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Secondary School, Kirkop

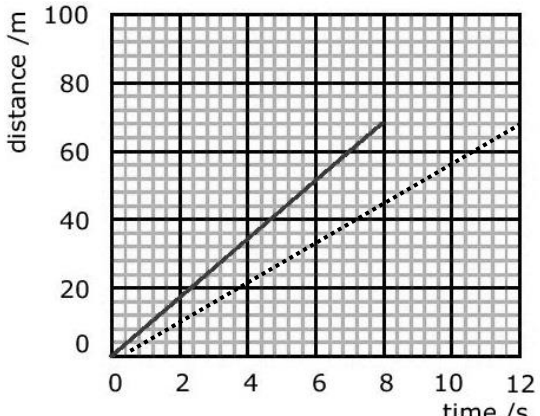
Mark

HALF YEARLY EXAMINATION – 2015/2016

MARKING SCHEME

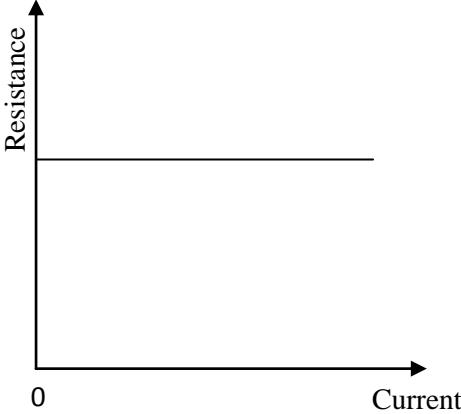
FORM 4		PHYSICS		Track 3
1.	a)	i) positively charged	1	10
		ii) All hair strands carry like charges	1	
		Like charges repel	1	
	b)	i) During rubbing the balloon gains electrons from the hair	1	
		The balloon has extra electrons, so it becomes negatively charged.	1	
	c)	i) Materials that allow electrons to flow freely through them (o.e)	1	
		ii) Any metal, water (o.e)	1	
		iii) Materials that do not allow electrons to flow freely through them (o.e)	1	
		iv) Wood, plastic, rubber, (o.e)	1	
		v) Silicone, Germanium (o.e)	1	
2.	a)	A. Cell or battery B. Open switch C. Filament lamp or bulb D. Diode E. Variable resistor or Rheostat	5	10
	b)	i) The ammeter gives a reading.	1	
		ii) The ammeter reading will be halved. (<i>accept decrease</i>)	1	
		Resistance is directly proportional to the length of wire so the resistance increases. or Resistance and current are inversely proportional.	1	
		iii) The ammeter reading will be doubled. (<i>accept decrease</i>).	1	
		Resistance is inversely proportional to the area so the resistance decreases. or Resistance and current are inversely proportional.	1	

3.	a)	Thermistor	1	10
	b)	Low resistance	1	
	c)	The p.d across the 40Ω resistor	1	
	d)	$V = IR$ $4 = I \times 40$ <i>(do not award mark if working is not shown)</i>	1	
		$I = 0.1A$	1	
	e)	$V = IR$ $12 = 0.1 \times R$ <i>(do not award mark if working is not shown)</i>	1	
		$R = 120\Omega$	1	
	f)	$V = IR$ $12 - 4 = 0.02 \times R$	1	
		$R = 400\Omega$	1	
	g)	The resistance of the thermistor increases so total resistance increases, so current in the circuit decreases.	1	

4.	a)	68m	1	10
	b)	8s	1	
	c)	52m	1	
	d)	The graph of distance against time is a straight line.	1	
	e)	$\text{speed} = \frac{\text{distance}}{\text{time}} = \frac{68m}{8s}$ <i>(do not award mark if working is not shown)</i>	1f.t	
		Speed = 8.5m/s	1	
	f)		1	

	g)	$\text{speed} = \frac{\text{distance}}{\text{time}} = \frac{68m}{12s}$ (do not award mark if working is not shown)	1	
		Speed = 5.7m/s	1	
	h)	Jurgen	1	

5.	a)	i) Acceleration from rest	1	15
		ii) constant speed	1	
		iii) deceleration to rest	1	
		iv) at rest	1	
	b)	20m/s	1	
	c)	$a = \frac{v-u}{t} = \frac{10-0}{2}$ (do not award mark if working is not shown)	1	
		$a = 5m/s^2$	1	
	d)	Distance covered is equal to the area under the graph.	1	
	e)	$Area = \frac{4 \times 20}{2} = 40m$	(do not award mark if working is not shown) 1	
		$Area = 6 \times 20 = 120m$	(award marks if formula for area of trapezium is used) 1	
		$Area = \frac{6 \times 20}{2} = 60m$	1	
		Total area = 40m + 120m + 60m = 220m	1 f.t	
	f)	$Area = \frac{2 \times 10}{2} = 10m$	(do not award mark if working is not shown) 1	
		$Area = 8 \times 10 = 80m$	(award marks if formula for area of trapezium is used) 1	
		Total area = 80m + 10m = 90m	1 f.t	
	g)	Total distance = 220m + 90m = 310m	1 f.t	

6.	a)	d.c supply; length of metal wire; switch, ammeter; voltmeter; variable resistor (do not award mark if labelling is not shown)	$\frac{1}{2}$ each	15
	b)	Set up the apparatus as shown in the circuit. Set the variable resistor to maximum setting and switch on the circuit. Record the current from the ammeter and voltage across the wire from the voltmeter. Repeat step 3 for different variable resistor settings.	2 (- 1e.o.e)	
	c)	Graph: <ul style="list-style-type: none"> • Correct axis • Drawn over more than half the graph paper • Correct titles • Correct plotting • Joining of line and passes through the origin 	1 1 1 1 1	
	d)	5V	1	
	e)	Ohm's Law states that the current through the component is directly proportional to the voltage across it	1	
		Provided that its temperature is kept constant	1	
	f)		1	
	g)	The temperature of the metal wire increases / The resistance of the wire will increase/ The graph of resistance against current will not remain horizontal/ Ohm's Law is no longer obeyed.	1	

7.	a)	i) In parallel	1	15
		ii) In series	1	
	b)	i) Switches X and Y	1	
		ii) Switches X and Z	1	
	c)	i) 3V	1	
		ii) $Q = I t$	1	
		$Q = 2 \times 30$	1	
		$Q = 60 \text{ C}$	2	
	d)	iii) The voltage across A is double than the voltage across A	2	
		i) The nozzle transfers electrons to the glue droplets as they rub against it / by friction	1	
		Since the glue droplets have extra electrons, they are now negatively charged.	1	
		ii) Since the droplets carry like charges, they repel each other and spread out.	1	
		As a result a uniform coating/layer of glue is formed on the paper.	1	
		iii) Since the glue droplets and the sand carry opposite charges	1	
		They attract each other	1	