Let the mind manage the body
Que l'esprit gère le corps

MAURITIUS
EXAMINATIONS
SYNDICATE

NATIONAL CERTIFICATE OF EDUCATION

SCIENCE

PHYSICS

Specimen paper
for first assessment in October 2020

TABLE OF SPECIFICATIONS - NCE SCIENCE SPECIMEN PAPER - PHYSICS													
Topic/Content Strand	**Question Number**	**LO**	**Page No in Textbook**	**Assessment Objectives**									**Total**
				AO1: Knowledge with Understanding			**AO2: Application**			**AO3: Scientific Inquiry & Problem Solving**			
				B	**I**	**P**	**B**	**I**	**P**	**B**	**I**	**P**	
Measurement	1(1)	P1.1	3	1									10
	1(2)	P1.1	26	1									
	3(a)	P1.2	20-21				2						
	3 (b)	P1.4	18-21		2								
	3 (c)(i)			1									
	3 (c)(ii)									1			
	6 (f)								2				
Light	1(4)	P2.7	54	1									10
	1(7)	P2.7	54	1									
	2(a)(i)	P2.1	42	1									
	2(a)(ii)	P2.1	47	1									
	2(b)(i)	P2.8	48-51	2									
	2(b)(ii)	P2.8	48-51	1									
	2(c)(i),(ii)	P2.10/2.11	66-68							3			
Energy, heat and temperature	1(3)	P3.2	17	1									11
	1(6)		4	1									
	1(8)	P3.5	24	1									
	6(a)	P3.1	11				2						
	6(b)	P3.1	14		1								
	6(c)	P3.1									1		
	6(d)	P3.1	14						2				
	6(e)	P3.1										2	
Motion	1(5)	P4.1	34	1									9
	1(9)	P4.4	46-48	1									
	5(a)	P4.6	40						3				
	5(b)(i)	P4.4/P4.5	46-48		1								
	5(b)(ii)	P4.7	49						2				
	5(b)(iii)	P4.6	36	1									
Electricity	1(10)	P5.3	83	1									10
	4(a)(i)	P5.7	62	1									
	4(a)(ii)	P5.7	70	1									
	4(b)	P5.8/P5.13	74				2						
	4(c)(i)	P5.4	80	1									
	4(c)(ii)	P5.8/P5.13	83					2					
	4(c)(iii)	P5.3/5.4/5.13	83								2		

Total marks	**20**	**4**	**0**	**6**	**2**	**9**	**4**	**3**	**2**	**50**
Total of the AOs	**24**			**17**			**9**			
% of each AO	**48**			**34**			**18**			**100**

<u>In terms of content knowledge and skills</u>

Basic: 58 %

Intermediate: 20 %

Proficient: 22 %

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Que l'esprit gère le corps

Index Number: ....

NATIONAL CERTIFICATE OF EDUCATION

Specimen paper for first assessment in October 2020

SCIENCE (N 530)

PHYSICS SECTION

ADDITIONAL MATERIALS: Ruler, protractor

TIME: 45 MINUTES

READ THESE INSTRUCTIONS FIRST

1. Write your Index number in the space provided above.
2. Write in dark blue or black ink.
3. You may use a soft pencil for any diagrams, graphs or rough working.
4. Any rough working should be done in this booklet.
5. Do not use correction fluid.
6. Calculators are not allowed.
7. The total of the marks for this paper is **50**.
8. Check that this document consists of 16 printed pages.
9. Any discrepancy in the document must be immediately notified to the invigilator.
10. The number of marks is given in brackets [ ] at the end of each question or part question

Question 1 (10 marks)

Circle the correct answer.

1. Which one of the following is the SI unit of **length**?

A	second	**B**	ampere
C	metre	**D**	kilogram

2. **Fig. 1.1** shows an instrument.

Fig. 1.1

This instrument is used to measure ………………… .

A	temperature	**B**	time
C	distance	**D**	speed

3. Which one of the following sources of energy is **non-renewable**?

A	Bagasse	**B**	Coal
C	Sun	**D**	Wind

4. An image formed by a plane mirror is ……………… when compared to its object.

A	smaller	**B**	real
C	bigger	**D**	virtual

5. Which one of the following is a **scalar** quantity?

A Acceleration   **B** Mass

C Velocity   **D** Force

6. Which one of the following formulae is used to calculate the **work done** by a force?

A force × displacement   **B** force ÷ displacement

C force × time   **D** force ÷ time

7. **Fig. 1.2** shows a ray of light from an object **O** being reflected from a plane mirror. At which of the following positions will the image be found?

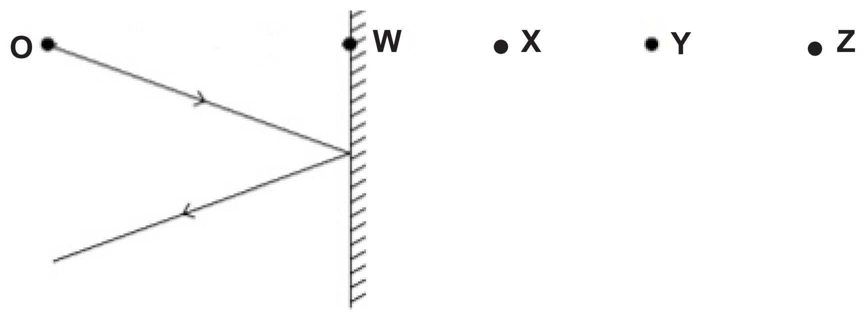

Fig. 1.2

A W   **B** X   **C** Y   **D** Z

8. Which one of the following expressions gives the correct conversion of 27°C into **Kelvin**?

A 27°C + 273   **B** 27°C - 273

C 27°C × 273   **D** 27°C ÷ 273

9. **Fig. 1.3** shows the speed-time graph of a body moving along a straight line.

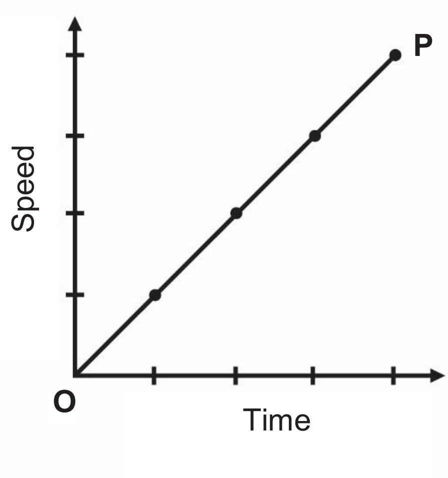

Fig. 1.3

What does the **gradient** of the line **OP** represent?

A Acceleration

B Distance

C Speed

D Time

10. **Fig. 1.4** shows an electric circuit.

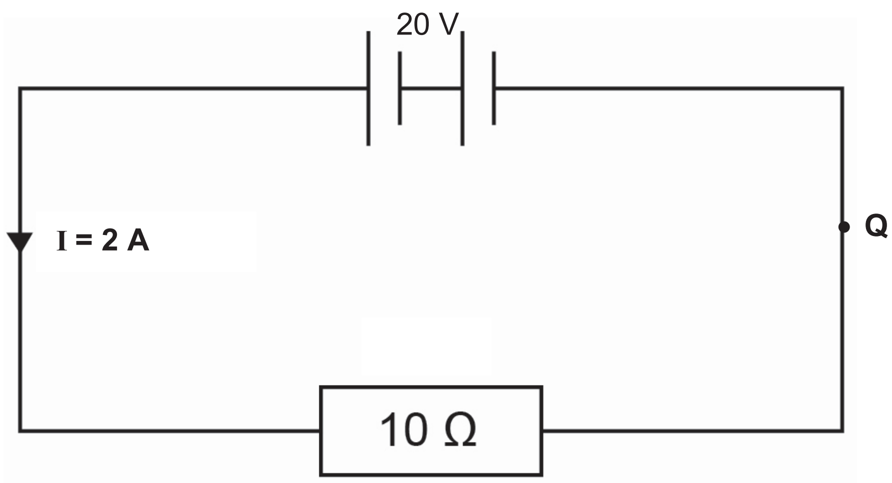

Fig. 1.4

What is the current at **Q**?

A 1 A

B 2 A

C 10 A

D 20 A

Question 2 (8 marks)

a) **Fig. 2.1** shows a book, the eye of a person and a lit bulb in a room.

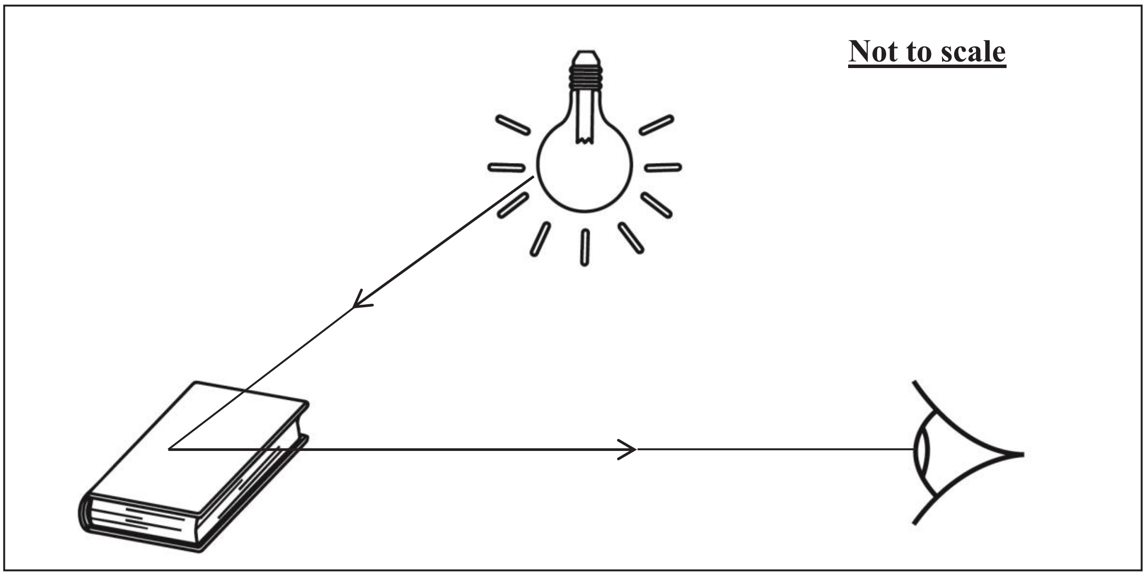

Fig. 2.1

(i) Which one of the objects in **Fig. 2.1** is a **luminous** object? Circle your answer.

The book The eye The bulb

[1]

(ii) On **Fig. 2.1**, **label** the **incident** and **reflected** light rays to show how the person is able to see the book.

[1]

b) A ray of light strikes a smooth flat surface.
It bounces off the surface as shown in **Fig. 2.2.**

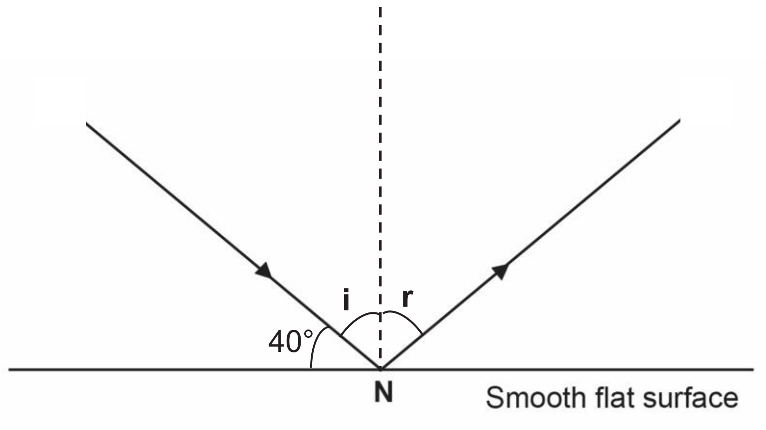

Fig. 2.2

(i) Calculate the angle of incidence, **i**.

i = ... °

[2]

(ii) State the angle of reflection, **r**.

r = ...°

[1]

c) **Fig 2.3** shows a ray of light incident on a block of glass.

The ray of light undergoes **refraction** as it enters and leaves the block.

On **Fig. 2.3**, use a ruler to complete the path of the ray of light

(i) as it enters the glass block.

[1]

(ii) as it leaves the glass block .

[2]

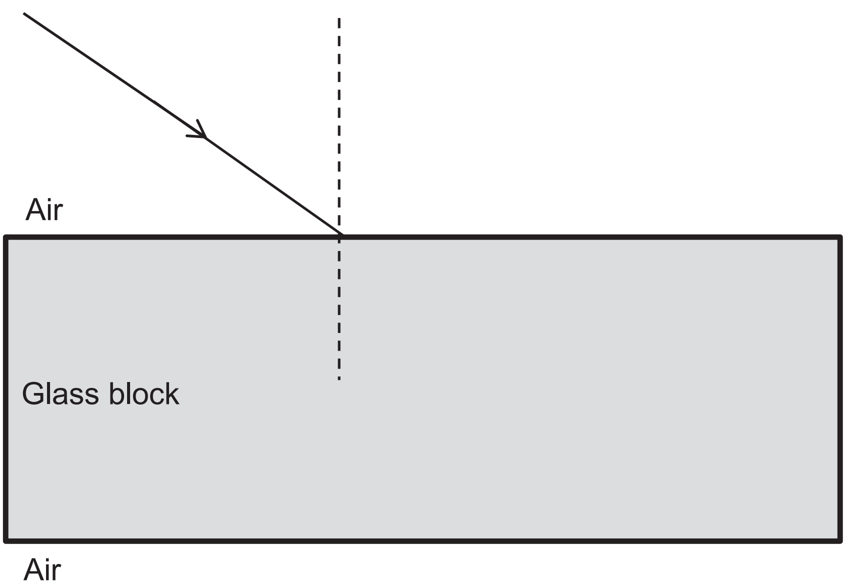

Fig. 2.3

Question 3 (6 marks)

A measuring cylinder is used to measure the volume of a stone.

Fig. 3.1 below shows the measuring cylinder containing 44 cm^3 of water.

Fig. 3.2 shows the **same** measuring cylinder after a stone is lowered completely into it.

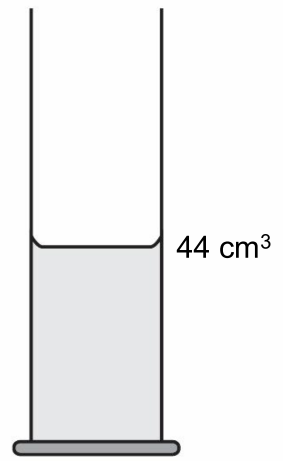

Fig. 3.1

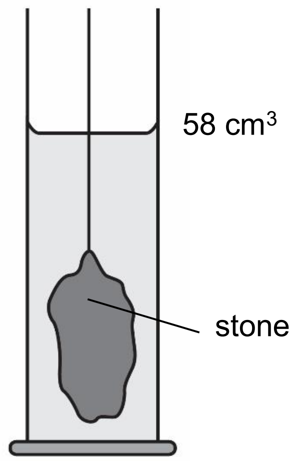

Fig. 3.2

a) Determine the volume of the stone.

Volume = ... cm^3

[2]

b) Give **two** precautions you should take to determine the volume of the stone in **Fig. 3.2** as accurately as possible.

1. ....

....

2. ....

....

[2]

c) The stone is removed from the cylinder and its mass is immediately recorded.

(i) Which instrument can be used to measure the mass of the stone?

....

[1]

(ii) The mass recorded is 45 g.

What can you say about the **real mass** of the stone?

Put a tick (✔) in the appropriate box below.

It is equal to 45 g.	☐
It is less than 45 g.	☐
It is more than 45 g.	☐

[1]

Question 4 (9 marks)

a) **Fig. 4.1** shows a simple circuit.

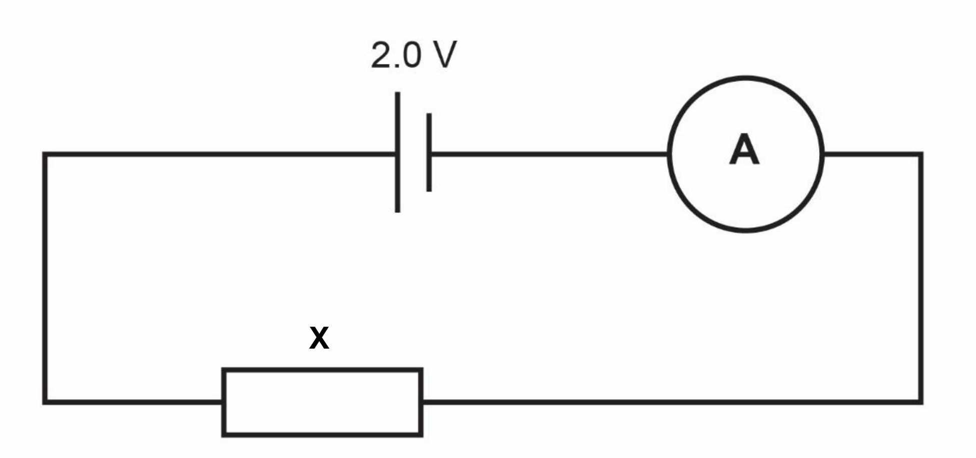

Fig. 4.1

(i) Name component **X**.

....

[1]

(ii) Draw a voltmeter in **Fig. 4.1** so that the potential difference across component **X** can be measured.

[1]

b) The ammeter reading is 0.5 A.

Calculate the resistance of component **X**.

Resistance of X = ... Ω

[2]

c) Component **Y** has the same resistance as component **X**.
Component **Y** is connected to the circuit in **Fig 4.1.**
Fig. 4.2 shows the new circuit.

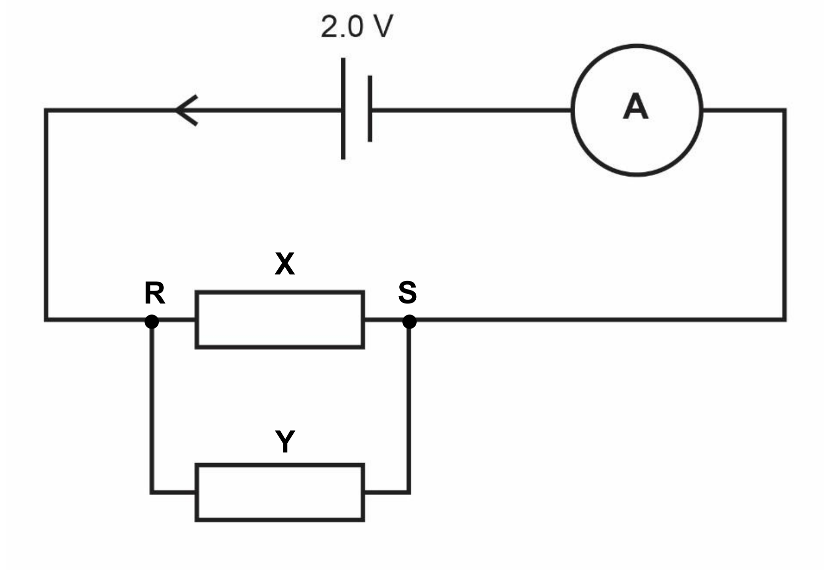

Fig. 4.2

(i) **X** and **Y** are said to be connected in ....

[1]

(ii) Calculate the **combined resistance** between points **R** and **S**.

Combined resistance = ... Ω

[2]

(iii) State whether the ammeter reading in **Fig. 4.2** will be **greater than** or **smaller than** the ammeter reading in **Fig. 4.1**.

………………………………………

Give a reason for your answer.

…………………………………………………………………………………………

………………………………………………………………………………………… [2]

Question 5 (7 marks)

a) A body is moving with a constant acceleration of 4 m/s^2.

Given that the initial speed of the body was 2 m/s, calculate its speed 3 seconds later.

Speed = ... m/s

[3]

b) **Fig. 5.1** shows the speed-time graph of a lorry for the first 50 seconds of its journey.

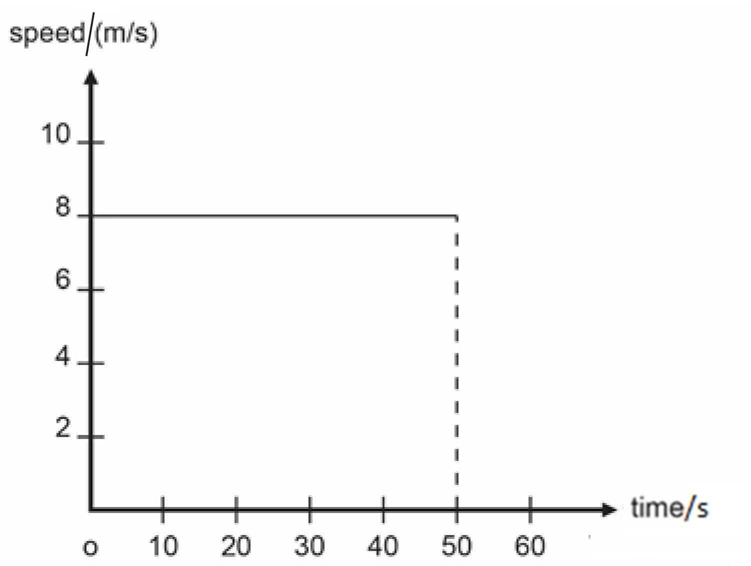

Fig. 5.1

(i) Describe the motion of the lorry during the first 50 seconds.

....

.... [1]

(ii) Calculate the **distance** travelled by the lorry in the first 50 seconds.

Distance = ... m [2]

(iii) After some time, the lorry is back to its **starting position**.

What is the value of its displacement for the whole journey?

Displacement = ... m
[1]

Question 6 (10 marks)

A boy of mass 50 kg is sitting still on a swing at vertical position **B**, as shown in **Fig. 6.1**.

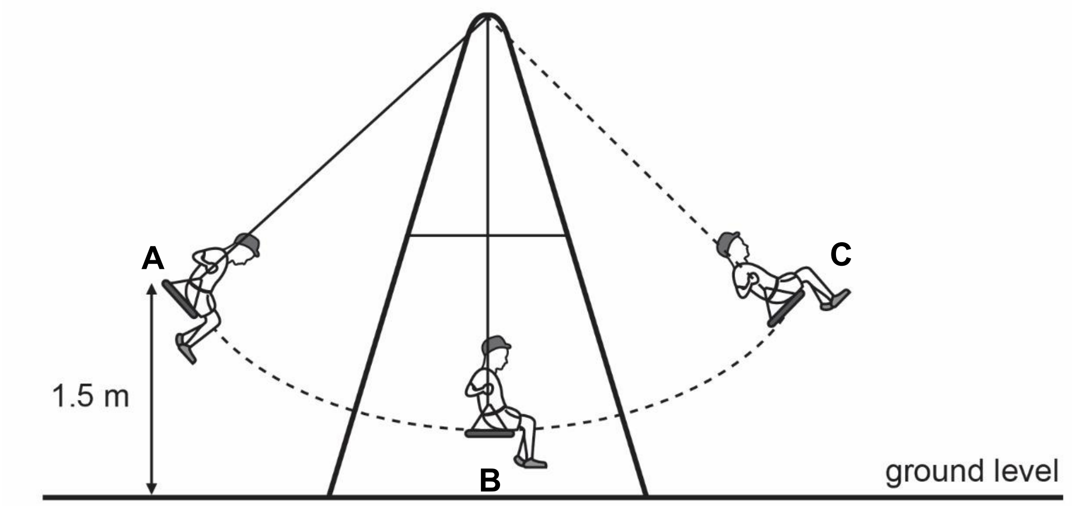

Fig. 6.1

The boy is pulled from position **B** to position **A**.

He is now 1.5 m above the ground.

a) Calculate the **gravitational potential energy** of the boy at position **A**.

[Take $g = 10$ m/s^2]

Gravitational potential energy = ... J

[2]

b) The boy is released from position **A**.

At which of the positions **A**, **B** or **C**, does he have **maximum** kinetic energy?

....

[1]

c) Assuming there is **no** energy loss, state his **total** energy at position **B.**

Total energy = ...J
[1]

d) When the boy passes through position **B**, his **kinetic energy** is 500 J.

Calculate his gravitational potential energy at position **B**.

Gravitational potential energy = ... J
[2]

e) How do the values for the gravitational potential energy and kinetic energy at position **B** compare with their values in part (d) when energy is **lost** to the surrounding?

Put a tick (✔) in the appropriate boxes below.

	LESS	**MORE**	**SAME**
Kinetic energy at **B**	☐	☐	☐
Gravitational potential energy at **B**	☐	☐	☐

[2]

f) The time taken for the boy to move from **A** to **C** and then back to **B** is 1.8 seconds.

Calculate the time period of the swing.

Time period = ... s
[2]

NOTE:

Mark schemes are prepared by the Assessment developers and considered, together with the relevant questions, by a panel of subject experts.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided. While the guiding principles of assessment remain constant, details will change, depending on the content of a particular assessment paper.

MARK SCHEME

SCIENCE

Specimen paper Mark scheme
for first assessment in October 2020

PHYSICS

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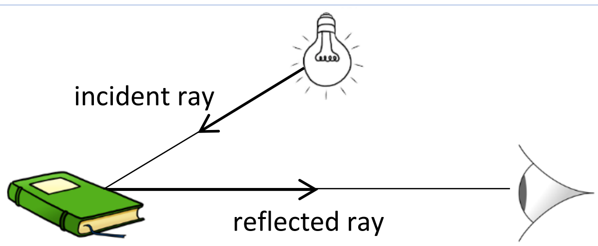
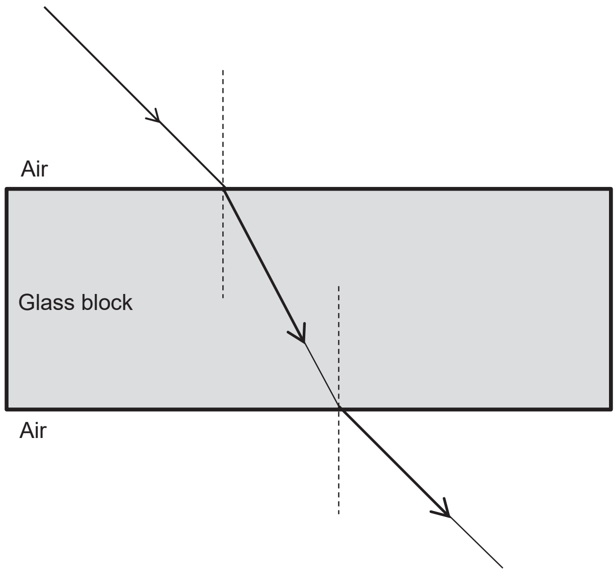
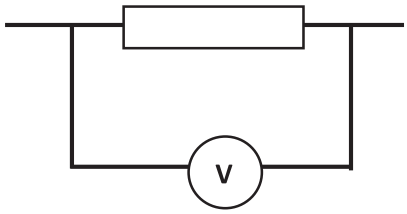
PHYSICS SPECIMEN MARK SCHEME

Question	Answer	Mark	Remark
1 (1)	**C**	10 marks	1 mark for each correct letter encircled
1(2)	**B**		
1(3)	**B**		
1(4)	**D**		
1(5)	**B**		
1(6)	**A**		
1(7)	**C**		
1(8)	**A**		
1(9)	**A**		
1(10)	**B**		
2 (a) (i)	The bulb	1 mark	
2 (a) (ii)		1 mark	
2 (b) (i)	$90^{o} - 40^{o}$ $= 50°$	2 marks	1 mark for $90^{o} - 40^{o}$ 1 mark for correct answer.
2 (b) (ii)	50^{o}	1 mark	Award the mark if answer to 2(b)(i) is incorrect but answer to 2(b)(i) and 2(b)(ii) are same.

2 (c)(i) **2(c)(ii)**		3 marks	1 mark for refracted ray shown bending towards normal inside glass block. 1 mark for refracted ray shown bending away from normal when leaving the glass block. 1 mark for incident and emergent ray shown in parallel.
3(a)	Volume of stone = 58 – 44 = 14 cm^3	2 marks	1 mark for subtraction 1 mark for correct answer
3 (b)	Avoid splashing of the water when lowering the stone into the cylinder / Ensure cylinder is on a flat horizontal surface / Avoid parallax error when reading the **lower** meniscus / measure the **lower** meniscus.	2 marks	1 mark for each correct precaution.
3 (c)(i)	Balance	1 mark	
3 (c)(ii)	*"It is **less** than 45 g"*	1 mark	
4(a)(i)	Fixed Resistor	1 mark	Accept resistor

4(a)(ii)		1 mark	1 mark for correct position of voltmeter across fixed resistor
4(b)	Potential difference, V = IR 2 = ½ x R R = 4 Ω	2 marks	1 mark for correct equation or correct substitution 1 mark for correct answer
4(c)(i)	Parallel	1 mark	
4 (c)(ii)	Combined resistance, $1/R = 1/R_X + 1/R_Y$ R = 2 Ω	2 marks	1 mark for correct formula 1 mark for correct answer
4 (c)(iii)	*'greater than'* Accept any one of the following: • Candidates calculate ***I*** = 1 A and hence deduce that the current in **Fig. 4.2** is greater • The combined resistance in **Fig. 4.2** is lower than the resistance in **Fig. 4.1**. Hence, current increases • ***I*** is inversely proportional to **R**. Since **V** is constant and has decreased, then ***I*** will increase	2 marks	1 mark for *'greater than'*. Accept equivalent ways of expressing the same idea
5 (a)	$a = \frac{v-u}{t}$ or equivalent word equation $4 = \frac{v-2}{3}$ $v = 14$ m/s	3 marks	1 mark for formula 1 mark for correct substitution in formula 1 mark for correct answer Accept the use of proportion

<table>
<tr><td>5 (b)(i)</td><td>The lorry moves at a constant speed of 8 m/s for the first 50 s of its journey.</td><td>1 mark</td><td></td></tr>
<tr><td>5 (b)(ii)</td><td>Distance travelled = area under graph
$= (50 \times 8)$ m
$= 400$ m</td><td>2 marks</td><td>1 mark for:
50×8, seen or implied or distance= area under graph

1 mark for correct answer.</td></tr>
<tr><td>5 (c) (iii)</td><td>0 m</td><td>1 mark</td><td></td></tr>
<tr><td>6(a)</td><td>Potential energy at A = mgh
$= (50 \times 10 \times 1.5)$
$= 750$ J</td><td>2 marks</td><td>1 mark for writing the correct formula or correct substitution

1 mark for correct answer</td></tr>
<tr><td>6 (b)</td><td>B</td><td>1 mark</td><td></td></tr>
<tr><td>6 (c)</td><td>750 J</td><td>1 mark</td><td>Award one mark if same answer as for 4 (b)(i) given</td></tr>
<tr><td>6 (d)</td><td>Loss in E_p at A = Gain in E_k at B

Grav. potential energy at B = (their 750 – 500) J
= 250 J</td><td>2 marks</td><td>1 mark for $E_{total} - E_k$

1 mark for answer.</td></tr>
<tr><td>6 (e)</td><td><table><tr><td></td><td>LESS</td><td>MORE</td><td>SAME</td></tr><tr><td>Kinetic energy at X</td><td>✓</td><td></td><td></td></tr><tr><td>Potential energy at X</td><td></td><td></td><td>✓</td></tr></table></td><td>2 marks</td><td>1 mark for each correctly ticked box.</td></tr>
<tr><td>6 (f)</td><td>¾ swing in 1.8 s

Therefore time for one swing is 2.4 s

Or ¼ oscillation in 1.8/3 =0.6 s

Therefore time for one oscillation is 2.4 s.</td><td>2 marks</td><td>1 mark for recognising ¾ of swing in 1.8 s.

1 mark for correct answer.</td></tr>
<tr><td></td><td></td><td></td><td>Accept other correct methods for determining the time period.</td></tr>
</table>