UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the November 2004 question paper

0625 PHYSICS

0625/03 **Paper 3 (Extended Theory), maximum mark 80**

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which Examiners were initially instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began. Any substantial changes to the mark scheme that arose from these discussions will be recorded in the published *Report on the Examination*.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes must be read in conjunction with the question papers and the *Report on the Examination*.

- CIE will not enter into discussion or correspondence in connection with these mark schemes.

CIE is publishing the mark schemes for the November 2004 question papers for most IGCSE and GCE Advanced Level syllabuses.

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Grade thresholds taken for Syllabus 0625 (Physics) in the November 2004 examination.

	maximum mark available	minimum mark required for grade:			
		A	C	E	F
Component 3	80	57	33	23	14

The threshold (minimum mark) for B is set halfway between those for Grades A and C.
The threshold (minimum mark) for D is set halfway between those for Grades C and E.
The threshold (minimum mark) for G is set as many marks below the F threshold as the E threshold is above it.
Grade A* does not exist at the level of an individual component.

November 2004

INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK: 80

SYLLABUS/COMPONENT: 0625/03

PHYSICS
(Extended Theory)

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1	**(a)**	deceleration/slows down/speed reduces	**1**		
		deceleration uniform/comes to rest at 4 s	**1**		**2**
	(b) **(i)**	40 (m/s)	**1**		
	(ii)	4 (s)	**1**		**2**
	(c)	speed falls from 0 to 40 m/s in 4 s	**1**		
		acceleration = change in speed/time taken or 40(m/s)/4(s)	**1**		
		acceleration = 10 m/s^2	**1**		**3**
	(d)	distance = average speed x time or area of triangle under graph	**1**		
		= 20 x 4 or 2 x 40	**1**		
		= 80 m	**1**		**3**
					(10)
2	**(a)**	pressure = hdg or 20 x 1000 x 10	**1**		
		= 2 x 10^5 Pa	**1**		**2**
	(b)	force = pressure x area or 2 x 10^5 x 0.5 e.c.f.	**1**		
		= 1 x 10^5 N	**1**		**2**
	(c)	potential energy (at water surface)	**1**		
		changed to kinetic energy (at pipe exit)	**1**		**2**
					(6)
3	**(a)**	one mark for each labelled diagram			
		both diagrams sensible but no labels max 1	**2**		**2**
	(b)	newtons/10 is kg or equivalent	**1**		**1**
	(c)	volume/level/reading of water then volume etc. water + rock	**1**		**1**
	(d)	difference in the two readings	**1**		**1**
	(e)	density = mass/volume	**1**		**1**
					(6)
4	**(a)** **(i)**	put hot junction in beaker (of hot water)	**1**		
		read temperature from galvo. in some way (calibration)	**1**		**2**
	(ii)	high/low temperatures stated or high/low values quoted or temperature varying rapidly or small site/at point or remote place (from meter) or in control systems any 2	**2**		**2**
	(b) **(i)**	raises the water temperature	**1**		
	(ii)	provides latent heat or boils/evaporates water	**1**		**2**
					(6)

5	**(a)**	**(i)**	any suitable random motion	**1**	
			molecules hit walls	**1**	
		(ii)	**1.**		
			rebound/bounce back or many hits per unit area or per unit time or collisions create force	**1**	
			2.		
			(av) k.e./speed of molecules increases	**1**	
			more hits(/sec) or harder hits	**1**	**5**
	(b)		$p_1v_1 = p_2v_2$ quoted or any recognisable substitution	**1**	
			$2 \times 10^5 \times 0.35 = 5 \times 10^5 \times v$	**1**	
			volume = 0.14 (m^3)	**1**	**3**
					(8)
6	**(a)**		expect two internal reflections at sensible angles	**1**	**1**
	(b)		angle of incidence at Y greater than critical angle	**1**	
			total internal reflection occurs	**1**	**2**
	(c)	**(i)**	frequency = velocity/wavelength or $1.9 \times 10^8/3.2 \times 10^{-7}$	**1**	
			$= 5.9 \times 10^{14}$Hz	**1**	
		(ii)	refractive index = 3/1.9 or 1.9/3	**1**	
			= 1.58 (no e.c.f.)	**1**	**4**
					(7)
7	**(a)**		I = V/R or 12/8	**1**	
			= 1.5 A	**1**	**2**
	(b)	**(i)**	10(Ω)	**1**	
		(ii)	2(Ω)	**1**	**2**
	(c)		power = VI or I^2R or V^2/R	**1**	
			= 72W	**1**	**2**
	(d)	**(i)**	12(V)	**1**	
		(ii)	6(V)	**1**	**2**
	(e)	**(i)**	(resistance) less	**1**	
		(ii)	(resistance) less	**1**	**2**
					(10)
8	**(a)**		diffraction	**1**	**1**
	(b)		plane waves in front of gap	**1**	
			curved end effect shown, reasonable curves	**1**	
			wavelength constant throughout and approximately same as in Fig. 8.1	**1**	
			good quality i.e. end effect starts at correct points	**1**	**4**
	(c)		particles/water oscillate/vibrate/move up and down	**1**	
			at right angles to wave direction	**1**	**2**
					(7)

9	**(a)**	**(i)**	two coils on continuous core (not allow coils joined)	**1**	
			primary coil to 240 V, secondary coil to 6 V	**1**	
			iron core, primary/input and secondary/output labelled	**1**	
		(ii)	any values with correct 40:1 ratio, accept here or on diagram	**1**	**4**
	(b)		power in = power out or 240 x I = 12	**1**	
			current = 0.05 A	**1**	**2**
	(c)		must be a changing magnetic field, only from a.c.	**1**	**2**
			so that induction can take place	**1**	**(8)**
10	**(a)**	**(i)**	switch, relay or amplifier	**1**	
		(ii)	any one of the three versions below, each 2 marks		
			1. vary base current	**1**	
			transistor switches on for V_{be} >0.6 V	**1**	
			2. small change in base current	**1**	
			produces a large change in collector/emitter current	**1**	
			3. vary potential divider connected to transistor base	**1**	
			transistor switches on for V_{be} > 0.6 V	**1**	**3**
	(**b)**	**(i)**	standard symbol with 2 inputs and an output labelled	**1**	
		(ii)	one or both inputs 1, output 1 (accept on, high for 1)	**1**	
			both inputs 0, output 0 (accept off, low for 0)	**1**	**3**
					(6)
11	**(a)**		correct equation i.e. Ra gives Rn + alpha particle or He	**1**	
			all numbers correct on Rn and He	**1**	**2**
	(b)	**(i)**	radiation from surroundings/background radiation	**1**	
		(ii)	532 to 552 counts/min	**1**	
		(iii)	5/6 cm	**1**	
		(iv)	beyond 5/6 cm no alpha, only background radiation	**1**	**4**
					(6)