Penrith High School

Year 12
Half Yearly Examination
2013

Biology

The Exam Paper must be submitted at the end of the examination.

STUDENT'S NAME: _____

Part A – Instructions for Multiple Choice Questions

Use the multiple-choice answer sheet provided.

Select the alternative A, B, C or D that best answers the question.
Fill in the response oval completely.

Example   2 + 4 = ?

(A) 2   (B) 6   (C) 8   (D) 9

(A) ⬭   (B) ⬤   (C) ⬭   (D) ⬭

If you think you have made a mistake, put a cross through the incorrect answer and fill in the new answer.

(A) ⬤   (B) ⊗   (C) ⬭   (D) ⬭

If you change your mind and have crossed out what you consider to be the correct answer, then indicate this by writing the word 'correct' and drawing an arrow as follows:

⊗   correct   ⬭   ⬭

(A)   (B) ⊗   (C)   (D)

Total marks (10)
Attempt Questions 1 – 10
Allow about 20 minutes for this Part

Answer Sheet

Part A

1. (A) ◯   (B) ◯   (C) ◯   (D) ◯

2. (A) ◯   (B) ◯   (C) ◯   (D) ◯

3. (A) ◯   (B) ◯   (C) ◯   (D) ◯

4. (A) ◯   (B) ◯   (C) ◯   (D) ◯

5. (A) ◯   (B) ◯   (C) ◯   (D) ◯

6. (A) ◯   (B) ◯   (C) ◯   (D) ◯

7. (A) ◯   (B) ◯   (C) ◯   (D) ◯

8. (A) ◯   (B) ◯   (C) ◯   (D) ◯

9. (A) ◯   (B) ◯   (C) ◯   (D) ◯

10. (A) ◯   (B) ◯   (C) ◯   (D) ◯

Students may detach this sheet. However, it is the student's responsibility to re-staple it to the examination paper and to write a name on it.

Marks cannot be awarded should the sheet be lost.

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Section I Part A : Ten 1 - Mark Multiple Choice Questions

1 Which of the following are all forms of defence that prevent the entry of pathogens into the body?

(A) Cilia, sweat, saliva

(B) T cells, B cells, antibodies

(C) Inflammation, skin, phagocytosis

(D) Stomach acid, mucus, lymph system

2 *Huntington's Disease* is caused by an inherited gene that codes for a toxic protein.

Kwashiorkor is a disease caused by a deficiency of proteins in the body.

Mesothelioma is a disease caused by a gene mutation in the lungs after exposure to asbestos.

Which row in the table correctly classifies these diseases?

	Huntington's Disease	*Kwashiorkor*	*Mesothelioma*
(A)	Genetic	Nutritional	Environmental
(B)	Nutritional	Environmental	Environmental
(C)	Genetic	Nutritional	Genetic
(D)	Nutritional	Environmental	Genetic

3 Why is it important to continue research into new antibiotics?

(A) New prion diseases have been recently discovered.

(B) Resistant bacteria have evolved from the overuse of antibiotics.

(C) Viral infections require a broad range of antibiotics for eradication.

(D) New diseases are discovered regularly and all require new antibiotics.

4 What feature of prions distinguishes them from all other types of pathogens?

(A) Prions are not cells.

(B) Prions do not contain DNA.

(C) Prions do not contain nucleic acids.

(D) Prions cannot reproduce outside a host cell.

5 Koch contributed to an understanding of disease by developing

(A) a method to link a particular pathogen to the cause of a disease.

(B) an experiment that disproved the theory of spontaneous generation.

(C) a method of killing microbes by heating and thus preventing decay.

(D) an immunisation program based on a knowledge of immune responses.

6 Students performed an investigation to compare the effectiveness of two water treatments for purifying pond water.

Three samples of pond water, *A*, *B* and *C,* were collected and each used to inoculate an agar plate. The plates were incubated at 25°C and examined three days later. The number of visible bacterial colonies on each plate was counted and the results tabulated.

Sample	A	B	C
Treatment	5g of pool chlorine per litre of water	Boiling for 1 minute	No treatment
Number of visible colonies	0	6	22

What is the dependent variable in this investigation?

(A) The use of a control sample

(B) The number of visible bacterial colonies

(C) The use of sterile agar plates for each sample

(D) Treating the water by boiling or adding pool chlorine

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7 At the end of a marathon race a runner's body is dehydrated.

How does the body control the two hormones, ADH and aldosterone, to help to re-establish normal water balance?

(A) ADH is released and aldosterone is inhibited.

(B) ADH is inhibited and aldosterone is released.

(C) Both ADH and aldosterone are released.

(D) Both ADH and aldosterone are inhibited.

8 Which substance is mainly bound to proteins when it is carried in mammalian blood?
(A) Nitrogenous waste
(B) Carbon dioxide
(C) Lipid
(D) Salt

9 How does a plant respond in order to keep cool on an extremely hot day?

(A) It grows smaller leaves.

(B) It opens stomata in the leaves.

(C) It grows more hairs on the surface of the leaves.

(D) It decreases the number of stomata on the top of the leaves.

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10 The movement of materials through a plant occurs by translocation and the transpiration stream.

What is the main difference between these mechanisms?

(A) Translocation occurs in endotherms, while the transpiration stream occurs in ectotherms.

(B) Translocation occurs in xylem tissue, while the transpiration stream occurs in phloem tissue.

(C) Translocation involves active transport, while the transpiration stream involves passive transport.

(D) Translocation transports respiration products, while the transpiration stream transports photosynthetic products.

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Part B – Free Response Questions : Answer All Questions

11 a) Outline the steps you would follow in a first-hand investigation of

the types of organisms found in a sample of water.   2marks

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 b) Describe **ONE** possible risk in this investigation and **ONE** precaution necessary to

maintain safety.

                                                                     2marks

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12 Complete the following table.

PATHOGEN	Distinguishing characteristic of the pathogen	Disease caused by this type of pathogen
Bacteria		
Fungus		
Protozoa		

13 A new product has been developed to kill pathogens in drinking water.

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a) Design an experiment to test the effectiveness of the new product.

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4marks

b) Justify the validity of this investigation plan.

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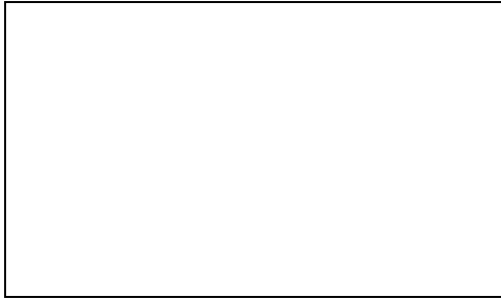
14 a) Name a blood product extracted from donated blood and outline how it could be used to restore normal body function.

3marks

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b) Propose TWO reasons why research is needed to develop alternatives to donated blood.

2marks

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15 Draw a diagram of a mammalian kidney.

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a) On your drawing, label THREE regions involved in the excretion of waste products AND

indicate the main process that occurs in each of the three regions.

6marks

b) Predict the likely effect on kidney function if ADH secretion was to stop in a mammal's

kidneys.

2marks

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16 A student working in a restaurant is required to wear disposable gloves and hat when preparing food.

a) Explain how the practice assists in the control of disease.   3marks

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b) Identify another hygiene practice the reduces the risk of infection.

1mark

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17 An experiment was conducted to determine the effects on body function of increasing ambient temperature. Participants (100 individuals) were asked to lie down and remain as still as possible during the entire experiment. The following observations were made:

• The starting temperature of the room was 22°C.

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•   The mean body temperature of all participants at the start of the experiment was 37.1°C.

•   As the room temperature increased, sweating and heart rate also increased.

•   As the room temperature returned to 22°C, sweating and heart rate returned to normal.

In a control group of 100 participants who were lying down in a room where the ambient temperature was maintained at 22°C no changes in sweating and heart rate were observed.

a) Identify the dependent and independent variables in this investigation.   2marks

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b) Identify the body system that monitors and responds to changes in external temperature.   1mark

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c) Draw and label a model of a feedback mechanism that explains the observations made in the experiment.   4marks

| Year	Effectiveness of drug (%)	
	Mefloquinine	Quinine
1976	100	90
1978	100	85
1980	100	80
1984	100	72
1988	90	64
1992	70	58

18 The following data were recorded about the effectiveness of anti-malarial drugs for treating malaria.

Year	Effectiveness of drug (%)	
	Mefloquinine	Quinine
1976	100	90
1978	100	85
1980	100	80
1984	100	72
1988	90	64
1992	70	58

a) Graph the data on the grid on the following page.

4marks

Graph the data on the grid.
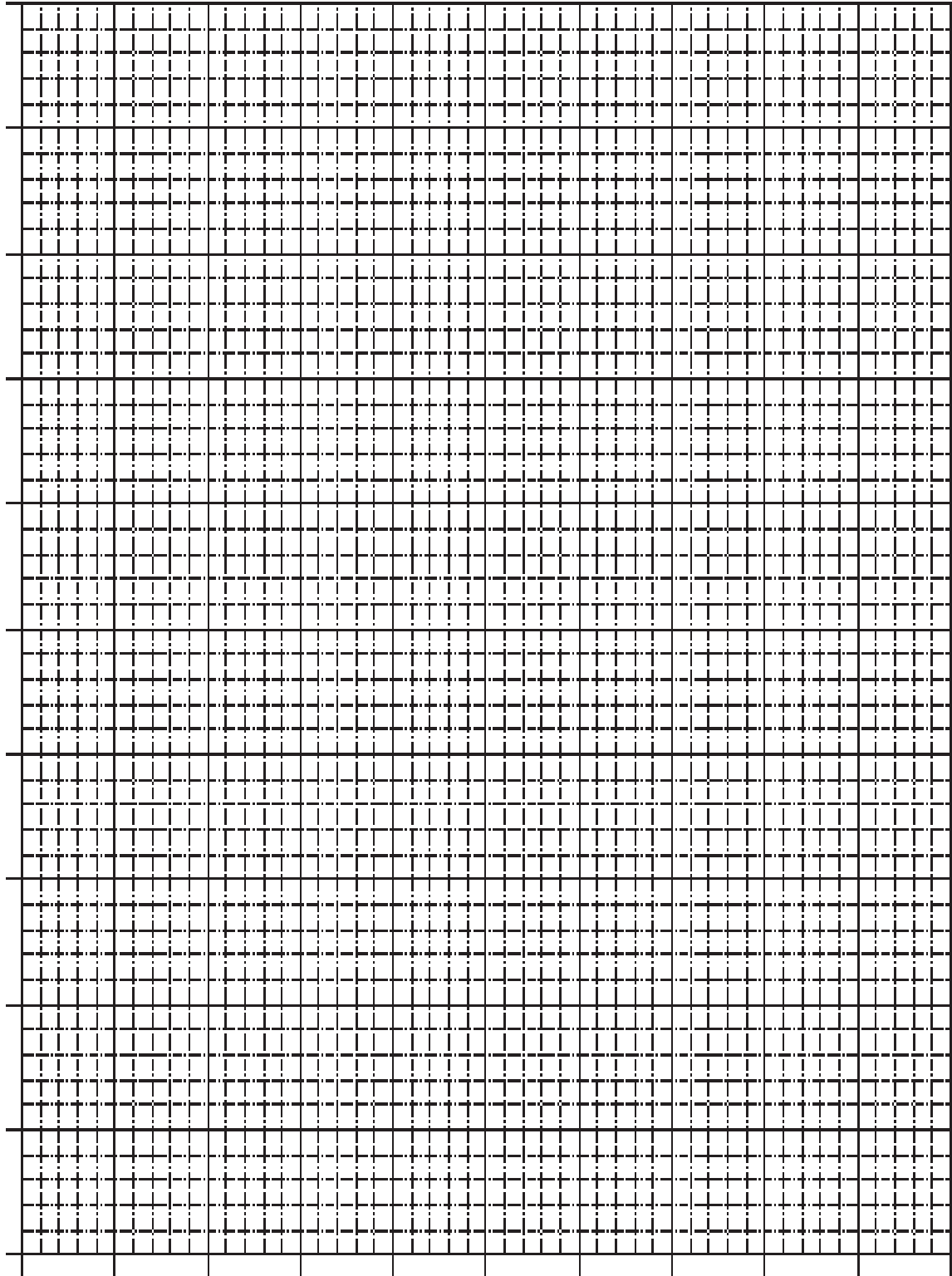
b) Use these data to explain the impact of human processes on biodiversity.   3marks

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19 A fisherman pricked his finger on a fish hook. Soon after he noticed that the injured

finger was red and swollen. Some time later he felt a throbbing sensation in his arm.

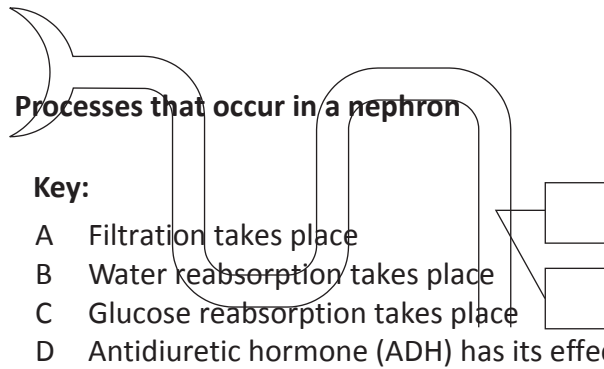His doctor prescribed a course of antibiotics.

a) Identify TWO defence adaptations used by the body in response to the injury.   2marks

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b) Describe the role of the antibiotics in the management of this injury.   2marks

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20 A diagram of a nephron is shown.

Processes that occur in a nephron

Key:

A   Filtration takes place
B   Water reabsorption takes place
C   Glucose reabsorption takes place
D   Antidiuretic hormone (ADH) has its effect

(a) Label each of the two boxes on the diagram using A, B, C or D to identify the processes that take place at this location.   2marks

(b) Which one of the above processes (A, B, C or D) occurs due to active transport?   1mark

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(c) Outline the effect of aldosterone on the control of body fluids.   3marks

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End of Exam

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Physics

DATA SHEET

Charge on the electron, q_e	-1.602×10^{-19} C
Mass of electron, m_e	9.109×10^{-31} kg
Mass of neutron, m_n	1.675×10^{-27} kg
Mass of proton, m_p	1.673×10^{-27} kg
Speed of sound in air	340 ms^{-1}
Earth's gravitational acceleration, g	9.8 ms^{-2}
Speed of light, c	3.00×10^{8} m s^{-1}
Magnetic force constant, $\left(k \equiv \dfrac{\mu_0}{2\pi} \right)$	2.0×10^{-7} N A^{-2}
Universal gravitational constant, G	6.67×10^{-11} N m^2 kg^{-2}
Mass of Earth	6.0×10^{24} kg
Planck's constant, h	6.626×10^{-34} J s
Rydberg's constant, R_H	1.097×10^{7} m^{-1}
Atomic mass unit, u	1.661×10^{-27} kg
	931.5 MeV/c^2
1 eV	1.602×10^{-19} J
Density of water, ρ	1.00×10^{3} kg m^{-3}
Specific heat capacity of water	4.18×10^{3} J kg^{-1} K^{-1}

FORMULAE SHEET

$$c = f\lambda$$

$$\text{Intensity} \propto \frac{1}{d^2}$$

$$\frac{v_1}{v_2} = \frac{\sin i}{\sin r}$$

$$E = \frac{F}{q}$$

$$R = \frac{V}{I}$$

$$P = VI$$

$$\text{Energy} = VIt$$

$$v_{av} = \frac{\Delta s}{\Delta t}$$

$$a_{av} = \frac{\Delta v}{\Delta t} = \frac{v - u}{t}$$

$$\Sigma F = ma$$

$$E_k = \tfrac{1}{2}mv^2$$

$$p = mv$$

$$\Delta p = Ft$$

$$F = \frac{mv^2}{r}$$

$$F = -\frac{Gm_1 m_2}{r^2}$$

$$\frac{r^3}{T^2} = \frac{GM}{4\pi^2}$$

$$m_1 + m_2 = \frac{4\pi^2 r^3}{GT^2}$$

$$M = m - 5\log\left(\frac{d}{10}\right)$$

$$\frac{I_A}{I_B} = 100^{(m_B - m_A)/5}$$

$$d = \frac{1}{p}$$

$$F = BIl\sin\theta$$

$$\frac{F}{l} = k\frac{I_1 I_2}{d}$$

$$\tau = Fd$$

$$\tau = nBIA\cos\theta$$

$$\frac{V_p}{V_s} = \frac{n_p}{n_s}$$

FORMULAE SHEET

$$F = qvB\sin\theta$$

$$T = 2\pi\sqrt{\frac{l}{g}}$$

$$E = \frac{V}{d}$$

$$E = hf$$

$$E_p = -\frac{Gm_1 m_2}{r}$$

$$v = u + at$$

$$Z = \rho v$$

$$v_x^2 = u_x^2$$

$$v_y^2 = u_y^2 + 2a_y\Delta y$$

$$\frac{I_r}{I_0} = \frac{\left[Z_2 - Z_1\right]^2}{\left[Z_2 + Z_1\right]^2}$$

$$\Delta x = u_x t$$

$$\Delta y = u_y t + \tfrac{1}{2} a_y t^2$$

$$\frac{1}{\lambda} = R_H\left(\frac{1}{n_f^2} - \frac{1}{n_i^2}\right)$$

$$\frac{s}{t} = \frac{u+v}{2}$$

$$\lambda = \frac{h}{mv}$$

$$l_v = l_0\sqrt{1 - \frac{v^2}{c^2}}$$

$$\text{Amplifier gain} = \frac{V_{out}}{V_{in}}$$

$$t_v = \frac{t_0}{\sqrt{1 - \frac{v^2}{c^2}}}$$

$$A_0 = \frac{V_0}{V_+ - V_-}$$

PERIODIC TABLE OF THE ELEMENTS

KEY

79	Symbol of element
Au	Atomic Number
197.0	Atomic Weight
Gold	Name of element

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 H 1.008 Hydrogen																	2 He 4.003 Helium
3 Li 6.941 Lithium	4 Be 9.012 Beryllium											5 B 10.81 Boron	6 C 12.01 Carbon	7 N 14.01 Nitrogen	8 O 16.00 Oxygen	9 F 19.00 Fluorine	10 Ne 20.18 Neon
11 Na 22.99 Sodium	12 Mg 24.31 Magnesium											13 Al 26.98 Aluminium	14 Si 28.09 Silicon	15 P 30.97 Phosphorus	16 S 32.07 Sulfur	17 Cl 35.45 Chlorine	18 Ar 39.95 Argon
19 K 39.10 Potassium	20 Ca 40.08 Calcium	21 Sc 44.96 Scandium	22 Ti 47.87 Titanium	23 V 50.94 Vanadium	24 Cr 52.00 Chromium	25 Mn 54.94 Manganese	26 Fe 55.85 Iron	27 Co 58.93 Cobalt	28 Ni 58.69 Nickel	29 Cu 63.55 Copper	30 Zn 65.39 Zinc	31 Ga 69.72 Gallium	32 Ge 72.61 Germanium	33 As 74.92 Arsenic	34 Se 78.96 Selenium	35 Br 79.90 Bromine	36 Kr 83.80 Krypton
37 Rb 85.47 Rubidium	38 Sr 87.62 Strontium	39 Y 88.91 Yttrium	40 Zr 91.22 Zirconium	41 Nb 92.91 Niobium	42 Mo 95.94 Molybdenum	43 Tc [98.91] Technetium	44 Ru 101.1 Ruthenium	45 Rh 102.9 Rhodium	46 Pd 106.4 Palladium	47 Ag 107.9 Silver	48 Cd 112.4 Cadmium	49 In 114.8 Indium	50 Sn 118.7 Tin	51 Sb 121.8 Antimony	52 Te 127.6 Tellurium	53 I 126.9 Iodine	54 Xe 131.3 Xenon
55 Cs 132.9 Caesium	56 Ba 137.3 Barium	57–71 Lanthanides	72 Hf 178.5 Hafnium	73 Ta 180.9 Tantalum	74 W 183.8 Tungsten	75 Re 186.2 Rhenium	76 Os 190.2 Osmium	77 Ir 192.2 Iridium	78 Pt 195.1 Platinum	79 Au 197.0 Gold	80 Hg 200.6 Mercury	81 Tl 204.4 Thallium	82 Pb 207.2 Lead	83 Bi 209.0 Bismuth	84 Po [210.0] Polonium	85 At [210.0] Astatine	86 Rn [222.0] Radon
87 Fr [223.0] Francium	88 Ra [226.0] Radium	89–103 Actinides	104 Rf [261.1] Rutherfordium	105 Db [262.1] Dubnium	106 Sg [263.1] Seaborgium	107 Bh [264.1] Bohrium	108 Hs [265.1] Hassium	109 Mt [268] Meitnerium	110 Uun — Ununnilium	111 Uuu — Unununium	112 Uub — Ununbium	113	114 Uuq — Ununquadium	115	116 Uuh — Ununhexium	117	118 Uuo — Ununoctium

Lanthanides

57 La 138.9 Lanthanum	58 Ce 140.1 Cerium	59 Pr 140.9 Praseodymium	60 Nd 144.2 Neodymium	61 Pm [146.9] Promethium	62 Sm 150.4 Samarium	63 Eu 152.0 Europium	64 Gd 157.3 Gadolinium	65 Tb 158.9 Terbium	66 Dy 162.5 Dysprosium	67 Ho 164.9 Holmium	68 Er 167.3 Erbium	69 Tm 168.9 Thulium	70 Yb 173.0 Ytterbium	71 Lu 175.0 Lutetium

Actinides

89 Ac [227.0] Actinium	90 Th 232.0 Thorium	91 Pa 231.0 Protactinium	92 U 238.0 Uranium	93 Np [237.0] Neptunium	94 Pu [239.1] Plutonium	95 Am [241.1] Americium	96 Cm [244.1] Curium	97 Bk [249.1] Berkelium	98 Cf [252.1] Californium	99 Es [252.1] Einsteinium	100 Fm [257.1] Fermium	101 Md [258.1] Mendelevium	102 No [259.1] Nobelium	103 Lr [262.1] Lawrencium

Where the atomic weight is not known, the relative atomic mass of the most common radioactive isotope is shown in brackets.
The atomic weights of Np and Tc are given for the isotopes ^{237}Np and ^{99}Tc.

Definitions of Verbs

Account	Account for: state reasons for, report on *Give an account of:* narrate a series of events or transactions
Analyse	Identify components and the relationship among them; draw out and relate implications
Apply	Use, utilise, employ to a particular situation
Appreciate	Make a judgement about the value of
Assess	Make a judgment of value, quality, outcomes, results or size
Calculate	Ascertain/determine from given facts, figures or information
Clarify	Make clear or plain
Classify	Arrange or include in classes/categories
Compare	Show how things are similar or different
Construct	Make; build; put together items or arguments
Contrast	Show how things are different or opposite
Critically (analyse/evaluate)	Add a degree or level of accuracy depth, knowledge and understanding, logic, questioning, reflection and quality to (analysis/evaluation)
Deduce	Draw conclusions
Define	State meaning and identify essential qualities
Demonstrate	Show by example
Describe	Provide characteristics and features
Discuss	Identify issues and provide points for and/or against
Distinguish	Recognise or note/indicate as being distinct or different from; to note differences between
Evaluate	Make a judgement based on criteria; determine the value of
Examine	Inquire into
Explain	Relate cause and effect; make the relationships between things evident; provide why and/or how
Extract	Choose relevant and/or appropriate details
Extrapolate	Infer from what is known
Identify	Recognise and name
Interpret	Draw meaning from
Investigate	Plan, inquire into and draw conclusions about
Justify	Support an argument or conclusion
Outline	Sketch in general terms; indicate the main features of
Predict	Suggest what may happen based on available information
Propose	Put forward (for example a point of view, idea, argument, suggestion) for consideration or action
Recall	Present remembered ideas, facts or experiences
Recommend	Provide reasons in favour
Recount	Retell a series of events
Summarise	Express concisely the relevant details