

GCSE

Physics A

General Certificate of Secondary Education

Unit A333/02: Unit 3 – Ideas in Context plus P7 (Higher Tier)

Mark Scheme for June 2011

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Any enquiries about publications should be addressed to:

OCR Publications PO Box 5050 Annesley NOTTINGHAM NG15 0DL

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E-mail: publications@ocr.org.uk

Qı	uesti	on	Answer	Mark	Guidance
1	а	i	measure velocity/speed (1) measure mass (1) momentum = mv (1)	3	allow distance and time or how fast instead of velocity allow change in momentum = force x time (1); measures force and measures time (1) ignore weight but otherwise apply list principle
		ii	2,116,800 (1)	1	
	b	i	any 2 from: ALARA / 'As Low As Reasonably Achievable'; idea that people will not stop racing /there will be some risk; regulations make drivers wear HANS device;	2	ignore explanations of how the HANS device reduces injury
			the HANS device reduces the risk as low as possible / minimise the risk;		this must be linked to the first or third marking point ignore makes it as safe as possible
		ii	duration of crash increased by crumple zones (1) idea that change in momentum is the same with or without a crumple zone (1) (hence force must be less because) change in momentum = force x time (1)	3	the formula must be part of the argument
	С	i	(gamma) X-Ray ultraviolet / uv (visible) infrared / ir micro(wave) radio(wave)	1	

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Question	Answer	Mark	Guidance
ii	differences: frequency; wavelength; energy of photons; similarity: wave properties e.g. transverse, diffract (same) speed; both photons; not ionising; travel through vacuum etc.	1	do not accept both waves or uses e.g. can transmit information
d	analogue - continuously varying / takes any value(1) digital - only takes two values / only 1s and 0s (1)	2	marks may be gained from a labelled diagram. do not accept a fuzzy digital signal as analogue
	Total	[14]	

Qu	Question		Answer	Mark	Guidance
2	а	-	megaparsec (1)	1	
		ii	parsec (1)	1	
		iii	parsec (1)	1	
	b	i	B (1)	1	
		ii	B (1)	1	
	С		stars (1) nebula / nebulae (1) galaxy (1) cepheid / variable (1)	4	allow Andromeda
	d	i	Australia Chile	1	both needed for the mark, in either order
		ii	any 3 from: use computers; automatic control of telescope / tracking / pointing; view images on screen; record images (in computer); transmit / share images; improve / process (digital) images; remote access;	3	accept data for image throughout
			QWC - Clear well ordered answer (1)	1	only award if response attempts to answer the question
			Total	[14]	

Question	Answer	Mark	Guidance
3 a	nucleus is very small / atom is mostly empty space (1) because only a small proportion bounced back/most went straight through (or deflected through small angles) (1) nucleus is positive (1) because (positive) alpha particles were repelled / deflected / back scattered (1) nucleus is massive / contains most of the atom's mass / very dense (1) because alpha particles bounce backwards towards the source	4	The reason must support a correct structural feature Maximum 2 marks for features ignore implication of contact collisions Ignore reflection of alpha
b	protons have positive charge (1) like charges repel/electrostatic repulsion (1) strong force must overcome/be stronger than / balanced with the repulsive force (1)	3	allow protons repel each other gains 2 marks allow electromagnetic for electrostatic
	Total	[7]	

C	Question		Answer	Mark	Guidance
4	а		A – photosphere (1) B - convective zone (1) C - radiative zone (1)	3	accept convection do not accept radiation zone
	b		hydrogen (1) helium (1) (nuclear) fusion (1)	3	
		ii	radiation/light/photons/radiated (1)	1	ignore heat
			Total	[7]	

Qı	uestion	n Answer	Mark	Guidance
5	а	any 3 from: presence of line spectra / absorption spectrum / lines in a star's spectrum; (line spectra) produced by movement of electrons in atoms / excitation of electrons / absorbed by	3	Maximum of two marks if emission spectra from the star
		electrons; unique to each chemical elements; (hence) can identify elements from lines;		

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Qı	uestio	n Answer	Mark	Guidance
	b	Either	3	marks can be obtained from only one method, choose to benefit of candidate
		'peak frequency' / colour / wavelength linked to temperature (1)		allow marks from appropriate diagram(s)
		increased temperature leads to increased peak frequency/ decreased wavelength / bluer (1) ora		A candidate getting the second marking point will usually gain the first marking point also.
		Radiation/ frequency/ wavelength/ peak frequency linked to colour(1)		
		OR		
		Luminosity linked to temperature (1)		
		Higher temperature higher luminosity ora (1)		accept 'intrinsic brightness'/total radiation output for luminosity
		Size also needed to be known (1)		accept OR
				'Spectral type' linked to temperature (1)
				strength of different spectral lines links to temperature (1)
				different elements ionised at different temperatures (1)
			[6]	

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Q	Question		Answer	Mark	Guidance
6	а		-270 (1)	1	
	b	i	any three from: gravity pulls particles/clouds inward / gravity compresses cloud / gravitational collapse; volume decreases / density increases; pressure increases; particles gain kinetic energy; particles collide more (often);	3	ignore fusion ignore particles more energetic collisions
		ii	idea of balance (of inward and outward forces) (1) subsequent marks require first mark pressure / radiation pressure (1) gravity (1)	3	ignore reference to other variables not changing
			Total Total	[7] [55]	

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

14 – 19 Qualifications (General)

Telephone: 01223 553998 Facsimile: 01223 552627

Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

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Telephone: 01223 552552 Facsimile: 01223 552553

