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**PHYSICS**

**0625/33**

Paper 3 Core Theory

**October/November 2016**

MARK SCHEME

Maximum Mark: 80

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**Published**

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
1(a)	100 (km/h)	<b>B1</b>
1(b)	boxes L – M <b>AND</b> R – S ticked	<b>B1</b>
1(c)	0.1 hours identified 6 (minutes)	<b>C1</b> <b>A1</b>
1(d)	area under graph $0.5 \times 0.2 \times 100$ 10 (km)	<b>C1</b> <b>C1</b> <b>A1</b>
	<b>Total</b>	<b>7</b>

<b>Question</b>	<b>Answer</b>	<b>Mark</b>
2(a)(i)	constant speed/velocity	<b>B1</b>
2(a)(ii)	75 N forwards	<b>B1</b> <b>B1</b>
2(b)	<u>friction</u> two surfaces rubbing together owtte	<b>B1</b> <b>B1</b>
	<b>Total</b>	<b>5</b>

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
3(a)(i)	maximum displacement owtte	<b>B1</b>
3(a)(ii)	moving with maximum speed <b>OR</b> mid-point of oscillation	<b>B1</b>
3(b)(i)	energy cannot be created or destroyed (but can be changed) owtte	<b>B1</b>
3(b)(ii)	any <b>three</b> from: stretched spring has elastic potential energy potential energy converted to kinetic energy each oscillation energy transferred to surroundings oscillations become smaller (in amplitude)	<b>B3</b>
	<b>Total</b>	<b>6</b>

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
4(a)	W = m × g in any form 10 000 (N)	<b>C1</b> <b>A1</b>
4(b)(i)	pressure = force/area in any form (10 500 / 4) / 125 21 (N/cm <sup>2</sup> )	<b>C1</b> <b>C1</b> <b>A1</b>
4(b)(ii)	(weight spread over) larger area owtte pressure reduced	<b>B1</b> <b>B1</b>
4(c)(i)	moment = force × distance from pivot in any form 200 × 0.25 <b>OR</b> 50 <u>Nm</u>	<b>C1</b> <b>A1</b> <b>B1</b>
4(c)(ii)	force applied further away from wheel nut owtte	<b>B1</b>
	<b>Total:</b>	<b>11</b>

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
5(a)	air above water becomes less dense cool breeze occurs as a result of convection warm air rises	<b>B1</b> <b>B1</b> <b>B1</b>
5(b)	(jacket) traps air air is an insulator <b>OR</b> prevents convection	<b>B1</b> <b>B1</b>
	<b>Total:</b>	<b>5</b>

<b>Question</b>	<b>Answer</b>	<b>Marks</b>
6(a)(i)	arrow on incident ray pointing towards mirror <b>OR</b> arrow on reflected ray pointing away from mirror	<b>B1</b>
6(a)(ii)	<i>i</i> <b>AND</b> <i>r</i> both correctly labelled	<b>B1</b>
6(a)(iii)	same distance from mirror as candle same size as the candle	<b>B1</b> <b>B1</b>
6(b)	angle of incidence = angle of reflection	<b>B1</b>
	<b>Total:</b>	<b>5</b>

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
7	Person A : lightning seen and thunder heard at (almost) same time	<b>B1</b>
	Person B : lightning seen first OR thunder heard later/after flash of lightning	<b>B1</b>
	Explanation: light travels faster than sound <b>OR</b> reverse argument	<b>B1</b>
	sound has further to travel to B so time delay is greater or similar argument <b>OR</b> distances for A are so short that no observable difference in time.	<b>B1</b>
	<b>Total:</b>	<b>4</b>

<b>Question</b>	<b>Answer</b>	<b>Marks</b>
8(a)	any named insulator, e.g. cotton, string etc.	<b>B1</b>
8(b)	1 = attract	<b>B1</b>
	2 = repel	<b>B1</b>
	3 = repel	<b>B1</b>
8(c)	(sphere) is rubbed with a cloth	<b>B1</b>
	<u>electrons</u> move off (sphere) owtte	<b>B1</b>
	<b>Total:</b>	<b>6</b>

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
9(a)	a.c. current changes direction <b>OR</b> d.c. one direction only	<b>B1</b>
9(b)(i)	<u>variable resistor</u>	<b>B1</b>
9(b)(ii)	changes the amount of current	<b>B1</b>
	changes speed of motor fan	<b>B1</b>
9(c)(i)	V = IR in any form	<b>C1</b>
	24/8.5	<b>C1</b>
	2.82	<b>A1</b>
	A <b>OR</b> amps	<b>B1</b>
9(c)(ii)	5 (A)	<b>B1</b>
9(d)	protect user from electric shock	<b>B1</b>
	<b>Total:</b>	<b>10</b>

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
10(a)	<u>electrons</u> <u>protons AND neutrons</u>	<b>B1</b> <b>B1</b>
10(b)	same number of protons <b>OR</b> proton number <b>AND</b> different number of nucleons <b>OR</b> neutrons/nucleon number	<b>B1</b>
10(c)	alpha – most ionising beta – carries a negative charge gamma – most penetrating	<b>B1</b> <b>B1</b> <b>B1</b>
	<b>Total:</b>	<b>6</b>



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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
11(a)	X = step up <b>AND</b> Y = step down	<b>B1</b>
11(b)	$V_p/V_s = N_p/N_s$ <b>OR</b> $V_s = 132\,000 / (24\,000/2000)$ <b>OR</b> turns ratio, 12 calculated 11 000 (V)	<b>C1</b> <b>A1</b>
11(c)	any two from: less heating <b>OR</b> less energy <b>OR</b> power wasted <b>OR</b> more efficient thinner wires <b>OR</b> cables fewer power stations lower current in cables transmit longer distances (without drop in power)	<b>B2</b>
	<b>Total:</b>	<b>5</b>

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
12(a)(i)	correct symbols for battery <b>AND</b> switch connected in series with coil	<b>B1</b> <b>B1</b>
12(a)(ii)	increasing turns on coil increasing the current increasing the strength of the magnetic field	<b>B1</b> <b>B1</b> <b>B1</b>
12(b)(i)	coil in series with galvanometer magnet moved relative to coil deflection on galvanometer	<b>B1</b> <b>B1</b> <b>B1</b>
12(b)(ii)	more <b>OR</b> less coils <b>OR</b> number of coils faster <b>OR</b> slower movement <b>OR</b> speed of magnet <b>OR</b> coil	<b>B1</b> <b>B1</b>
	<b>Total:</b>	<b>10</b>