

GCSE 2004

June Series



Mark Scheme

SCIENCE: DOUBLE AWARD (Modular) 3468/2H

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Dr. Michael Cresswell Director General

Science: Double Award (Modular)**June 2004****3468/2H****3468/2H Q1**

question	answers	extra information	mark
(a)	any two from: <ul style="list-style-type: none"> • agriculture • buildings • roads any 2 <u>different</u> uses for wood for 1 mark each	accept land to grow crops or graze cattle accept wood for burning (energy) accept timber for wood	2
(b)(i)	USA has more wealth / technology / devices / need for <u>electricity</u>		1
(ii)	damage done <u>linked</u> effect	e.g pollutant / mining / non-renewable / deforestation e.g greenhouse effect / visual pollution / run out of resources / flooding	1
(c)(i)	Problem – because some people did not want to pay the (landfill) tax waste dumped elsewhere		1 1
(ii)	named example of: Reduce – such as less packaging / repairing Reuse – such as glass bottles / shopping bags / ink jet cartridges Recycle – such as metals, glass, paper	mark as a whole	1 1 1
total			10

3468/2H Q2

question	answers	extra information	mark
(a)	A because: the graph line was <u>steeper</u> / the reaction had stopped earlier accept A because: CO ₂ given off faster / fizzes more for 1 mark	accept sample B slower because: the graph line was <u>less steep</u> / the reaction stopped later accept B slower because CO ₂ given off slower / fizzes less for 1 mark	2
(b)	increases the speed / energy of the (hydrochloric acid) particles collide more(frequently) (collide more) energetically / successfully		1 1 1
total			5

3468/2H Q3

question	answers	extra information	mark
(a)	nitrogen	accept N or N ₂	1
(b)	the reaction is exothermic	accept the reaction releases heat energy	1
(c)	water	accept H ₂ O accept hydrogen oxide	1
(d)	with ammonia and nitric acid neutralisation	accept correct description of reacting (ammonia and nitric acid)	1 1
total			5

3468/2H Q4

	answers	extra information	mark
(a)	7.5	<p>correct answer with no working = 3 if incorrect allow 1 mark for (change in velocity from graph =) 15</p> <p>1 mark for $\frac{\text{change in velocity}}{\text{time taken}}$</p> <p>2 marks for $\frac{15}{2}$</p> <p>N.B. correct answer from the incorrectly recalled relationship $\frac{\text{distance}}{\text{time}} = 2$ marks</p>	3
(b)	<p>(4 – 5 seconds) the bungee jumper slows down (decelerates)</p> <p>(the rubber cord) stops the fall</p> <p>(5 – 6) seconds the bungee jumper starts moving (accelerating) upwards (in the opposite direction)</p>	<p>maximum of 2 marks if no correct indication of time</p>	<p>1</p> <p>1</p> <p>1</p>
total			6

3468/2H Q5

question	answers	extra information	mark
(a)	8550	<p>correct answer with no working = 3 if incorrect, allow 1 mark for work = force / weight \times distance, 2 marks for = 1900×4.5</p> <p>N.B. correct answer from the incorrectly recalled relationship mass \times distance = 2 marks</p>	3
(b)	some of the work done is against frictional forces	<p>accept transferred as heat energy</p> <p>noise / sound is neutral</p>	1
total			4

3468/2H Q6

question	answers	extra information	mark
	Quality of written communication: One mark for correct sequencing. bolt out → plunger up → switch off / circuit broken		1
	any five from		5
	<ul style="list-style-type: none"> • high current flows • electromagnet is stronger • the iron bolt is pulled out • the plastic plunger moves up • the switch is lifted / open / off • no current flowing • to re-set the plunger must be pushed down 	accept circuit is broken	
total			6

3468/2H Q7

question	answers	extra information	mark
(a)(i)	(pointer) moves to the left	accept (pointer) moves in the opposite direction / goes negative	1
(ii)	a voltage (potential difference) is produced between the ends of the wire	accept an <u>induced</u> voltage / current	1
(b)	any two from:		2
	<ul style="list-style-type: none"> • rotate (move) the wire coil faster • increase the strength of the magnetic field • increase the number of turns (on the coil) • increase the area of the coil • coils closer together 	accept stronger magnets / move magnets together bigger magnet is neutral larger coil is neutral	
total			4

3468/2H Q8

question	answers	extra information	mark
	<p>any five from:</p> <ul style="list-style-type: none"> • the amount of energy (in the biomass of organisms) is reduced at each successive stage in a food chain • all of prey organism is not consumed • energy is 'lost' as the organisms' waste materials • energy is transferred / lost during respiration • energy is transferred / lost as movement (kinetic energy) • energy is transferred /lost as heat (thermal energy) • energy is transferred / lost to the surroundings • the only energy transferred to a higher level is that which the organisms have used in growing 	<p>statements about energy flow the wrong way are neutral</p>	5
total			5

3468/2H Q9

question	answers	extra information	mark
(a)	any 5 of: <ul style="list-style-type: none"> energy / heat (radiation) from Sun to Earth energy / heat is then <u>radiated</u> by the Earth most of this energy / heat (radiation) is trapped or absorbed by carbon dioxide / methane (molecules) some of this energy is <u>re-radiated</u> back towards the Earth temperature increase any two effects indicated, such as sea levels rise, climate change 	‘rays’ are neutral ‘reflected’ is neutral ‘reflected’ is neutral max 4 if reference to ozone / acid rain	5
(b)	methane : carbon dioxide 1:4	accept $\frac{1}{4}$ or 0.25 or 25%	1
(c)	when methane burns carbon dioxide is produced carbon dioxide contributes to the ‘greenhouse effect’ OR lower concentration of methane in the atmosphere decreases the greenhouse effect this could cause a decrease in the Earth’s average temperature	accept word equation : methane + oxygen → water + carbon dioxide or a balanced symbol equation accept carbon dioxide may cause global warming accept Earth becomes colder max 1 if reference to ozone	1 1
total			8

3468/2H Q10

question	answers	extra information	mark
(a)	10.86	accept answers between 10.64 to 10.9 if answer is incorrect allow 1 mark for rfm $\text{FeSO}_4 = 152$ 2 marks for $152 \times 4/56$	3
(b)	$2 \text{Fe} + 3 \text{H}_2\text{SO}_4 \rightarrow \text{Fe}_2(\text{SO}_4)_3 + 3\text{H}_2$	accept other correct multiples for balancing	1
total			4

3468/2H Q11

question	answers	extra information	mark
	exothermic does not gain any credit		
	reactants: bond breaking (436 + 242 =) 678 (kJ)		1
	products: bond making (2 × 431 =) 862 (kJ)		1
	so overall 184 (kJ) <u>released</u> / -184(kJ)		1
total			3

3468/2H Q12

question	answers	extra information	mark
(a)	increases % / amount of ammonia		1
	favours the forward reaction		1
(b)	reaction(s) would be too slow		1
(c)	<p>any three from:</p> <ul style="list-style-type: none"> • rate increased • decreases % / amount of ammonia • the forward reaction is exothermic • the backward reaction is endothermic • backward reaction favoured / forward reaction not favoured • yield / amount of nitrogen and hydrogen increased • the relative amount (yield) of ammonia decreases as the <u>equilibrium</u> is changed • the relative amount (yield) of nitrogen and hydrogen increases as the <u>equilibrium</u> is changed 	explanations in terms of particles are neutral	3
total			6

3468/2H Q13

question	answers	extra information	mark
	12 100	<p>correct answer with no working = 3 if answer incorrect, allow 1 mark for force = mass \times acceleration $1210 \times 10 = 2$ force / weight = mass \times gravity is neutral</p> <p>N.B. no marks for correct answers with incorrectly recalled relationship</p>	3
total			3

3468/2H Q14

question	answers	extra information	mark
(a)	900 000	<p>correct with no working = 3 if answer incorrect, allow :</p> <p>1 mark for K.E. = $\frac{1}{2} \times \text{mass} \times \text{speed}^2$ 2 marks for $\frac{1}{2} \times 5000 \times 600^2$</p> <p>N.B. correct answer with the incorrectly recalled relationship</p> <p>$\frac{1}{2} \times \text{weight} \times \text{speed}^2 = 2$ marks</p>	3
(b)	<p>Satellite A geostationary and is used for communications</p> <p>Satellite B polar orbit and is used for monitoring / weather</p>		1 1
total			5

3468/2H Q15

question	answers	extra information	mark
	Quality of written communication: One mark for using correct scientific sequence : gravity → fusion → balance		1
	any four from		4
	<ul style="list-style-type: none"> (dust and gas) pulled together by gravity (star formed when) it is hot enough <u>hydrogen</u> (and helium) nuclei <u>fuse</u> (these nuclear fusion reactions) release the energy / heat / light (which is radiated by stars) energy causes expansion gravitational pull is balanced by the expansion (force) 	accept (as mass is pulled together) it gets very hot	
total			5

3468/2H Q16

question	answers	extra information	mark
(a)	B because it contains more (of the light fraction)		1
	Quantitative answer e.g B has 30%, A has 20% / 10% more / 1.5 times more		1
(b)(i)	$ \begin{array}{cccccc} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} \\ & & & & & \\ \text{H} & - \text{C} & - \text{C} & - \text{C} & - \text{C} & - \text{C} & - \text{H} \\ & & & & & \\ & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} \end{array} $		1
(ii)	heat		1
	catalyst	if neither mark gained allow cracking for 1 mark	1
total			5

3468/2H Q17

question	answers	extra information	mark
(a)	<p>(oil / natural gas / coal)</p> <p>burning releases carbon dioxide (1) greenhouse effect (1)</p> <p>OR</p> <p>burning (releases sulphur dioxide (1) acid rain (1)</p> <p>OR</p> <p>(nuclear power)</p> <p>accidents can release very dangerous radioactive material (1)</p> <p>produces waste that stays dangerously radioactive for thousands of years or radioactive waste has to be stored safely for thousands of years (1)</p>	<p>no marks are given for choosing the correct non-renewable energy source</p> <p>allow 2 effects for 2 marks</p> <p>no marks are given for choosing the correct non-renewable energy source</p> <p>accept the cost of installation and decommissioning is high</p>	2
(b)	<p>any four from:</p> <p>(wind power)</p> <ul style="list-style-type: none"> • considered unsightly / visual pollution (1) very large areas of land (1) • noisy for people living nearby / noise pollution (1) <p>(tidal power)</p> <ul style="list-style-type: none"> • barrages / visual pollution (1) • destroys the habitat of many living organisms (1) <p>(hydroelectricity)</p> <ul style="list-style-type: none"> • damming / visual pollution (1) • very large areas of land (1) flooding (1) 	<p>no marks are given for choosing the correct non-renewable energy source</p> <p>no marks are given for choosing the correct non-renewable energy source</p> <p>no marks are given for choosing the correct non-renewable energy source</p>	4
total			6