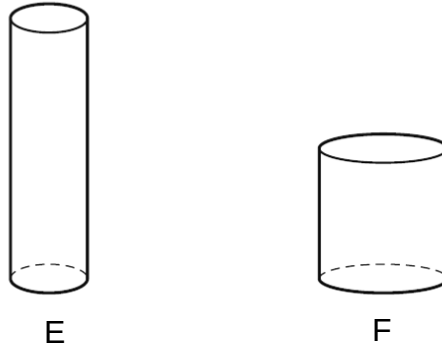


- 11** The gravitational field strength on the surface of planet P is one tenth of that on the surface of planet Q. On the surface of P, a body has its mass measured to be 1.0 kg and its weight measured to be 1.0 N.

What results are obtained for measurements of the mass and weight of the same body on the surface of planet Q?

	Mass on Q / kg	Weight on Q / N
A	1.0	0.1
B	1.0	10
C	10	10
D	10	100

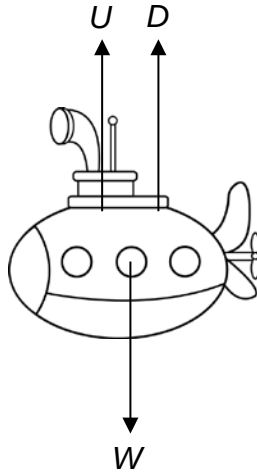
- 12** Two cylinders E and F are made of copper as shown below.



The height of E is twice the height of F. The diameter of E is half the diameter of F.

Which statement is correct?

- A** The density of cylinder E is four times that of cylinder F.
 - B** The density of cylinder E is twice that of cylinder F.
 - C** The density of cylinder E is equal to that of cylinder F.
 - D** The density of cylinder E is half that of cylinder F.
- 13** A submarine descends vertically at a constant velocity. The three forces acting on the submarine are viscous drag D , upthrust U and weight W .



The forces are not drawn to scale.

Which relationship between their magnitudes is correct?

- A** weight < drag
- B** weight = drag
- C** weight < upthrust
- D** weight > upthrust

14 When does a body accelerate uniformly?

- A** When the resultant force is zero.
- B** When the resultant force is constant but not zero.
- C** When the resultant force increases uniformly with respect to time.
- D** When the resultant force is proportional to the displacement from a fixed point.

15 A resultant force F is applied to an object. At one instant of time, the object has velocity v and acceleration a .

Which quantities *must* be in the same direction?

- | | |
|---------------------------|----------------------------|
| A a and F only | B a and v only |
| C v and F only | D v , F and a |

16 The diagram below shows a block of mass 0.60 kg is on a rough horizontal surface. A force of 12 N is applied to the block and it accelerates at 4.0 m s^{-2} .



What is the magnitude of the frictional force acting on the block?

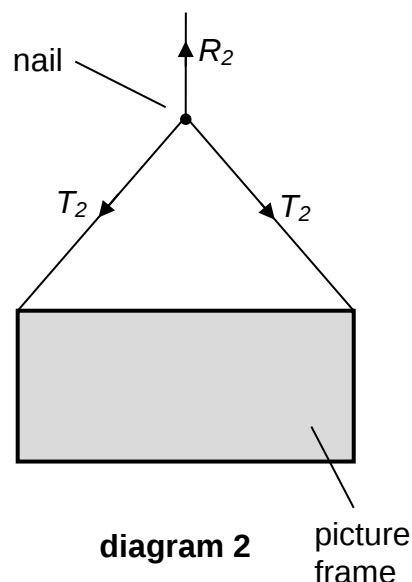
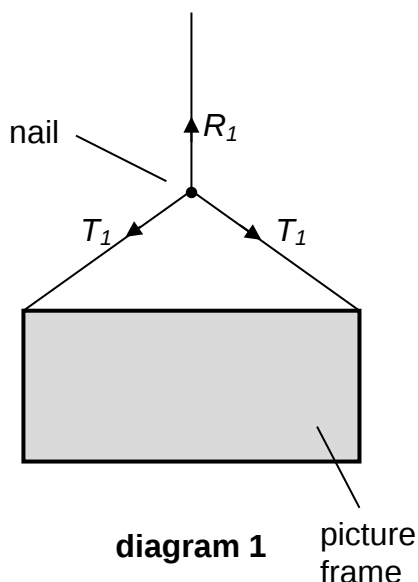
- | | |
|-------------------------|-------------------------|
| A 2.4 N | B 5.3 N |
| C 6.7 N | D 9.6 N |

17 A helicopter rises vertically with a constant speed. According to Newton's third law, there is a force which makes an action-reaction pair with the weight of the helicopter.

Which of the following is this force?

- A** The gravitational force on the Earth due to the helicopter.
- B** The lift force created by the engine of the helicopter.
- C** The air resistance on the helicopter as it rises up.
- D** The upthrust acting on the helicopter due to air around it.

- 18** The diagrams below show two ways of hanging the same picture frame.

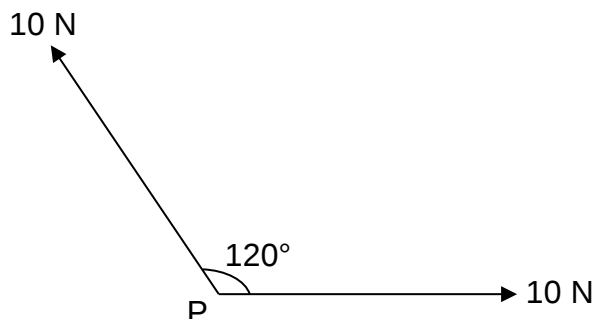


In both cases, a string is attached to the same points on the picture and looped symmetrically over a nail in a wall. The forces shown are those that act on the nail. The forces are not drawn to scale.

In diagram 1, the string loop is shorter than in diagram 2.
Which information about the magnitude of the forces is correct?

A	$R_1 = R_2$	$T_1 = T_2$
B	$R_1 = R_2$	$T_1 > T_2$
C	$R_1 > R_2$	$T_1 < T_2$
D	$R_1 < R_2$	$T_1 = T_2$

- 19** Two forces, each of 10 N, act at a point P as shown in the diagram below. The angle between the directions of the forces is 120° .

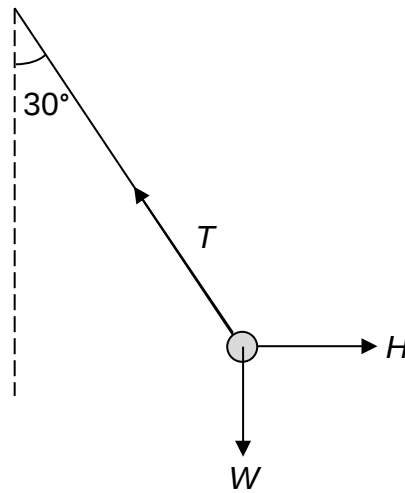


What is the magnitude of the resultant force?

- | | | | |
|----------|-------|----------|------|
| A | 5.0 N | B | 10 N |
| C | 17 N | D | 20 N |

- 20** A pendulum bob is held stationary by a horizontal force H . The tension in the string of the pendulum is T . The weight of the pendulum bob is W .

The forces are not drawn to scale.



Which equation is correct?

- A** $H = T \cos 30^\circ$
C $W = T \cos 30^\circ$

- B** $T = H \sin 30^\circ$
D $W = T \sin 30^\circ$

End of Section A

Answers to Section A

1	B	6	C	11	B	16	D
2	A	7	B	12	C	17	A
3	B	8	C	13	D	18	B
4	A	9	D	14	B	19	B
5	A	10	B	15	A	20	C