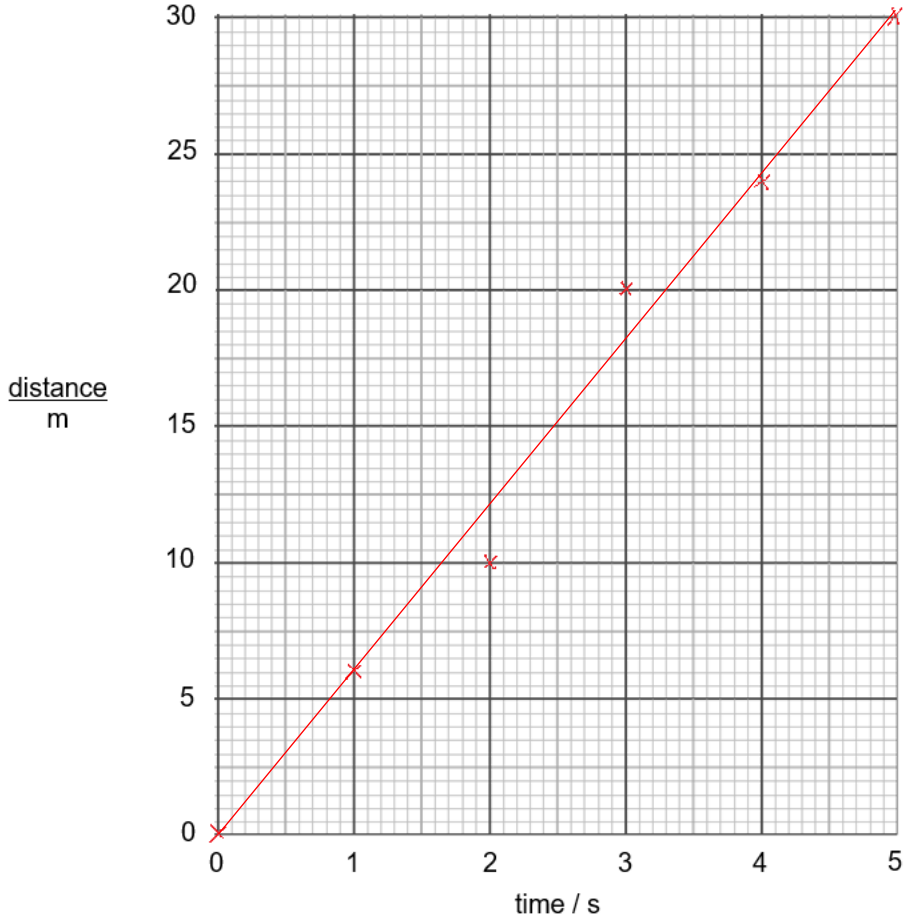
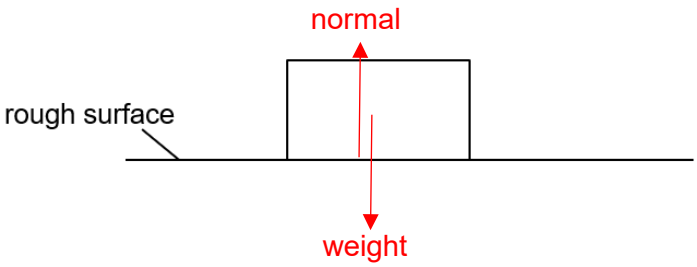
2024 PRELIMINARY EXAMINATION
SECONDARY 4 NORMAL (ACADEMIC)
SCIENCE (PHYSICS) 5105
MARKING SCHEME

PAPER 1

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

PAPER 2 Section A

Question	Marking scheme	Marks
1(a) and (b)		[B1] correct plotting of all points [B1] correct drawing of best fit line
(c)	time = 2.5 s (ecf from best fit line drawn)	[B1]
(d)	average speed = total distance / time = 30 / 5 = 6.0 m/s	[B1]

2(a)	1 Both are transverse waves. 2 Both travel in vacuum at the same speed. OR any other acceptable answers	[B1] [B1]
(b)	$v = f\lambda$ $f = v/\lambda = (3 \times 10^{8}) / (1.0 \times 10^{-11})$ $= 3.0 \times 10^{19}$ Hz	 [B1]
(c)(i)	charge: no change mass: no change	[A1] [A1]
(ii)	Lead. Lead is able to absorb gamma radiation.	[A1] [B1]
3(a)	<table><tr><th>ammeter R / A</th><th>ammeter S / A</th><th>ammeter T / A</th><th>correct readings</th></tr><tr><td>0.5</td><td>0.5</td><td>0.8</td><td></td></tr><tr><td>0.5</td><td>0.5</td><td>1.0</td><td></td></tr><tr><td>0.6</td><td>0.6</td><td>0.6</td><td>√</td></tr><tr><td>0.6</td><td>0.4</td><td>1.0</td><td></td></tr></table>	[A1]
(b)	Total pd across both lamps = 2 x 2.0 = 4.0 V Since e.m.f of the battery is equal to the sum of the pd across the both lamps, the e.m.f. of the battery = 4.0 V	[M1] [A1]
4(a)	<table><tr><th>quantity</th><th>suitable apparatus</th></tr><tr><td>length of 8.5 cm</td><td>digital calipers [A1]</td></tr><tr><td>mass of 4.8 g</td><td>electronic balance [A1]</td></tr></table>	
(b)(i)	Volume = length x breadth x height = 8.5 x 5.0 x 1.0 = 42.5 cm^3 = 43 cm^3 (2sf)	 [B1]
(ii)	density = mass / volume = 4.8 / 42.5 = 0.11 g/cm^3 (2sf)	 [B1]
(c)(i)		[B1] correct drawing and label of normal [B1] correct drawing and label of weight
(ii)	5.0 N. Since the block is moving with a constant speed, its **acceleration is zero**. As **F - f = ma** and that a=0.0 m/s^2, the friction will be equal to the applied force of 5.0 N.	[A1] [B1]

PAPER 2 Section B

Question	Marking scheme	Marks
5(a)	chemical potential store	[A1]
(b)	The internal energy **increases**. As the temperature increases, the **kinetic store of the gas increases**. Since internal energy depends on kinetic store, it also increases.	[A1] [B1]
(c)(i)	**Infrared radiation**	[A1]
(ii)	As the infrared radiation reaches the shiny metal surface, it gets **reflected to the man**. This allows the **transfer of thermal energy to be more efficient** and helps the man to **absorb more thermal energy**.	[B1] [B1]
(iii)	1 White is a poor emitter of infrared radiation. Heat loss from the man to the surroundings through radiation is reduced. 2 Air is trapped in the wool. Since air is a poor conductor /good insulator of heat, heat loss from man to the surroundings is minimised.	[B1] [B1]
6(a)	X: live wire To disconnect the live wire from the high voltage so that it is electrically isolated.	[A1] [B1]
(b)	Z: earth wire To allow the high current to flow to the earth when the metal casing becomes live when there is a fault.	[B1] [B1]
(c)(i)	Current flowing in the motor, I = P/V = 300 / 24 = 12.5 A	 [B1]
(ii)	Fuse rating: 13 A	[A1] allow ecf from (ci)
(iii)	E = Pt = (300/1000) x 5 = 1.5 kWh	 [M1] [A1]