



CO-ORDINATED SCIENCES

0654/33

Paper 3 Theory (Core)

October/November 2017

MARK SCHEME

Maximum Mark: 120

Published

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This document consists of **9** printed pages.

Question	Answer	Marks
1(a)	C ; B ; E ; A ;	4
1(b)	<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>part of flower</p> <div style="border: 1px solid black; padding: 2px; width: 100px; margin: 5px auto;">anther</div> <div style="border: 1px solid black; padding: 2px; width: 100px; margin: 5px auto;">ovary</div> <div style="border: 1px solid black; padding: 2px; width: 100px; margin: 5px auto;">petal</div> <div style="border: 1px solid black; padding: 2px; width: 100px; margin: 5px auto;">sepal</div> <div style="border: 1px solid black; padding: 2px; width: 100px; margin: 5px auto;">stigma</div> </div> <div style="text-align: center;"> <p>function</p> <div style="border: 1px solid black; padding: 2px; width: 150px; margin: 5px auto;">where ovules are produced</div> <div style="border: 1px solid black; padding: 2px; width: 150px; margin: 5px auto;">protects the flower when in bud</div> <div style="border: 1px solid black; padding: 2px; width: 150px; margin: 5px auto;">produces pollen</div> <div style="border: 1px solid black; padding: 2px; width: 150px; margin: 5px auto;">often coloured to attract insects</div> <div style="border: 1px solid black; padding: 2px; width: 150px; margin: 5px auto;">where pollen is deposited</div> </div> </div> <p>1 or 2 correct ; 3 or 4 correct ; 5 correct ;</p>	3
1(c)	<i>sexual reproduction</i> requires two parents ; produces genetically dissimilar offspring ; uses sex cells / gametes / haploid cells ;	max 2

Question	Answer	Marks
2(a)	26 ; 3 ; 19 ; 0 ; 10 ;	5

Question	Answer	Marks
2(b)	1 ; zero / negligible / 1 / 2000 ;	2
2(c)(i)	transition ;	1
2(c)(ii)	alloy ;	1
2(c)(iii)	harder / less malleable / takes a sharper edge / stronger ;	1

Question	Answer	Marks														
3(a)	gland ; blood ; organs ; liver ;	4														
3(b)	<table border="1"> <thead> <tr> <th>situation</th> <th></th> </tr> </thead> <tbody> <tr> <td>gentle walking</td> <td></td> </tr> <tr> <td>bungee jumping</td> <td>✓</td> </tr> <tr> <td>drinking a glass of water</td> <td></td> </tr> <tr> <td>painting a picture</td> <td></td> </tr> <tr> <td>riding a roller coaster</td> <td>✓</td> </tr> <tr> <td>sitting an exam</td> <td>✓</td> </tr> </tbody> </table> ; ; ;	situation		gentle walking		bungee jumping	✓	drinking a glass of water		painting a picture		riding a roller coaster	✓	sitting an exam	✓	3
situation																
gentle walking																
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riding a roller coaster	✓															
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3(c)	increase pulse rate / heart rate ; increase blood glucose concentration ; increase metabolic activity / rate ;	max 2														

Question	Answer	Marks							
4(a)(i)	solid state detector / SSD / GM tube / photographic film ;	1							
4(a)(ii)	existence of an element that has atoms with same proton number but different neutron number / mass number ;	1							
4(b)(i)	α β γ most ionising least ionising ;	1							
4(b)(ii)	mutation of cells / cancer etc. ;	1							
4(c)(i)	infra-red ;	1							
4(c)(ii)	<table border="1" style="width: 100%; text-align: center;"> <tr> <td style="width: 15%;">γ-rays</td> <td style="width: 15%;"></td> <td style="width: 15%;">ultraviolet</td> <td style="width: 15%;"></td> <td style="width: 15%;">infra-red</td> <td style="width: 15%;">microwaves</td> <td style="width: 15%;"></td> </tr> </table> infra-red in correct box ;	γ-rays		ultraviolet		infra-red	microwaves		1
γ-rays		ultraviolet		infra-red	microwaves				
4(d)	total internal reflection at the wall of the fibre throughout the fibre ;	1							

Question	Answer	Marks
5(a)(i)	14.5 (° C) ;	1
5(a)(ii)	65– 95 (° C) ;	1
5(b)	any temperature in range from 25–40 (° C) ; this temperature is when the enzyme is (most) active / optimum temperature ;	2
5(c)	amino acids ;	1
5(d)(i)	carbon, hydrogen, oxygen, nitrogen ;	1
5(d)(ii)	biuret ; purple ;	2

Question	Answer	Marks
6(a)(i)	hydrogen ;	1
6(a)(ii)	burning lighted splint ; pops ;	2
6(a)(iii)	potassium reacts more vigorously / quickly ;	1
6(b)(i)	m.pt. increasing down the group ;	1
6(b)(ii)	X is bromine and Y is iodine ;	1
6(c)(i)	exothermic AND means heat given off / evidence is the flame ;	1
6(c)(ii)	sodium atoms lose electrons and chlorine atoms gain electrons; one electron ; reference to atoms becoming charged ions ; the idea that ions of opposite charge attract ;	max 3
6(c)(iii)	no reaction / no change AND argon unreactive / inert / is an inert gas ;	1

Question	Answer	Marks
7(a)	microwaves ;	1
7(b)(i)	speaker ;	1
7(b)(ii)	battery ;	1
7(c)(i)	potential difference / voltage ;	1
7(c)(ii)	frequency (of electricity) ;	1
7(d)	P then Q ;	1

Question	Answer	Marks
7(e)	transverse waves - the vibrations are at right angles to the direction of travel / longitudinal waves - the vibrations are along the same direction as the direction of travel ;	1
7(f)	weight / force ; (vertical) distance ;	2

Question	Answer	Marks
8(a)(i)	NaOH 8 to 14 AND H ₂ SO ₄ 6 to 1 ;	1
8(a)(ii)	sodium sulfate ; water ;	2
8(a)(iii)	cobalt chloride paper ; (blue) to pink ; or anhydrous / white copper(II) sulfate ; turns blue ;	2
8(b)(i)	calcium oxide ;	1
8(b)(ii)	carbon dioxide ;	1
8(b)(iii)	<u>thermal decomposition</u> ;	1
8(b)(iv)	add to soil / lakes ; neutralise excess acidity ; make soil more suitable for certain types of crop ;	max 2

Question	Answer	Marks
9(a)(i)	1500 (m) ;	1
9(a)(ii)	evidence that correct section has been identified / steepest gradient selected ; speed = distance / time or = 500 / 50 ; = 500 / 50 = 10 m / s ;	3
9(b)(i)	Q ;	1
9(b)(ii)	R ;	1
9(b)(iii)	equal magnitude ; opposite directions ;	2
9(c)(i)	particles collide with tyre walls ; particles exert a force (on the tyre wall) ;	2
9(c)(ii)	particles are moving faster ; more collisions on tyre walls / collisions are more energetic ;	2
9(d)(i)	$I = V / R$ or $12 / 4.0$; = 3.0 (A) ;	2
9(d)(ii)	2.0Ω ; combined resistance of two resistances in parallel is less than that of either resistor by itself ;	2
9(e)	iron magnetises quickly / steel magnetises slowly / iron loses magnetism quickly / steel loses magnetism slowly ;	1

Question	Answer	Marks
10(a)(i)	A (upper) epidermis ; B spongy mesophyll (layer) ;	2
10(a)(ii)	arrow pointing to or through the stomata ;	1

Question	Answer	Marks
10(a)(iii)	<u>diffusion</u> ;	1
10(b)(i)	(they) absorb (more) (sun) light ; for photosynthesis ;	2
10(b)(ii)	(presence of) cell membrane / nucleus / cytoplasm ;	1

Question	Answer	Marks
11(a)	glucose on LHS AND water on RHS ;	1
11(b)(i)	muscle contraction ; protein synthesis ; cell division ; growth ; the passage of nerve impulses ;	max 2
11(b)(ii)	sweating ; vasodilation / described ;	2
11(c)	$37.6 - 36.5 = 1.1$; $1.1 \times 100 / 36.5 = 3$;	2

Question	Answer	Marks
12(a)(i)	CH ₄ ;	1
12(a)(ii)	no change AND methane saturated / cannot be unsaturated ;	1

Question	Answer	Marks
12(b)(i)	limewater ; turns milky ;	2
12(b)(ii)	reference to time required to form / ovp ;	1
12(b)(iii)	chemical ;	1
12(b)(iv)	contains less flammable gas / only the methane can burn ;	1
12(c)(i)	sulfur dioxide ;	1
12(c)(ii)	reference to acid rain / consequence of acid rain ;	1

Question	Answer	Marks
13(a)(i)	weight is measured in newtons / mass would be 40 kg ;	1
13(a)(ii)	useful energy output compared to energy input / AW ;	1
13(b)(i)	boiling happens at a constant temperature / temperature remains constant at 100 °C ;	1
13(b)(ii)	80 °C ;	1
13(b)(iii)	evaporation ; faster ; surface ;	3