

Name:

( )

Class:



**LOYANG SECONDARY SCHOOL**  
First Semester Examination 2017

**5 May 2017****5076/01/02****SCIENCE(PHYSICS)**

Secondary 3 Express

**1 hour 45 min**

Additional material: Optical Answer Sheet (OAS)

**READ THESE INSTRUCTIONS FIRST****Do not open this booklet until you are told to do so.**

Write your name and registration number on the Answer Sheet in the space provided unless this has been done for you. Write in dark blue or black pen.  
The use of an approved scientific calculator is expected, where appropriate. You may lose marks if you do not show your working or if you do not use appropriate units. Do not use staples, paper clips, highlighters, glue or correction fluid.

**Section A**

Answer ALL questions.

Write your answers in the spaces provided on the question paper.

**Section B and C**

Answer ALL questions.

Write your answers in the spaces provided on the question paper.

The number of marks is given in brackets [ ] at the end of each question or part question.

	For Examiner's Use
<b>Section A</b>	
<b>Section B</b>	
<b>Section C</b>	
<b>Total</b>	

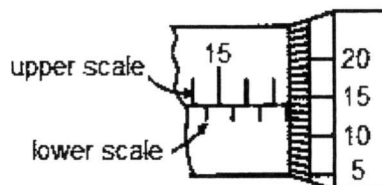
This document consists of 11 printed pages include the cover page.

[Turn over

**Section A (10 marks)**

Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

- 1 The diagram shows a micrometer which has a zero error of  $-0.02$  mm. The final reading shown on the micrometer is shown below.



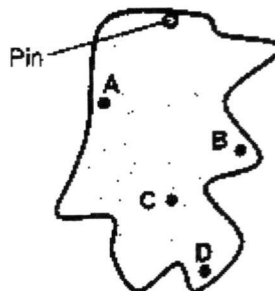
What is the correct reading?

- A 17.14 mm  
B 17.62 mm  
C 17.64 mm  
D 17.66 mm
- 2 Which action will increase the period of a pendulum?
- A use a heavier pendulum bob  
B use a longer pendulum  
C use a shorter pendulum  
D release the pendulum with a smaller angle
- 3 A stone is vertically projected from the ground with an initial speed of  $15$  m/s. Its deceleration during the upward flight is  $10$  m/s<sup>2</sup>. What is the magnitude of its acceleration when it is at its highest point?
- A  $0$  m/s<sup>2</sup>  
B  $10$  m/s<sup>2</sup>  
C  $15$  m/s<sup>2</sup>  
D  $20$  m/s<sup>2</sup>
- 4 A boy pushes a box horizontally along a rough surface and at a constant speed. When the pushing force is removed, what happens to the box?
- A The box continues to move at constant speed.  
B The box slows down to a lower constant speed.  
C The box slows down to a stop.  
D The box speeds up.

- 5 A car is travelling at a constant speed on a straight road, and drives onto a large patch of oil. The driver applies the brakes to stop the car. As compared to braking on a dry road,
- A the car slows down more quickly due to the reduced friction between the tyres and the road.
  - B the car slows down more quickly due to the increased friction between the tyres and the road.
  - C the car slows down more slowly due to the reduced friction between the tyres and the road.
  - D the car slows down more quickly due to the increased friction between the tyres and the road.
- 6 A object was brought from the Earth to the Moon. How does the mass, weight and inertia of the object change?

	Mass	Weight	Inertia
A	Decreases	Remains the same	Decreases
B	Remains the same	Decreases	Decreases
C	Remains the same	Decreases	Remains the same
D	Remains the same	Remains the same	Increases

- 7 An irregular shaped lamina is suspended freely by a pin as shown in the diagram below.



Which point (A, B, C or D) is the most likely centre of mass of the lamina?

- 8 Which would be most likely to sink into soft ground?
- A A loaded lorry with four wheels
  - B A loaded lorry with six wheels
  - C An empty lorry with four wheels
  - D An empty lorry with six wheels

- 9 A car of mass 1200 kg accelerates from 10 m/s to 12 m/s at 10 s. Calculate the resultant force of the motion of the car. Ignore air resistance.
- A 240 N
  - B 264 N
  - C 600 N
  - D 1440 N
- 10 What is the size of an atom?
- A  $1 \times 10^9$  m
  - B  $1 \times 10^{-9}$  m
  - C  $1 \times 10^{10}$  m
  - D  $1 \times 10^{-10}$  m

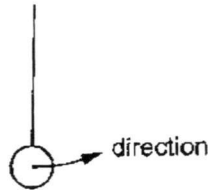
**Section B**Answer **all** the questions in this section.

Write your answers in the spaces provided on the question paper.

- 1 State the difference between a scalar quantity and vector quantity. Give an example for each quantity.

.....  
 .....  
 ..... [4]

- 2 A pendulum has a period of 1.0 s. A stopwatch is started when the pendulum is vertical and is moving to the right as shown.



- (a) Draw a diagram to show the position and the direction of the pendulum after 2.5 s later. [2]

- (b) Define period of the pendulum.

.....[1]

- 3 Mary is investigating the motion of a car at different times during part of the journey. She measured the speed of the car every 5.0 s. She tabulated her result below.

Time/s	0	5.0	10.0	15.0	20.0	25.0	30.0
Speed/ms <sup>-1</sup>	0	10.0	20.0	30.0	30.0	30.0	30.0

- (a) Use the space below, sketch a speed-time graph for this car's journey. [3]

- (b) State the maximum speed that the car has reached.

speed = .....ms<sup>-1</sup> [1]

- (c) Calculate the distance covered travelled by the car in the 30 s.

distance = .....m [3]

- 4 Fig 4.1 shows a balloon moves at constant speed of 5 ms<sup>-1</sup> up the sky.



Fig 4.1

- (a) On Fig 4.1, draw and name the types of forces to show forces acting on the balloon when it travels at constant speed. [4]
- (b) Determine the resultant force acting on the balloon.

resultant force = .....N [1]

- 5 A car has a weight of 11000 N accelerates uniformly from rest to 27.0 ms<sup>-1</sup> in 6.0 s. Take gravitational field strength, g is 10 N/Kg. Calculate

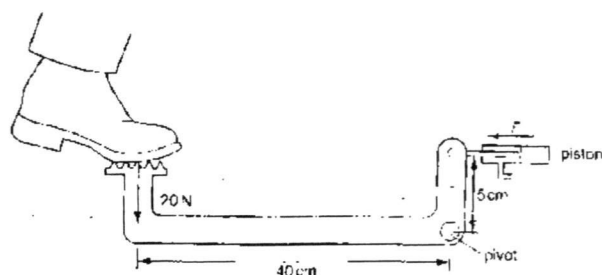
- (a) the resultant force on the car,

resultant force= .....N [3]

- (b) the average speed on the car by the resultant force in (a)

average speed = .....m/s [3]

- 6 A driver's foot presses with a steady force of 20 N on a pedal in a car as shown.



- (a) Determine the force  $F$  acting on the piston.

force = .....N [3]

- 7 Fig 7.1 shows the stability of a lorry is tested as shown.

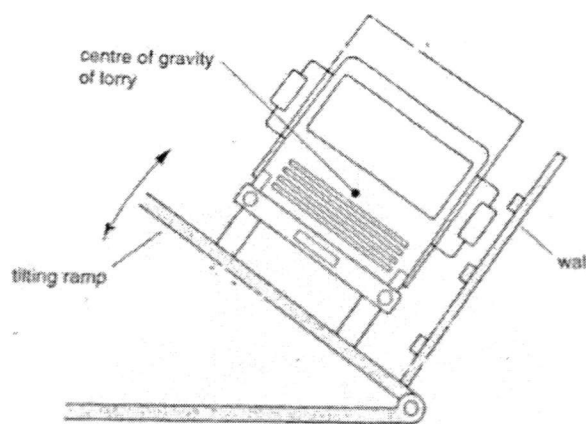


Fig 7.1

The ramp is tilted as much as possible without the lorry falling over. The ramp is then fixed and the lorry remains at rest in the position shown.

(a) Fig 7.1, draw arrows to represent the forces acting on the lorry. Label your arrows with the names of the forces. [3]

(b) Explain why the lorry falls over if the ramp is tilted any further.

.....  
.....[2]

8 Fig 8.1 shows a concrete slab with dimension 60.0 cm x 45.0 cm x 6.0 cm.

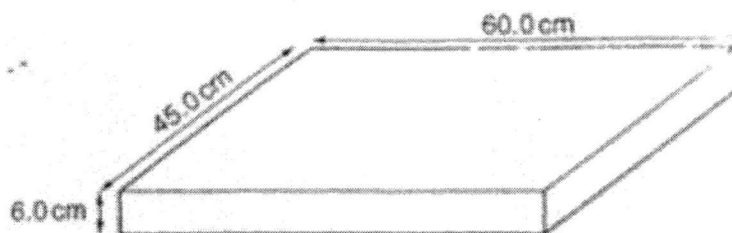


Fig 8.1

The density of concrete is  $2.5 \text{ g/cm}^3$ .

(a) Calculate the mass of one concrete slab.

mass = .....kg [3]

(b) A wheelbarrow is used to carry the slabs. The maximum mass that can be put into the wheelbarrow is 250 kg.

Calculate the number of slabs that can be safely put into the wheelbarrow.

number of slabs = .....[1]

(c) Determine the pressure exerted on the base of the slab.

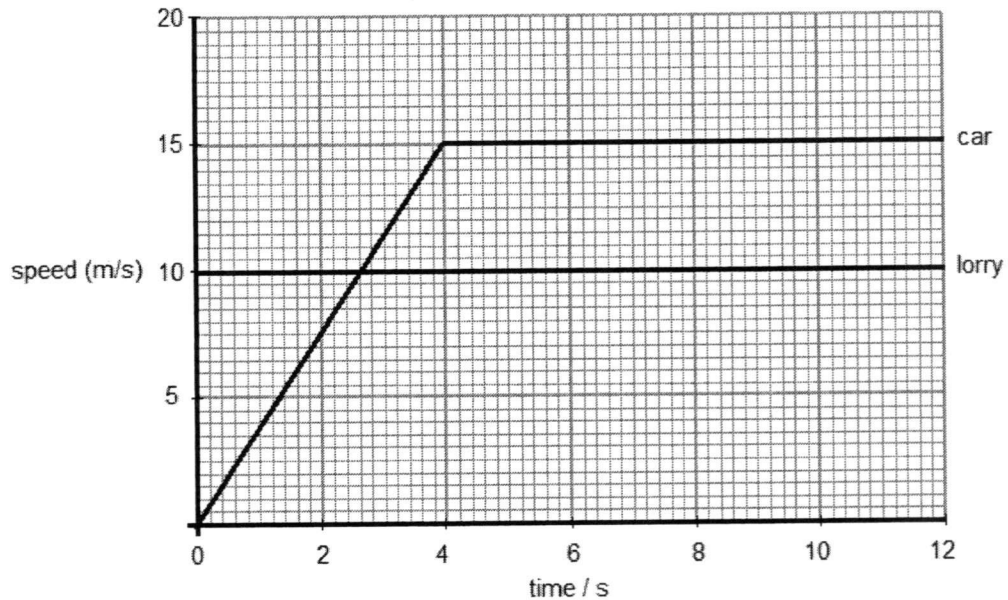
pressure = .....Pa [3]



**Section C**Answer **all** questions.

Write your answers in the spaces provided on the question paper.

- 1 (a) The diagram below shows the speed-time graph of a car and a lorry travelling on a straight road in the same direction. At time  $t = 0$ s, the lorry passes the car.



- (i) Define acceleration and state its S.I unit.

.....[2]

- (ii) Calculate the distance travelled by the car in the first 4 seconds.

distance=.....[1]

- (iii) Calculate the distance travelled by the lorry in the first 4 seconds.

distance =.....[1]

- (iv) Calculate the value of  $t$  when the car overtakes the lorry.

time =.....[1]

- (b) An object falls through the air from rest until it hits the ground. Fig 1.1 shows how the speed of the object changes with time.

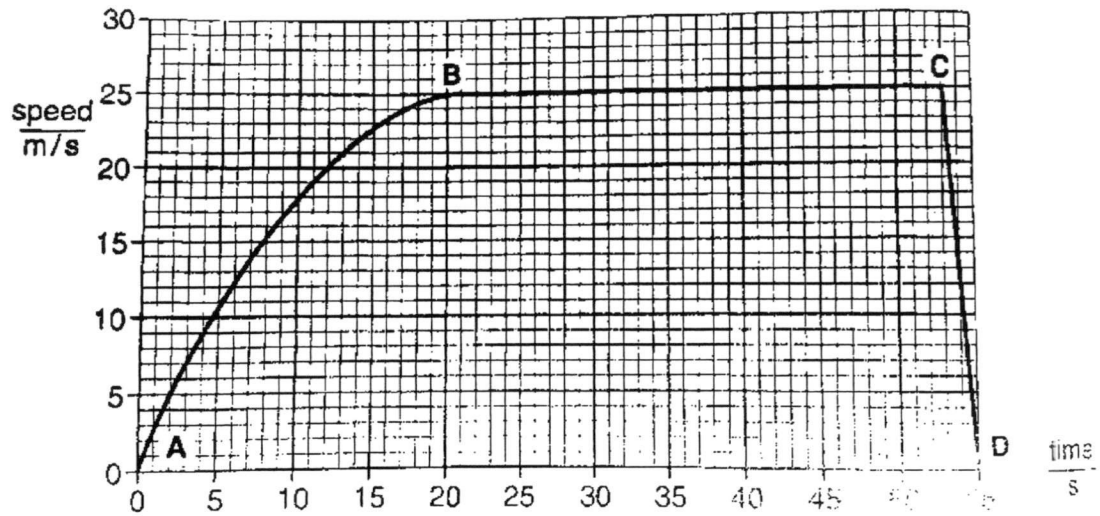


Fig 1.1

- (i) State the magnitude of the acceleration of the object between points B and C.

acceleration = ..... [1]

- (ii) Explain what happens to the acceleration of the object as it falls between point A and B.

.....

.....[2]

- (iii) The mass of the object is 5 kg. Calculate the resultant force on the object between point C and D.

resultant force = .....[2]

- 2 (a) (i) State 2 differences between weight and mass.

.....  
.....[2]

- (ii) Define gravitational field.

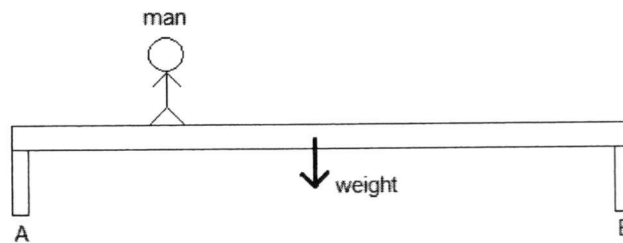
.....[2]

- (iii) State the relationship between weight, mass and gravitational field strength.

.....[1]

- (b) The diagram shows a uniform 8 metre long plank of mass 20 kg, supported at point A and point B. The centre of gravity of the plank is exactly at the middle of the plank.

A man weighing 600 N stands exactly midway from point A and the centre of gravity of the plank. The weight of the man and the weight of the plank exert a clockwise moment about point A. The plank is in equilibrium. ( $g = 10 \text{ N/kg}$ )



- (i) Calculate the total clockwise moments about Point A.

moments=.....[2]

- (ii) State the total anticlockwise moments about Point A.

moments=.....[2]

- (iii) Calculate the force exerted at Point B.

force =.....[1]

***All the best***



## LOYANG SECONDARY SCHOOL

### Marking Scheme

SA1 (2017)

Year: 2017

Level: Secondary 3

Stream: Express

Setter: Kelvin Yong/Sherly Lim

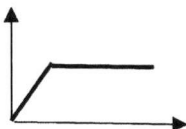
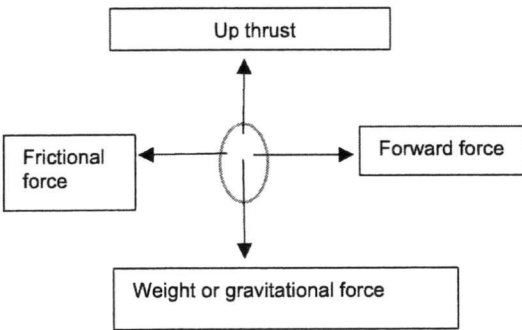
Subject / Paper No.: Science (Physics)

Total marks:

#### Section A

1	2	3	4	5	6	7	8	9	10
D	B	B	C	C	C	C	A	A	D

#### Section B

Qn	Answers	Marks
1	Scalar quantity has magnitude only ,example are speed/time/distance/mass Vector quantity have both magnitude and direction, example are weight/force/displacement (Any one example for each case)	1 mark each [4]
	Show the direction is the opposite from the original	
	Period is the time taken for one complete oscillation of the pendulum.	[1]
3a		1 mark for correct axis and time 1 mark for correct shape of the graph
	Max speed = $30 \text{ ms}^{-1}$	
	Distance = area under the graph = $\frac{1}{2} \times 15 \times 30 + (30 \times 15)$ = 675 m	[1] [1] [1]
4a		1 mark for each correct arrow pointing of direction and the name is also correct. [4]
b	0 N	

Qn	Answers	Marks
5a	$a = v - u / t = 27 - 0 / 6 = 4.5 \text{ ms}^{-2}$ $F = ma$ $= 1.1 \times 10^3 \times 4.5$ $= 4950 \text{ N}$	[1] [1] [1]
b	Average speed = total distance / total time $= \frac{1}{2} \times 27 \times 6 / 6$ $= 13.5 \text{ m/s}$	[1] [1] [1]
6a	Taking moments at the pivot, Clockwise moment = anti-clockwise moment $FX 5 = 20 \times 40$ $F = 160 \text{ N}$	[1] [1] [1]
7a	Arrow must draw vertically down from the centre of gravity on the lorry. 2 arrows must draw vertically up on the 2 tyres.	[1] [2]
b	Centre of gravity <u>falls outside</u> the <u>base area</u> of the ramp when tilted therefore it will topple.	[1] + [1]
8a	Density = $m/v$ $m = 2.5 \times (60 \times 45 \times 6) = 40500 \text{ g}$ $= 40.5 \text{ kg}$	[1] + [1] [1]
b	Number of slabs = $250 / 40.5$ $= 6$	[1]
c	$P = F/A$ $= 40.5 \times 10 / 0.6 \times 0.45$ $= 1500 \text{ Pa}$	[1] [1] [1]

## Section C

Qn	Answers	Marks
1a	(i) Acceleration is defined as the change in velocity, S.I unit $\text{ms}^{-2}$	[1] + [1]
	(ii) Distance $= (0.5)(4)(15)$ $= 30 \text{ m}$	[1]
	(iii) Distance $= (4)(10)$ $= 40 \text{ m}$	[1]
	(iv) Time $= (40 - 30) / (15 - 10)$ $= 2 \text{ s}$ $T = 2 + 4 = 6 \text{ s}$	[1]
1b	(i) $a = 0 \text{ m/s}^2$	[1]
	(ii) Speed increases, air resistance also increases thus decreases the acceleration	[1] [1]
	(iii) $F = ma$ $= 5 \times 10 \times (-12.5)$ $= -625 \text{ N}$	
2a	(i) Weight depend on gravitational field strength whereas mass is unchanged due to position or location. Weight measure in Newton whereas mass measure is kilogram	[1] [1]
	(ii) Gravitational field is a <u>region</u> in which a <u>mass experiences</u> a force due to gravitational attraction.	[1] + [1]
	(iii) $W = mg$	[1]
2b	(i) For a body in equilibrium, the total clockwise moments about a point is equal to total anti clockwise moments about the same point.	[1] [1]
	(ii) Total clockwise moments $= (200)(4) + (600)(2)$ $= 2000 \text{ Nm}$	[1]
	(iii) 2000 Nm	[1]
	(iv) Force	

		$= 2000 / 8$ $= 250 \text{ N}$	[1]
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