CAMBRIDGE
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CO-ORDINATED SCIENCES **0654/33**

Paper 3 Theory (Core) **May/June 2026**

MARK SCHEME

Maximum Mark: 120

Published

This mark scheme contains the instructions and marking guidance that our examiners used to mark candidate responses for this component.

Before they start marking, examiners complete a standardisation process. They review a range of candidate responses and discuss the mark scheme in detail to agree which answers can and cannot be accepted. Examiners award marks where it is clear that candidate responses have met the requirements of the mark scheme. These requirements may vary between different components or different versions of the same component, depending on the exact requirements of the question and the candidate responses seen during the standardisation process.

Sometimes, our mark schemes may allow marks to be awarded to responses which contain elements that are factually incorrect or for content not covered by the syllabus. We do this in response to the demands of a specific question to support candidates and make sure that our assessments are fair. However, these allowances should not be used as a guide for teaching and learning.

We cannot discuss the mark scheme with schools, and we recommend that schools read the mark scheme together with the assessment material and the Principal Examiner Report for Teachers.

This document consists of **20** printed pages.

[Turn over

General marking principles

All examiners must apply these marking principles when marking candidate responses.

1	Examiners must award marks for each response in line with: • the specific **content** defined in the mark scheme • the specific **skills** defined in the mark scheme or in the level descriptions • the **standard of response** required as exemplified by the standardisation scripts.
2	Examiners must award **whole marks** (not half marks, or other fractions).
3	Examiners must award marks **positively**. This means that: • marks are not deducted for errors or omissions • marks are awarded for correct/valid answers as defined in the mark scheme and also for **other valid answers** which go beyond the scope of the syllabus and mark scheme referring to your team leader as appropriate • the quality of spelling, punctuation and grammar are judged **only** when the mark scheme indicates that these features are **specifically assessed** in the question. However, the meaning of all responses must be unambiguous.
4	Examiners must **consistently** apply the requirements of the mark scheme and any rules for what to do when candidates have not followed instructions correctly.
5	Examiners must use the **full range of marks** defined in the mark scheme, unless limited by the quality of the candidate responses seen.
6	Examiners must award marks according to the mark scheme and **must not** award marks with grade thresholds or grade descriptions in mind.

Science-Specific Marking Principles

1	Examiners should consider the context and scientific use of any keywords when awarding marks. Although keywords may be present, marks should not be awarded if the keywords are used incorrectly.
2	The examiner should not choose between contradictory statements given in the same question part, and credit should not be awarded for any correct statement that is contradicted within the same question part. Wrong science that is irrelevant to the question should be ignored.
3	Although spellings do not have to be correct, spellings of syllabus terms must allow for clear and unambiguous separation from other syllabus terms with which they may be confused (e.g. ethane / ethene, glucagon / glycogen, refraction / reflection).
4	The error carried forward (ecf) principle should be applied, where appropriate. If an incorrect answer is subsequently used in a scientifically correct way, the candidate should be awarded these subsequent marking points. Further guidance will be included in the mark scheme where necessary and any exceptions to this general principle will be noted.
5	‘List rule’ guidance For questions that require ***n*** responses (e.g. State **two** reasons …): • The response should be read as continuous prose, even when numbered answer spaces are provided. • Any response marked *ignore* in the mark scheme should not count towards ***n***. • Incorrect responses should not be awarded credit but will still count towards ***n***. • Read the entire response to check for any responses that contradict those that would otherwise be credited. Credit should **not** be awarded for any responses that are contradicted within the rest of the response. Where two responses contradict one another, this should be treated as a single incorrect response. • Non-contradictory responses after the first ***n*** responses may be ignored even if they include incorrect science.

6 Calculation specific guidance

Correct answers to calculations should be given full credit even if there is no working or incorrect working, **unless** the question states 'show your working'.

For questions in which the number of significant figures required is not stated, credit should be awarded for correct answers when rounded by the examiner to the number of significant figures given in the mark scheme. This may not apply to measured values.

For answers given in standard form (e.g. $a \times 10^n$) in which the convention of restricting the value of the coefficient (a) to a value between 1 and 10 is not followed, credit may still be awarded if the answer can be converted to the answer given in the mark scheme.

Unless a separate mark is given for a unit, a missing or incorrect unit will normally mean that the final calculation mark is not awarded. Exceptions to this general principle will be noted in the mark scheme.

7 Guidance for chemical equations

Multiples / fractions of coefficients used in chemical equations are acceptable unless stated otherwise in the mark scheme.

State symbols given in an equation should be ignored unless asked for in the question or stated otherwise in the mark scheme.

Annotations guidance for centres

Examiners use a system of annotations as a shorthand for communicating their marking decisions to one another. Examiners are trained during the standardisation process on how and when to use annotations. The purpose of annotations is to inform the standardisation and monitoring processes and guide the supervising examiners when they are checking the work of examiners within their team. The meaning of annotations and how they are used is specific to each component and is understood by all examiners who mark the component.

We publish annotations in our mark schemes to help centres understand the annotations they may see on copies of scripts. Note that there may not be a direct correlation between the number of annotations on a script and the mark awarded. Similarly, the use of an annotation may not be an indication of the quality of the response.

The annotations listed below were available to examiners marking this component in this series.

Annotations

Annotation	Meaning
	correct point or mark awarded
	incorrect point or mark not awarded
BOD	benefit of the doubt given
FT	follow through
NBOD	benefit of doubt was considered, but the response was decided to not be sufficiently close for benefit of doubt to be applied.
TV	response is too vague or there is insufficient detail in response
ECF	error carried forward applied
^	information missing or insufficient for credit
	unclear response
I	incorrect or insufficient point ignored while marking the rest of the response

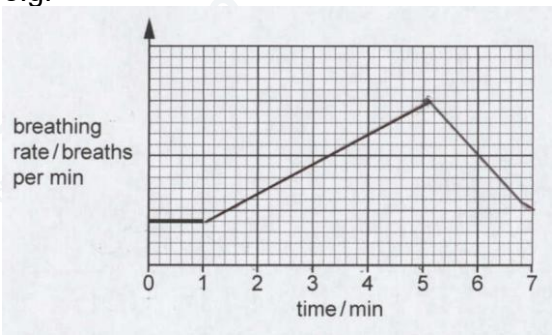
Annotation	Meaning
R	incorrect point or mark not awarded
LNK	two statements are linked
SEEN	point has been noted, but no credit has been given or blank page seen
	key point attempted / working towards marking point / incomplete answer / response seen but not credited / blank page seen
BP	blank page

Mark Scheme Abbreviations

;	separates marking points
/	separates alternative responses for the same marking point
A	accept (a less-than-ideal answer which should be marked correct)
I	ignore (mark as if this material was not present)
R	reject the response
AND	indicates that two or more parts of a response are required for the mark
AVP	alternative valid point
AW	alternative wording (where responses vary more than usual)
NOT	indicates an incorrect response that would contradict another otherwise correct alternative
OR	alternative responses for the same marking point
owtte	or words to that effect
underline	actual word given must be used by candidate (grammatical variants excepted)
ecf	error carried forward
ORA	or reverse argument
( )	the word / phrase in brackets is not required but sets the context
max	indicates the maximum number of marks

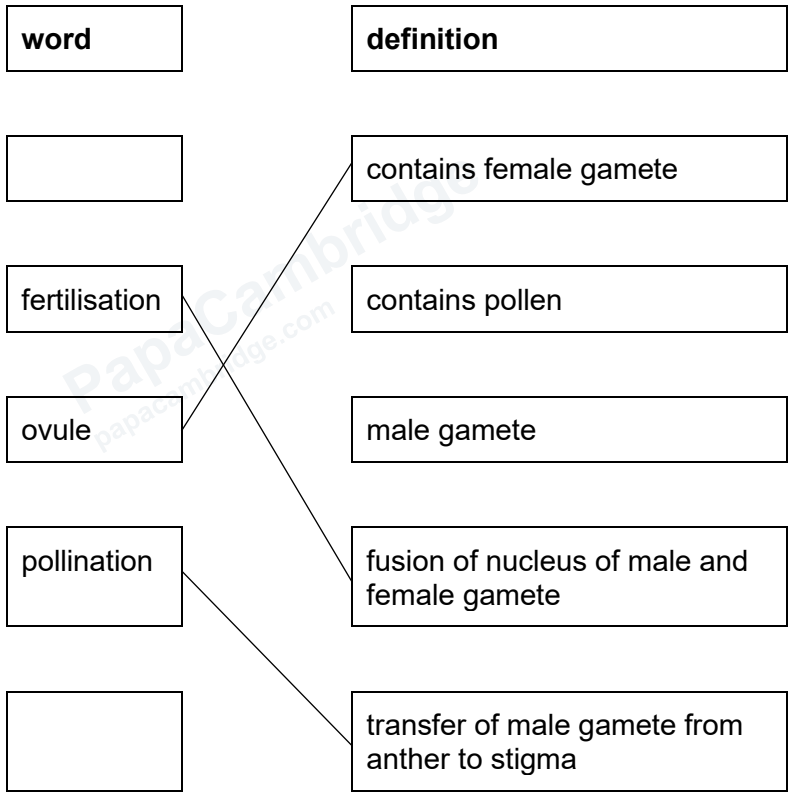
Question	Answer	Marks	Guidance
1(a)	**any three from:** neurone has a nucleus ; neurone has branches ; bacterial cell has circular DNA ; bacterial cell has plasmids ; bacterial cell has a cell wall ;	**3**	**ORA** in each case **A** bacterial cell has DNA in cytoplasm **A** neurone has dendrites / description of dendrites / bacterial cell is rectangular **I** different size / shape / solid shape **A** bacterial cell has strand of DNA **I** just bacterial cell has walls **I** neurone has mitochondria / myelin sheath / neurotransmitters **I** bacterial cell has flagellum **I** ribosomes **R** neurone has chloroplasts
1(b)	relay ;	**1**	
1(c)	electrical ;	**1**	**A** electric **I** nerve
1(d)	pathogen ;	**1**	more than one answer circled = 0 marks accept any indication of correct answer, e.g. ticking or underlining, but circling takes precedence
1(e)	**any two from**: skin ; hairs in nose ; mucus ; stomach acid ; white blood cells ; AVP ; ;	**2**	**A** hydrochloric acid **I** just acid **A** named white blood cell / phagocytosis e.g. ear wax / tears / saliva / blood clots / eyelashes / eyebrows / antibodies **I** immune system unqualified / fever

Question	Answer	Marks	Guidance
1(f)	excretion ; nutrition ;	**2**	

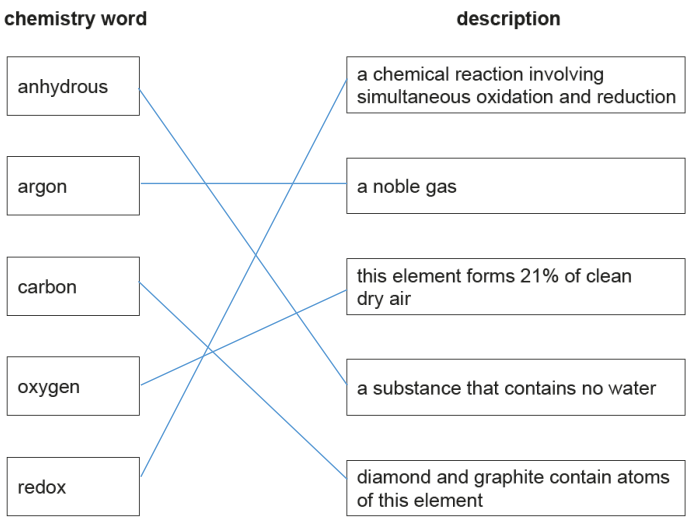
Question	Answer	Marks	Guidance
2(a)(i)	increasing line ; decreasing from 5 min ;	**2**	e.g.  **I** flat top to line **I** whether line descends to resting point for MP2 **R** any upward line after 5 min for MP2
2(a)(ii)	$\frac{3-0.5}{0.5} \times 100$ **or** 2.5 ; 500 (%) ;	**2**	correct answer on answer line = 2 marks
2(b)(i)	limewater ;	**1**	
2(b)(ii)	**any two from:** carbon dioxide causes (solution **Y** to go milky) / **AW** ; expired air goes through (liquid in test-tube **B**) / **ORA** ; **more** carbon dioxide in expired air / **more** carbon dioxide (in test-tube **B**) / **ORA** ;	**2**	**A** limewater for solution **Y** **A** CO_2 causes a reaction in solution **Y** **A** exhaled air / breath for expired air

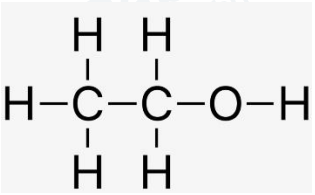
Question	Answer	Marks	Guidance
2(c)(i)	respiration ;	1	**I** anaerobic / aerobic
2(c)(ii)	protein synthesis / cell division / growth / passage of nerve impulses / maintenance of body temperature / active transport / AVP ;	1	**I** muscle contraction / movement **A** homeostasis / thermoregulation / breakdown of lactic acid / tissue repair **I** breathing / reproduction / digestion / exercise / pumping blood / excretion **R** respiration

Question	Answer	Marks	Guidance
3(a)(i)	**F ;** **B ;** **A ;**	3	
3(a)(ii)	**any two from:** large / coloured petals ; scent ; produce nectar ; flat / sticky stigma (for insect landing) ; sticky / spiky pollen ;	2	**I** produce large amount of pollen

Question	Answer	Marks	Guidance
3(b)	 ; ; ;	3	1 mark for each correct line more than one line from a word = 0 marks for that word
3(c)	**any three from**: uptake by root hair cells ; by osmosis ; to root cortex (cells) ; (up through stem) in xylem ; through mesophyll cells in leaf ;	3	**I** by hair roots **A** by diffusion (through apoplastic pathway) **R** by active transport **I** transpiration **I** in phloem

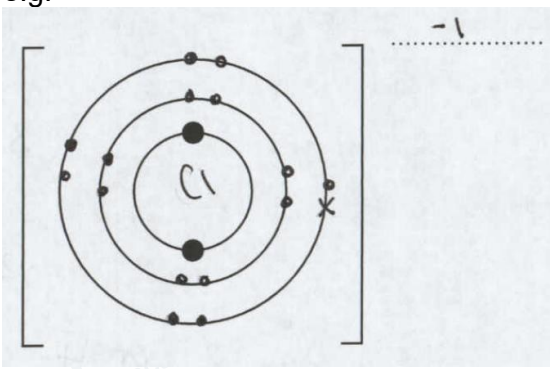
Question	Answer	Marks	Guidance
4(a)	consumer **and** carnivore ;	**1**	**both** boxes ticked for 1 mark
4(b)	*idea of* network of / interconnected, food chain**s** (showing energy transfers) / AW ;	**1**	**I** all food chains of specific animal / collection of food chains
4(c)(i)	**any two from:** hunting ; climate change ; pollution ; introduced species ; AVP ;	**2**	**A** poaching / competition with humans (for food / land / safety) / killed by humans **A** global warming **A** named examples e.g. lack of prey / deer / food / increased competition for resources **I** overharvesting
4(c)(ii)	**any two from:** reduced biodiversity ; extinction ; loss of soil ; flooding ; increased carbon dioxide in atmosphere ;	**2**	**I** loss of habitat **A** other species become endangered / extinction of named species **I** extinction of tigers / kills a lot of animals / causing migration **A** loss of soil fertility **A** air for atmosphere **A** global warming / climate change **I** more CO_2 unqualified
4(c)(iii)	area used for crop production ;	**1**	
4(d)	variation ; (thin) stripes ; alleles ;	**3**	One mark for each correct word **A** differences / mutation **A** camouflage **A** mutation **I** genes / DNA

Question	Answer	Marks	Guidance
5(a)	 ; ; ; ;	**4**	5 correct = 4 marks 3 or 4 correct = 3 marks 2 correct = 2 marks 1 correct = 1 mark
5(b)(i)	(experiment) A ; lowest temperature **and** lowest concentration ;	**2**	no marks if B, C or D selected **A** low temperature **and** concentration
5(b)(ii)	any number 1–6 inclusive ;	**1**	**A** below 7
5(b)(iii)	red / orange / yellow ;	**1**	**R** green
5(b)(iv)	colour is the same for all acid pHs / **AW** ;	**1**	**A** it is red at all acid pHs / only shows whether it is an acid or base **I** it doesn't show exact pH / cannot see colour change
5(b)(v)	carbon dioxide ;	**1**	**A** CO_2

Question	Answer	Marks	Guidance
6(a)(i)	9 ;	**1**	
6(a)(ii)	 C-O-H ; everything else correct ;	**2**	**A** C-OH for MP1 but bond must be to O not H **Note** H must be **only** bonded to C for MP1 **R** extra C in chain for MP2 **A** correct dot and cross diagram for max 1 including electron pairs
6(a)(iii)	covalent ;	**1**	
6(a)(iv)	2 × 12 **or** 6 × 1 **or** 24 + 6 + 16 ; 46 ;	**2**	correct answer on answer line = 2 marks
6(b)	(motion –) random (directions) / slide over each other ; (separation –) close (together) / loosely packed ;	**2**	**Note** Mark points anywhere but must be linked to correct idea **A** move past each other **R** vibrating in one position **A** most / all touching / small (separation) **I** little space between particles / separated unqualified **R** not touching **I** bulk properties e.g. can only be compressed slightly / can flow
6(c)	hydrocarbons contain carbon and hydrogen **only** / (ethanol) contains oxygen ;	**1**	**A** contains O **I** it is an alcohol / contains a hydroxide
6(d)	solvent / AVP ;	**1**	**A** hand sanitiser / antiseptic / disinfectant / for cleaning / (solvent in) perfumes / (solvent in) cosmetics / testing for fats / industrial / chemical feedstock **I** alcoholic drinks / medicine / making esters / mix into paint

Question	Answer	Marks	Guidance
6(e)	(ethanol) + oxygen → carbon dioxide + water ; ; one correct = 1 mark all three correct = 2 marks	**2**	products in either order **I** symbols unless complete and balanced for 2nd mark

Question	Answer	Marks	Guidance
7(a)	any **two** from: good thermal conductivity ; good electrical conductivity ; high melting point / high boiling point ; malleable ; ductile ; AVP ;	**2**	**A** solid at room temperature **I** flexible e.g. sonorous / shiny / high tensile strength **I** hard / shining
7(b)	magnesium zinc iron copper ;	**1**	all correct for 1 mark **A** symbols
7(c)	2 ;	**1**	
7(d)(i)	copper **and** zinc ;	**1**	**A** Cu **and** Zn
7(d)(ii)	(stainless steel) resists corrosion / (stainless steel is) hard(er) / **ORA** ;	**1**	**A** (steel) resists rusting / less oxidation / **ORA** **I** (steel) deteriorates less easily / more durable / stronger / **ORA**
7(e)(i)	3 ;	**1**	
7(e)(ii)	(+) 2 ;	**1**	

Question	Answer	Marks	Guidance
8(a)	number of outer–shell electrons is equal to group number ;	1	**A** number of electrons in outer–shell is the same as group number / group number shows how many electrons in their outer–shell / (they are) the same **I** proportional / one increases as the other increases **I** elements in the same group have the same number of (outer–shell) electrons
8(b)	chloride ion showing 2,8,8 ; – sign shown ;	2	e.g.  **A** dots, crosses or a mixture for electrons for MP1 **Note** charge must be a single negative charge – 1
8(c)	acidified (aqueous) silver nitrate ; white ppt ;	2	mark independently **I** just silver nitrate
8(d)	any **two** from: high melting points / high boiling points ; poor electrical conductivity (when solid) ; (generally) soluble in water ; AVP ;	2	**I** good electrical conductor when molten or aqueous e.g. brittle

Question	Answer	Marks	Guidance
8(e)(i)	decomposition ; molten ;	**2**	**A** break down / separation
8(e)(ii)	cathode **and** anode ;	**1**	both required for the mark **A** negative (electrode) **and** positive (electrode)

Question	Answer	Marks	Guidance
9(a)(i)	100 (°C) ;	**1**	
9(a)(ii)	melting ; condensation ;	**2**	
9(b)	any **two** from: ref to convection ; hot water is less dense / **ORA** ; (hot / less dense) water rises / **ORA** ;	**2**	**I** conduction
9(c)(i)	(2.8 kW =) 2800 (W) ; energy = power × time (in any form) **or** 2800 × 120 ; 336 000 (J) ;	**3**	correct answer on answer line = 3 marks **A** substitution with incorrect unit conversion e.g. 2.8 × 120 **A ecf** if incorrect unit conversion used with working shown e.g. 336 (J)
9(c)(ii)	13 (A) ; must be larger than the (maximum) current ;	**2**	**A** *idea that* current can only increase a bit before fuse melts / circuit broken **Note** if 30 A chosen 1 mark can be given for the correct explanation
9(c)(iii)	melts (when current is too large) **;** breaks the circuit ;	**2**	**A** breaks **A** stops flow of charge / electrons / stops current / makes circuit incomplete **I** cutting off electricity / stopping flow of electricity

Question	Answer	Marks	Guidance
10(a)	(volume =) 24 (cm^3) ; density = mass ÷ volume (in any form) **or** (density =) 64.8 ÷ 24 ; 2.7 (g / cm^3) ;	**3**	Correct answer on answer line = 3 marks **A ecf** substitution with incorrect volume clearly indicated by formula or calculation **A ecf** if incorrect volume used with working shown
10(b)(i)	reflected ray correct (by eye) ;	**1**	**A** any angle in the range 45–55° inclusive **I** arrow on line
10(b)(ii)	<u>normal</u> ;	**1**	
10(b)(iii)	angle *i* **and** angle *r* correctly indicated ;	**1**	**A ecf (b)(i)** if angle between ray and normal is indicated as *r* **R** if indicated angle extends to mirror **Note** angle indicated by use of arc
10(c)(i)	neutron changes / **AW** ; into proton and electron ;	**2**	**I** nucleus loses neutrons **A** β–particle for electron
10(c)(ii)	*idea that* 540 ÷ 135 = 4 **or** 4 half lives **or** 0.1 × ½ × ½ × ½ × ½ ; 0.0063 (g) ;	**2**	Correct answer on answer line = 2 marks **A** 0.00625 / 6.25×10^{-3}

Question	Answer	Marks	Guidance
11(a)(i)	C ;	**1**	
11(a)(ii)	D ;	**1**	
11(a)(iii)	zero ; (no resultant force when) speed is constant ;	**2**	**A** 0 **A** forces are balanced / forces are equal (in size) **and** opposite (in direction) / B is equal to D **I** forces cancel each other out / forces in equilibrium

Question	Answer	Marks	Guidance
11(a)(iv)	work done = force × distance (in any form) **or** (work done =) 150 × 40 ; 6 000 (J) ;	**2**	correct answer on answer line = 2 marks
11(b)	moment = force × (perpendicular) distance (in any form) **or** (moment =) 25 × 0.7 ; 17.5 ; Nm ;	**3**	correct answer on answer line = 2 marks **R** N / m

Question	Answer	Marks	Guidance
12(a)	visible light infrared / IR ultraviolet / UV ; ; one or two correct = 1 mark three correct = 2 marks	**2**	in any order **A** visible for visible light **I** light unqualified
12(b)(i)	letter A drawn between t = 60 and t = 80 ;	**1**	**A** label at 60 s
12(b)(ii)	evidence of use of area under graph / base × height / distance is area under graph ; 1 800 (m) ;	**2**	correct answer on answer line = 2 marks **Note** alternative method: distance = speed × time (in any form) **or** (distance =) 30 × 60 ; 1 800 (m) ;
12(c)	electrons ;	**1**	**I** negative (charges)
12(d)(i)	V = I × R (in any form) **or** (current =) 12 ÷ 4 ; 3.0 (A)	**2**	correct answer on answer line = 2 marks **I** V = A × R **A** 3

Question	Answer	Marks	Guidance
12(d)(ii)	if one lamp stops working the other can still operate ;	1	**A** both lamps get full voltage / both lamps are dimmer in series **A** can switch them off / on independently **I** both lamps get same current