Name:	Index Number:	Class:

YIO CHU KANG SECONDARY SCHOOL
END-OF-YEAR EXAMINATION 2016
SECONDARY TWO EXPRESS

SCIENCE (PHYSICS)

Friday 7 October 2016 2 hours
(For Biology and Physics)

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your name, index number and class on the cover page.
The Science Examination consists of two components: Science (Biology) and Science (Physics).
You are required to complete the two components in two hours.

Write in dark blue or black ink.
You may use a soft pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

SECTION A: Multiple Choice Questions
This section consists of **ten** multiple choice questions. 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 the bracket provided.

SECTION B: Structured Questions
This section consists of structured questions. Answer **all** questions.
Write your answers in the spaces provided.
The number of marks is given in brackets [ ] at the end of each question or part question.

The use of an approved scientific calculator is expected, where appropriate.

For Examiner's Use

Section A	/ 10
Section B	/ 40
Total	/ 50

Parent's / Guardian's signature

Name of Setter: Mr Phua Yong Bin

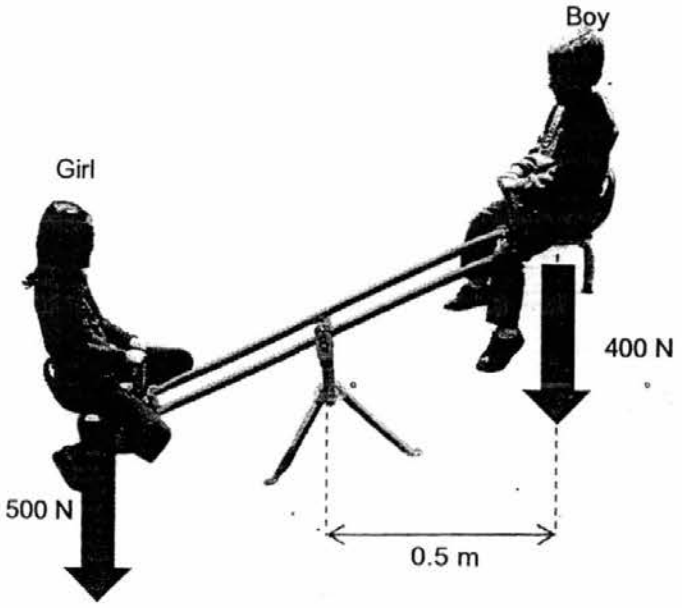
This document consists of **15** printed pages and **1** blank page.

SECTION A [10]: Multiple Choice Questions
Answer **all** questions in the brackets provided.

1 Which of the following is an example of a contact force?

A electrostatic force
B friction force
C gravitational force
D magnetic force ( )

2 The picture below shows two children on a see-saw. The boy weighs 400 N and the girl weighs 500 N. Both children are 0.5 m away from the pivot.



What is the direction of the moment due to the weight of the boy?

A anticlockwise
B clockwise
C downward
D upward ( )

3 A ball is thrown straight up into the air. It moved from P to Q as shown in Fig 3.1 and dropped from Q to P as shown in Fig 3.2.

Fig 3.1

Fig 3.2

Which one of the following is correct?

	Potential energy of ball from P to Q	Kinetic energy of ball from Q to P
A	decrease	decrease
B	decrease	increase
C	increase	decrease
D	increase	increase

( )

4 A hearing aid is attached to the ear to help people who suffer from hearing loss.

What is the main function of a hearing aid?

A To decrease the amplitude of sounds sent from the surroundings.
B To decrease the frequency of sounds sent from the surroundings.
C To increase the amplitude of sounds sent from the surroundings.
D To increase the frequency of sounds sent from the surroundings. ( )

5 Fireworks is the main highlight of every year's National Day Parade.

Edward said that it took 4 seconds for him to hear the fireworks, after seeing them explode in the night sky.

If sound travels at 300 m/s, how far away was Edward from the fireworks?

A 75 m

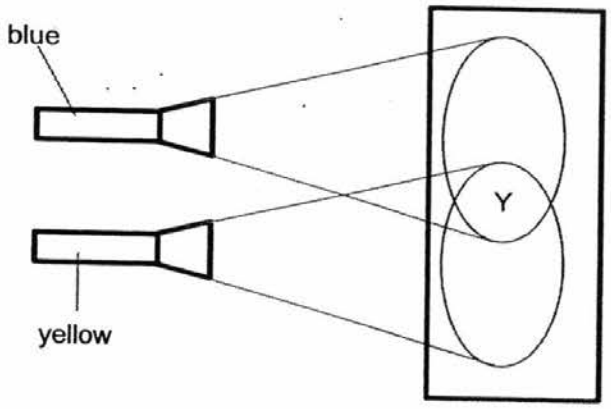
B 120 m

C 600 m

D 1200 m

( )

6 Blue and yellow light are shone on a white screen as shown in the diagram below.



What colour is region Y?

A blue

B green

C yellow

D white

( )

7 Which of the following statements correctly describes how a parallel beam of light will be reflected when it hits an uneven surface?

A The beam will be reflected as convergent rays of light.

B The beam will be reflected as diffused rays of light.

C The beam will be reflected as divergent rays of light.

D The beam will be reflected as parallel rays of light.

( )

8 Amy looks at herself in front of a plane mirror.

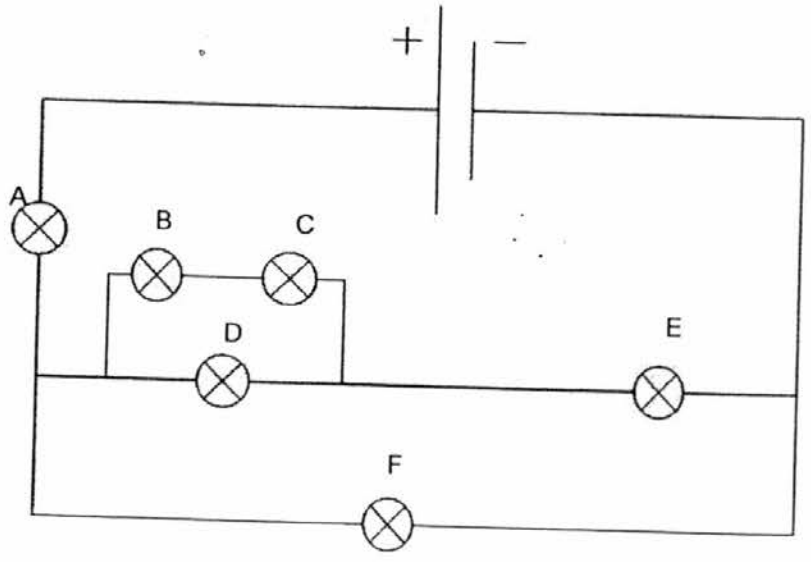
Which of the following statements correctly describes her image?

A Her image appears to be laterally inverted.
B Her image appears to be nearer.
C Her image appears to be real.
D Her image appears to be smaller. ( )

9 Which of the following statements is the definition of current?

A Current is defined as the flow of charge per resistance.
B Current is defined as the flow of charge per unit time.
C Current is defined as the flow of charge through a component.
D Current is defined as the flow of electricity. ( )

10 Study the circuit below. All bulbs and battery are in working condition.



Which one of the following correctly states the number of bulbs that would still be lit, when one or more bulbs are disconnected?

	Bulb(s) disconnected	Number of bulb(s) still lit
A	A	1
B	B & D	2
C	C	3
D	E & F	4

( )

SECTION B [40]: Structured Questions
Answer **all** questions in the spaces provided.

11 Fig 11.1 shows an experiment conducted by an engineer, to test the softness of soil. The engineer places a brick on the soil and measures the depression caused by the brick.

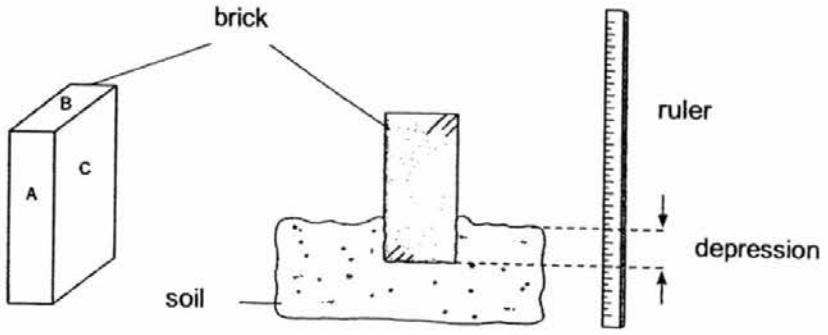


Fig 11.1

Which face of the brick, A, B or C, would cause the deepest depression?
Explain your answer.

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.....

..... [2]

12 **(a)** Fig. 12.1 below shows a book at rest on the table.

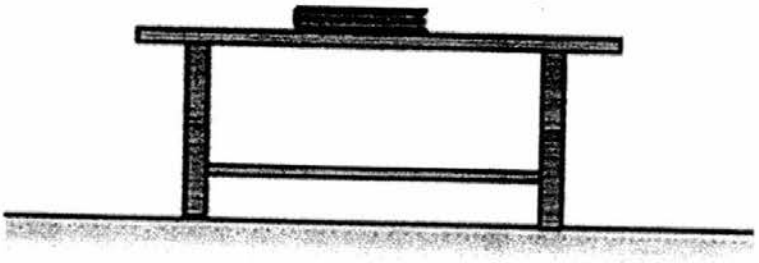


Fig 12.1

(i) On the picture above, draw arrows to represent the weight and normal contact force acting on the book. Label the forces drawn. [2]

(ii) If a horizontal force is applied on the book, state the change in motion of the book.

.....

..... [1]

(b) The book is now placed on a mass balance, as shown in Fig. 12.2 below.

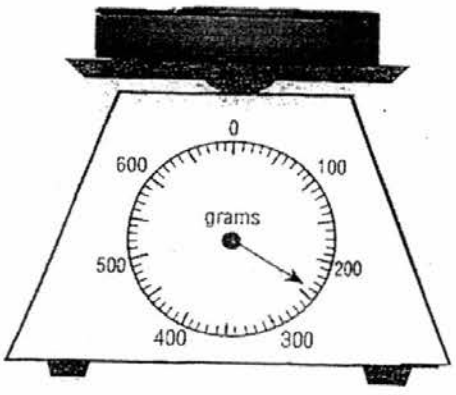


Fig 12.2

(i) State the mass of the book in kg.

mass = ... kg [1]

(ii) Taking acceleration due to gravity to be 10 m/s^2,

Calculate the weight of the book.

weight = ... N [1]

13 Fig 13.1 below shows a father carrying his baby home from the carpark and climbing up three levels of stairs to his flat. The carpark is 20 m away from the stairs and each level of the flat is 2.5 m high.

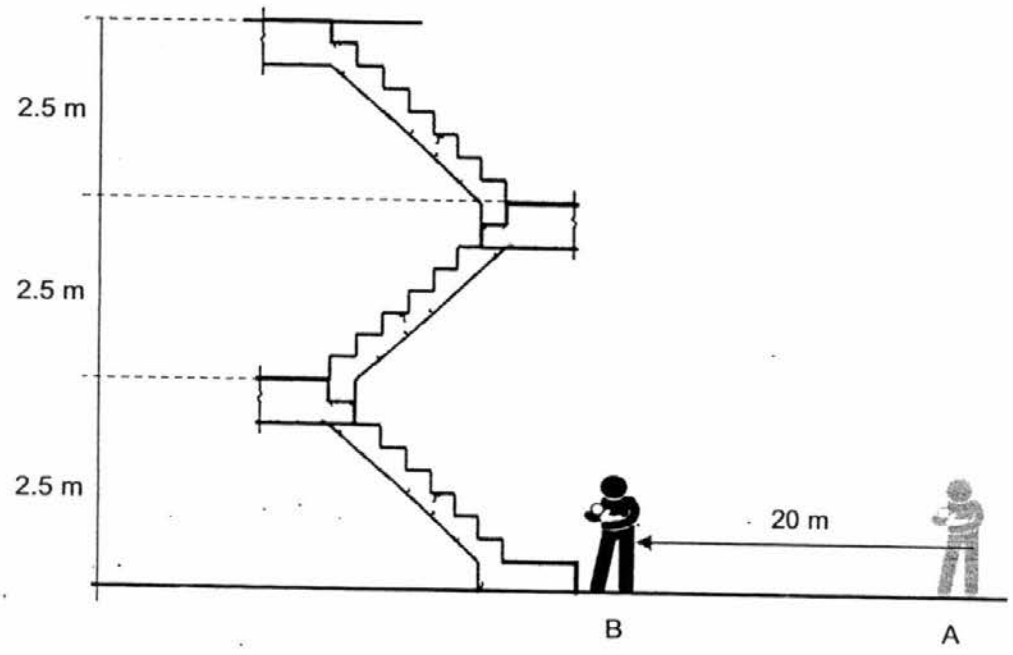


Fig 13.1

(a) The father weighs 600 N and the baby weighs 50 N.

(i) State and explain the work done by the father in carrying the baby as he walks from point A to B.

.....

..... [2]

(ii) Calculate the work done by the father when he climbs three levels up the stairs with his baby.

Work done = ...J [2]

14 Fig 14.1 shows a particular sound wave.

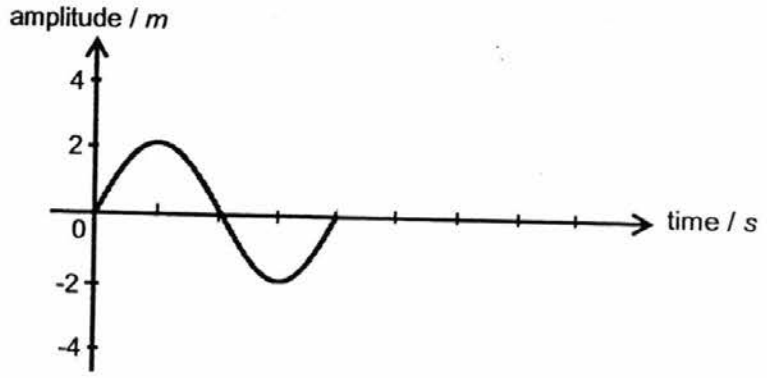
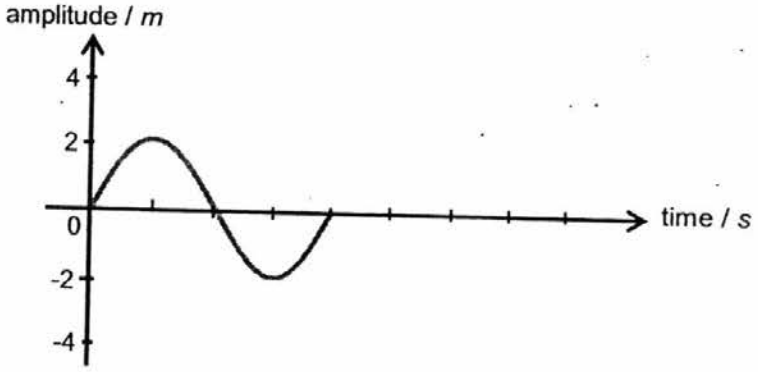


Fig. 14.1

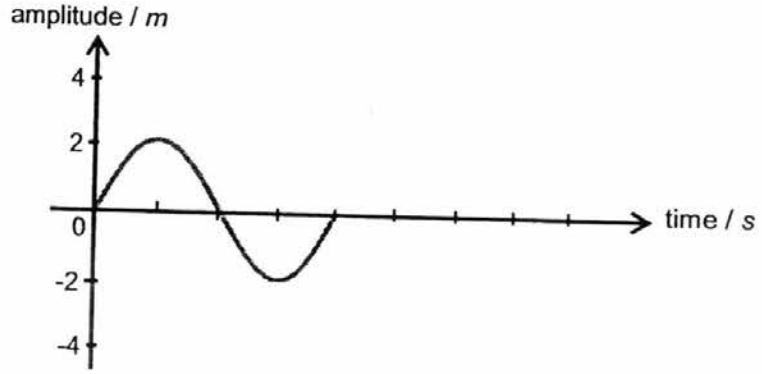
(a) On the axis provided below,

(i) draw a sound wave which has twice the loudness as the original sound.



[1]

(ii) draw a sound wave which has twice the pitch as the original sound.



[1]

(b) Explain why sound energy travels faster through solids than through air.

.....

.....

..... [2]

15 One of nature's most splendid masterpieces is the rainbow. Fig. 15.1 shows a light ray striking a raindrop.

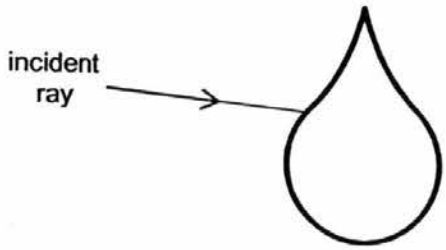


Fig. 15.1

(a) The part where light ray strikes on the surface of the raindrop has been magnified in Fig. 15.2 and 15.3 below. Part of the light ray is reflected while another is refracted as it enters the rain drop.

(i) In Fig 15.2, draw and label the normal and the reflected ray.

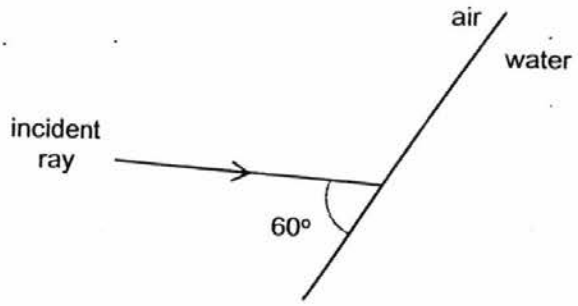


Fig. 15.2

[2]

(ii) State the angle of reflection.

angle of reflection = ... ° [1]

(iii) In Fig 15.3, draw and label the normal and the refracted ray.

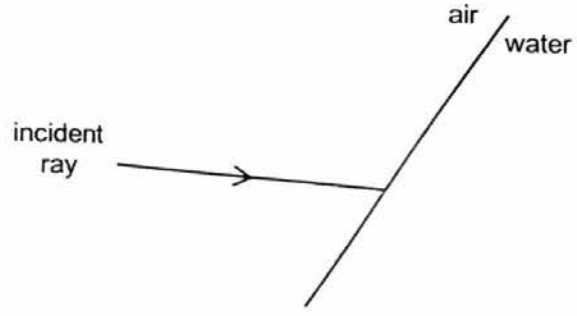


Fig. 15.3

[2]

(iv) State if the angle of refraction is bigger than, equal to or smaller than the angle of incidence.

..... [1]

(b) Explain how a rainbow can be formed from visible white light in nature.

.....

.....

.....

.....

..... [2]

16 Fig 16.1 below shows a schematic diagram of the electrical circuit in Mr Goh's house.

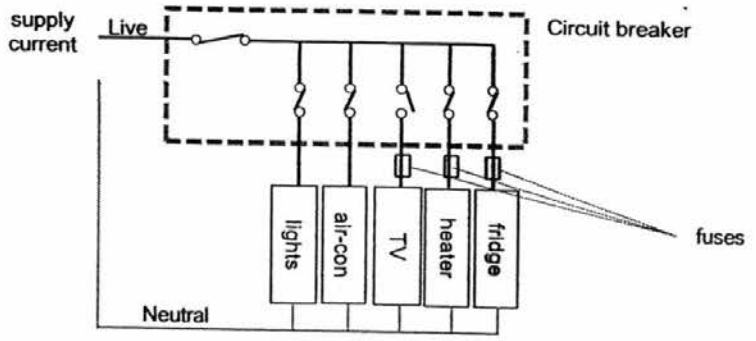


Fig. 16.1

(a) **(i)** Explain how the fuses protect the appliances from being damaged.

.....

.....

..... [1]

(ii) State one difference between a circuit breaker and a fuse.

.....

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..... [1]

(b) Fig. 16.2 below shows the lighting circuit for Mr Goh's living room.

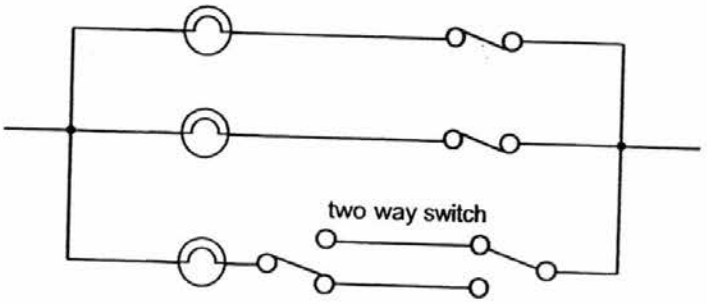

Fig. 16.2

(i) Each light bulb has a resistance of 20 Ω.

Calculate the effective resistance of all three light bulbs when they are connected.

Effective resistance = ... Ω [2]

(ii) Explain how the two way switch works.

.....

..... [1]

(iii) Suggest one location in the house where the two-way switch would be useful.

.....

..... [1]

(iv) Mr Goh wishes to install a fourth light bulb in his living room which can be switched on or off without affecting the other bulbs.

Draw on Fig. 16.2 above to show how this light bulb should be connected to the existing circuit. [1]

17 State one advantage and one disadvantage of generating electricity from a hydroelectric power plant.

.....

.....

.....

..... [2]

18 State one effect of an electric current and provide an example of its application.

.....

..... [2]

19. Fig. 19.1 below shows the packaging for a 60 W LED light bulb.

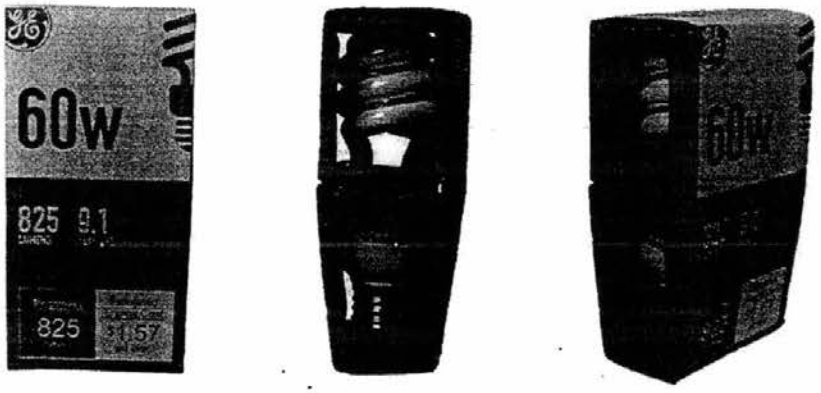

Fig. 19.1

(a) Explain what '60 W' means.

.....

..... [1]

(b) A 240 W light bulb and a 60 W LED light bulb were both switched on for 24 hours. The cost of electricity is $ 0.25 / kWh.

Calculate how much money can be saved by using the LED light bulb.

Savings = $ ..... [3]

20 Fig 20.1 below shows Mr Goh's electrical socket connected to multiple plugs, with all of them switched on at the same time.

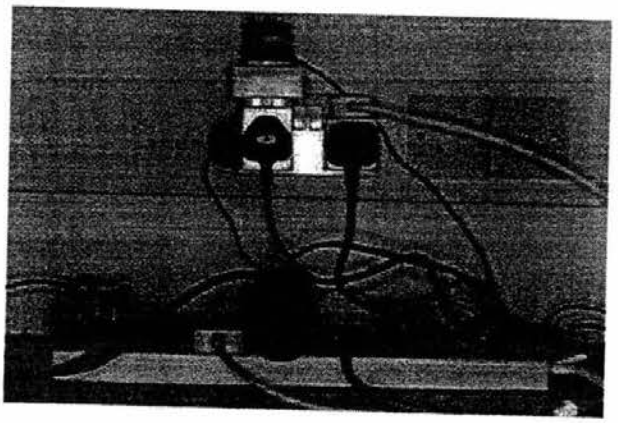

Fig. 20.1

Describe the electrical hazard that would possibly occur from Fig. 20.1.

.....

..... [2]

END OF PAPER

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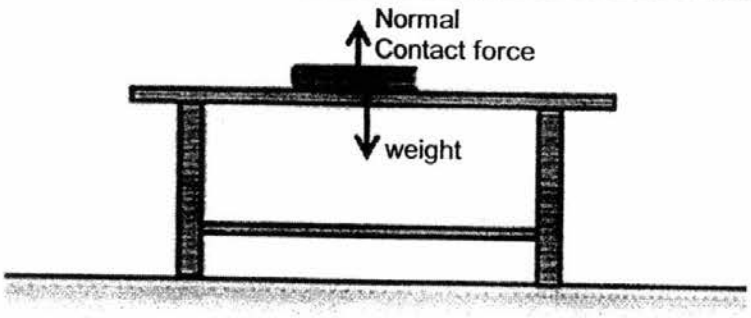
YIO CHU KANG SECONDARY SCHOOL
MARKING SCHEME

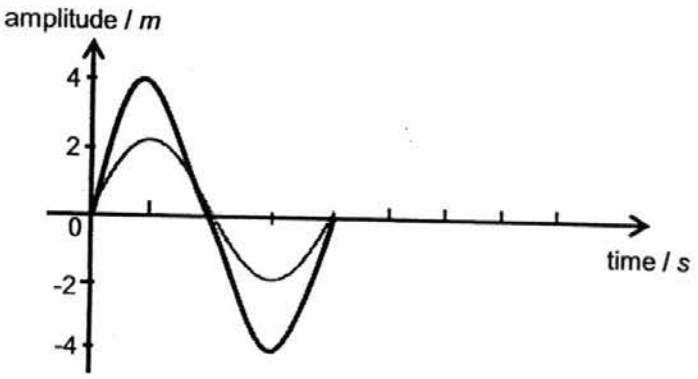
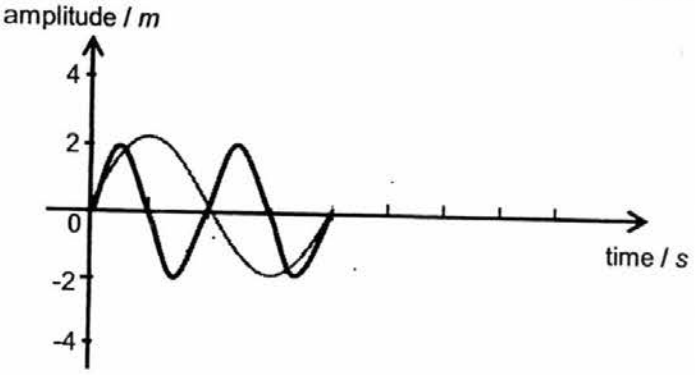
Exam: EOY 2016 Subject: SCIENCE (Physics) Level: 2E

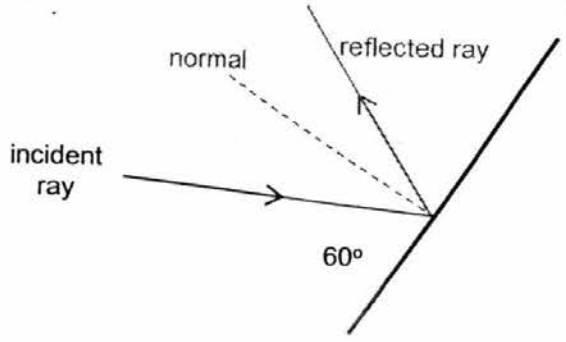
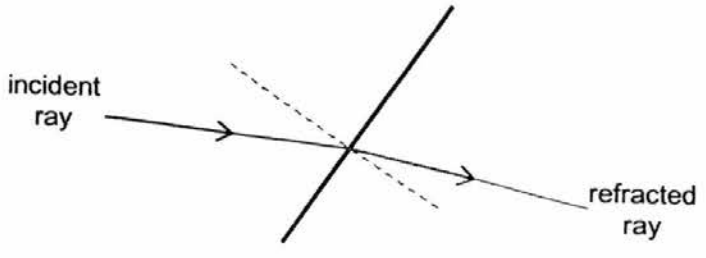
SECTION A (MCQ)

01.	B	Friction force is present whenever there is contact.
02.	B	Boy moves clockwise
03.	D	Ball PE increases as it gains height. Ball KE increases as it falls
04.	C	Increase loudness (amplitude) of sound sent from surroundings so that the ear can hear clearly.
05.	D	Distance travelled by the sound = speed x time taken Distance travelled by the sound = 300 x 4 Distance travelled by the sound = 1200 m
06.	D	Yellow (red + green) + blue = white
07.	B	When a parallel beam of light hits an uneven surface, diffused ray of light will be reflected.
08.	A	Image formed by plane mirror will be laterally inverted.
09.	B	Current is defined as the flow of charge per unit time.
10.	B	When B & D blow, A & F will still light up.

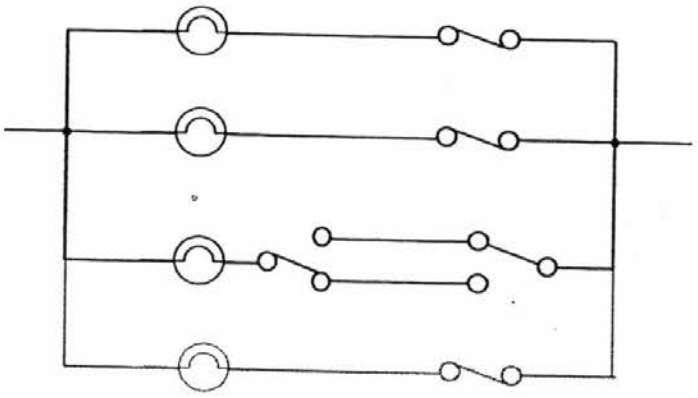
SECTION B

11		Face **B** would cause the deepest depression. Pressure is defined as force acting per unit area. As face B has the smallest area of contact, it will generate the greatest pressure, which causes the deepest depression.	[1] [1]
12	(ai)		[1] for **each** correct arrow AND label.
	(aii)	The book will start to move.	[1]
	(bi)	240 g = 0.24 kg	[1]
	(bii)	Weight = 0.24 x 10 = 2.4 N	[1] for ans
13	(ai)	The work done by the father is 0 J. As the force of carrying the baby is upwards, while he is moving horizontally. OR force is perpendicular to that of distance travelled.	[1] [1]
	(aii)	$Work\ done = Force \times distance\ moved$ $Work\ done = 650 \times 7.5$ $Work\ done = 4\,875\ J$	[1] [1]
14		One advantage of using a hydroelectric power plant is that it does not produce pollutants OR, it uses renewable source of energy. One disadvantage is that it requires a large amount of land to be flooded OR destroys ecosystem due to flooding OR it prevents nutrients from flowing down a river.	[1] any one [1] any one
15		An effect of a current is the Heating effect. One application is the Electric kettle OR; lighting effect, Light bulb OR; chemical effect, electroplating OR; Magnetic effect, telephone speaker	[1] effect [1] application

16	(ai)	 Same frequency, amplitude doubled.	[1]
	(aii)	 Same amplitude, frequency doubled (Two cycles within same time..	[1]
	(b)	Sound energy is transferred by the vibration of particles. Particles in solid are packed closely in an orderly manner while particles in air are spaced far apart. Therefore, it is easier for particles in solids to transfer the vibration than in air. As a result, sound travels faster in solid than in air.	[1] [1]

17	(ai)		[1] normal [1] reflected ray accurate
	(aii)	Angle of reflection = 30 °	[1]
	(aiii)		[1] normal [1] refracted ray bends towards normal

	(aiv)	Angle of refraction is smaller than angle of incidence.	[1]
	(b)	When light enters and exits the raindrop, different colours of the white light are refracted towards the normal through different angles. This causes the white light to disperse into different colours. Thus creating the rainbow.	[1] [1]

18	(ai)	When excessive current enters the circuit, the fuse will "blow"/the wire inside the fuse will melt and creates an open circuit to prevent any more current from entering, thus protecting the appliance.	[1]
	(aii)	The fuse needs to be replaced every time it blows, but the circuit breaker does not need to be replaced.	[1]
	(bi)	All bulbs are connected in parallel. $\frac{1}{R_{Total}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$ $\frac{1}{R_{Total}} = \frac{1}{20} + \frac{1}{20} + \frac{1}{20}$ $\frac{1}{R_{Total}} = \frac{3}{20}$ $\frac{R_{Total}}{1} = \frac{20}{3}$ $R_{Total} = 6.67\ \Omega$	[1] working [1] ans
	(bii)		[1] extension by parallel with swtich
	(biii)	When one switch is on, it can be off by the switch on the other end.	[1]
	(biv)	At both ends of a long corridor or at the start and end of a staircase.	[1]

19	(a)	60 W means that 60 J of energy would be converted within 1 second.	[1]
	(b)	Energy usage of light bulb = 0.24 kW x 24 = 5.76 kWh Energy usage of LED bulb = 0.06 kW x 24 = 1.44 kWh Savings = (5.76 – 1.44) x 0.25 = $ 1.08 Ans = $1.08	[1] Energy usage by bulb [1] Energy usage by LED [1] savings

20		Electrical fire is likely to occur as a large current will be drawn from the socket/mains when all appliances are switched on at the same time.	[1] [1]