



General Certificate of Secondary Education

Physics (Modular) 3453/F *Specification A*

Mark Scheme

2005 examination – June series

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

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

GCSE PHYSICS (MODULAR) 3453/F
MARK SCHEME – FOUNDATION TIER (TERMINAL PAPER)
SUMMER 2005**3453/F Q1**

	answers	extra information	mark
(a)	B		1
(b) (i)	increasing	or <u>getting</u> larger/faster or accelerating	1
(ii)	constant	or steady/not changing/uniform or the same do not accept stationary	1
(iii)	decreasing	or <u>getting</u> smaller/slower or decelerating do not accept reversing	1
(c) (i)	→		1
(ii)	←		1
(iii)	1000N		1
total			7

3453/F Q2

	answers	extra information	mark
(a) (i)	50 (m/s)	49 to 51	1
(ii)	12 (s)	11.8 to 12.2	1
(iii)	4 (m/s)	3 to 5	1
(b) (i)	E-F		1
(ii)	D-E		1
(iii)	A-B		1
total			6

3453/F Q3

	answers	extra information	mark
(a)	<u>Left to right</u> loudspeaker	1 mark for each correct	1
	microphone		1
	oscilloscope		1
(b) (i)	B		1
(ii)	B	do not credit sequential answer from (b) (i)	1
(iii)	C		1
(c) (i)	ultrasound	accept ultrasonic	1
(ii)	any two from (1 mark each) <ul style="list-style-type: none"> • cleaning in industry/quality control in industry/pre-natal scanning/detecting flaws in metals/echo-sounding/bat or dolphin navigation/breaking up kidney stones/removal of plaque/cleaning spectacle lenses 	accept other known application	2
total			9

3453/F Q4

	answers	extra information	mark
	optical	1 mark for each correct	1
	endoscope		1
	internal		1
	critical		1
total			4

3453/F Q5

	answers	extra information	mark
(a)	A		1
(b)	centripetal		1
(c)	(the) gravitational force/attraction between (the) Earth and (the) Moon	accept the gravity of the Earth allow one mark for:- gravity gravity from Sun pulls the Earth pulling force from Sun	2
total			4

3453/F Q6

	answers	extra information	mark
(a)	Quality of written communication one mark for correct linking of ideas any three from (1 mark each) <ul style="list-style-type: none"> • suspend card with pin through hole B • so that it can swing freely • draw a line along new position of string • where 2 lines cross is C of M • check by balancing at this point 	(on finger for example)	1 3
(b)	Q when suspended C of M is always directly below point of suspension	if not Q stop marking may refer back to (a)	1 1
total			6

3453/F Q7

	answers	extra information	mark
(a) (i)	14(%)		1
(ii)	any two from (1 mark each) <ul style="list-style-type: none"> • wind • waves • geothermal • solar (light) wood • other fuel (peat, willow, wood or waste) • tides • biomass 	do not accept uranium/plutonium do not accept water	2
(b)	Advantages: any one from (1 mark each) <ul style="list-style-type: none"> • reliable • short start-up time (for gas) 	do not accept costs/easier/effective/easier to find	1
	Disadvantages: any one from (1 mark each) <ul style="list-style-type: none"> • polluting gases released • cause increase in greenhouse effect • cause acid rain • soon run out 	accept pollution CO ₂ released SO ₂ released	1
(c)	any one from <ul style="list-style-type: none"> • no polluting gases released • no increase in greenhouse effect/acid rain • larger amount of energy per kg of fuel • low volume/mass/weight of (solid) waste • (future) supply of fossil fuels (may be) insecure (OWTTE) 	no pollution/no CO ₂ /no SO ₂ do not accept costs do not accept more electricity/cleaner accept less waste do not accept more efficient	1
total			6

3453/F Q8

	answers	extra information	mark
(a) (i)	variable resistor	<u>variable</u> essential or rheostat	1
(ii)	battery	accept cells do not accept cell do not accept power pack/supply	1
(b) (i)	it increases (OWTTE)		1
(ii)	it reverses (OWTTE)	do not accept changes	1
(c) (i)	electrical		1
	kinetic	accept movement	1
(ii)	thermal or sound	accept heat	1
total			7

3453/F Q9

	answers	extra information	mark
(a) (i)	Work (done) = force (applied) × distance (moved in direction of force)	must be an equation or a correctly transposed version accept joule = newton x metre do not accept J = Nm accept W or WD, F, d, x, s do not accept weight for force do not accept length for distance	1
(ii)	8J	if incorrect allow 1 mark (max. 2) for:- <ul style="list-style-type: none"> • W.D. = 20×0.4 • = 8 • joule / J / Nm accept 8kJ for 2 marks	3
(b) (i)	elastic/potential (energy)	accept strain/PE/Ep do not accept gravitational	1
(ii)	kinetic	accept movement, KE, E _K	1
total			6

3453/F Q10

	answers	extra information	mark
(a)	dust	} either order	1
	gas		1
	gravitational	accept gravity	1
	planets/comets	accept <u>natural</u> satellites/moons	1
(b)	<u>From the top</u> White dwarf		1
	Supernova		1
	Red giant		1
	Neutron (star)		1
total			8

3453/F Q11

	answers	extra information	mark
(a) (i)	concentric arcs	straight or concave waves = 0	1
	same λ as incident waves	judged by eye – dependent mark	1
(ii)	diffraction		1
(b)	Quality of written communication		
	one mark for correct use of scientific term – <u>diffraction</u>	} refraction loses first 3 marks	1
	waves (reach house) by spreading round or over hill		1
	longer (wavelength) waves spread more		1
LW radio has the longest wavelength	accept reverse argument accept λ accept comparison with TV and VHF	1	
total			7

3453/F Q12

	answers	extra information	mark
(a)	gives out/emits radiation	accept unstable nuclei/nuclei decay or gives out alpha/beta/gamma radiation do not accept radio active particles/rays	1
(b) (i)	43		1
(ii)	56		1
(c) (i)	time taken for half the nuclei to decay or time taken for <u>number</u> of (parent) nuclei to halve or the time taken for the count <u>rate</u> /activity to halve	} accept atoms do not accept time taken for the mass to halve do not accept time for radioactivity to halve	1
(ii)	β can enter the body and α cannot β can reach/harm organs/cells/tissue	OWTTE	1 1
(iii)	α more strongly absorbed by cells/more ionizing	accept reverse argument	1
total			7

3453/F Q13

	answers	extra information	mark
(a)	the Earth cooling down		1
(b) (i)	centimetres		1
(ii)	(natural) radioactive processes cause heating of the magma/mantle causing convection currents		1 1 1
(c) (i)	at the boundaries between plates/on fault lines	OWTTE	1
(ii)	any one from <ul style="list-style-type: none"> • they can occur without warning • measurements are difficult to make 	OWTTE OWTTE	1
total			7

3453/F Q14

	answers	extra information	mark
(a)	any three from (1 mark each) <ul style="list-style-type: none"> • rays actually pass through a real image • (projected) rays only <u>appear</u> to pass through/come from a virtual image • a real image can be formed on a screen • a virtual image cannot be formed on a screen 		3
(b)	upper & lower rays shown to diverge from a point on principal axis F correctly placed at the point	converging rays = 0 arrows not necessary	1 1 1
total			6