

BIOLOGY

0610 | Paper 4

2017 — 2025

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1 - (0610/42_Summer_2017_Q6)

ANSWER

Fig. 6.1 is a flow diagram that shows what happens at the start of a bacterial infection.

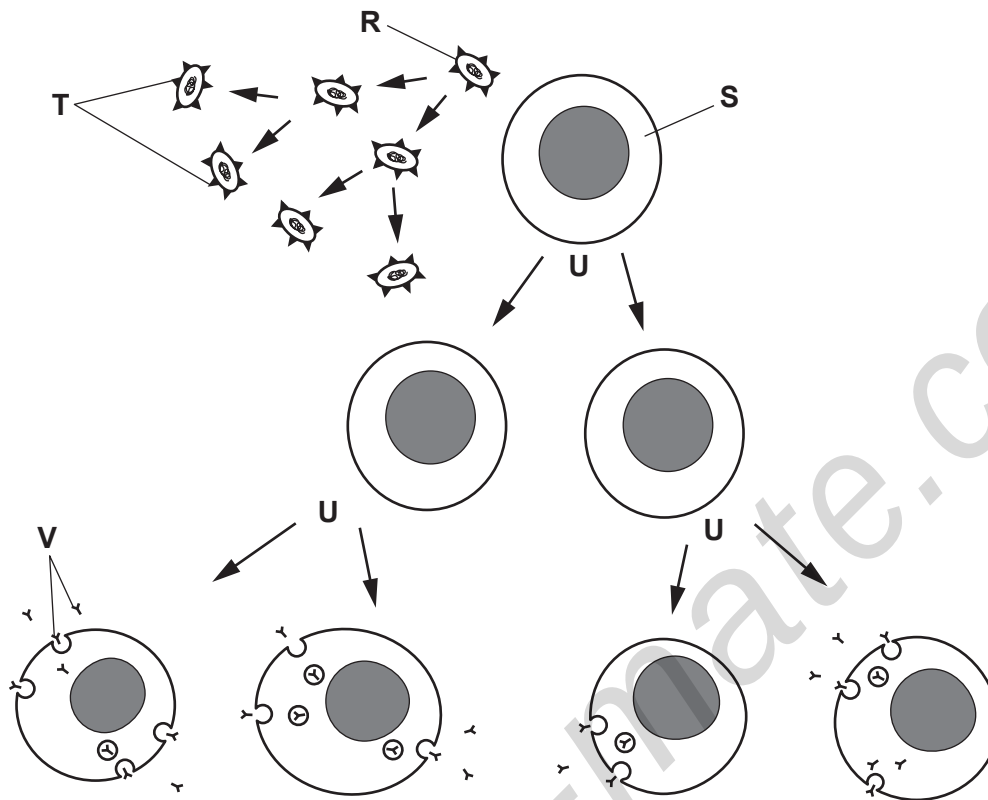


Fig. 6.1

(a) Cell **R** is a prokaryote and cell **S** is a lymphocyte.

- (i) State the names of **two** cellular structures that would be found in **both** prokaryotes and white blood cells.

1

2 [2]

- (ii) Describe how the cellular structure of white blood cells differs from the cellular structure of prokaryotes.

.....

 [3]

- (b) Cell **R** is a pathogen that has structures **T** on its surface. These structures are recognised by cell **S**. Cell **S** is a lymphocyte and it produces structures **V**. Cell **R** reproduces by binary fission and cell **S** divides by process **U**.

Identify **T** to **V** from the passage and Fig. 6.1.

T

U

V

[3]

- (c) Cell **W** in Fig. 6.2 also responds to pathogens.

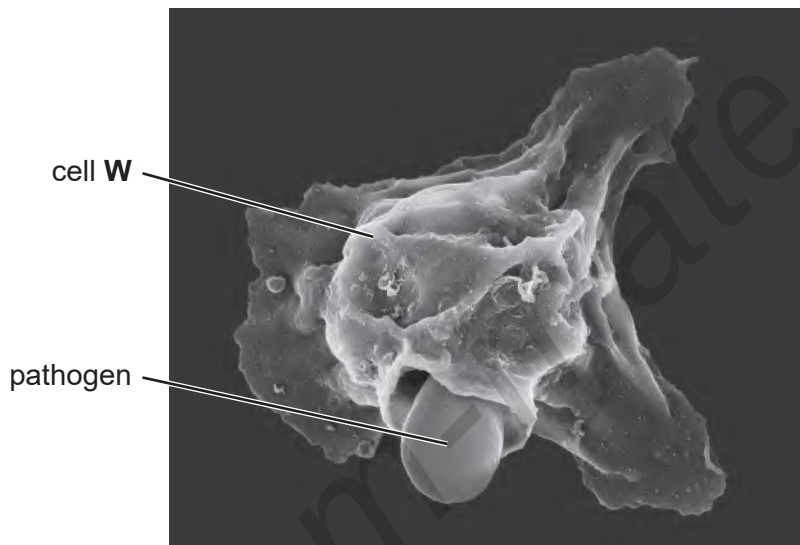


Fig. 6.2

- (i) State the name of the process shown in Fig. 6.2.

.....[1]

- (ii) Describe what happens to the pathogen during the process shown in Fig. 6.2.

.....
.....
.....[1]

Fig. 6.3 shows some human teeth that require dental treatment.



Fig. 6.3

(d) (i) Identify the type of teeth in Fig. 6.3.

.....[1]

(ii) Explain how bacteria dissolve enamel to cause tooth decay.

.....
.....
.....
.....
.....[2]

(e) Describe **two** ways of preventing tooth decay.

.....
.....
.....
.....[2]

[Total: 15]

2 - (0610/43_Summer_2017_Q4)

ANSWER

Fig. 4.1 is a photograph of a yellow-shouldered Amazon, *Amazona barbadensis*, a species of parrot found along the Venezuelan coast of the Caribbean.



Fig. 4.1

- (a) State the vertebrate group that includes *A. barbadensis* and give **two** features that are used to classify animals into this group.

vertebrate group

feature 1

feature 2

[2]

- (b) This species is subdivided into several populations on the mainland and on the islands of Margarita and Bonaire. Scientists believe that yellow-shouldered Amazons rarely travel between these places.

Explain what biologists mean when they refer to *populations* of animals, such as *A. barbadensis*.

.....
.....
.....
.....
.....
.....[3]

- (c) The number of yellow-shouldered Amazons on Margarita Island had decreased to 700 parrots by 1989. The population then increased to 1600 parrots by 2009.

Part of this increase was due to the release of captive-bred parrots on the island. This is one of the few successful release programmes of parrots. A similar release programme in Arizona in the 1980s of a different species of parrot was not successful.

Suggest why release programmes for captive-bred parrots were **not** successful.

.....

.....

.....

.....

.....[2]

- (d) Some captive breeding programmes involve very small numbers of animals.

Outline the disadvantages of such programmes.

.....

.....

.....

.....

.....

.....

.....[3]

[3]

3 - (0610/41_Winter_2017_Q6)**ANSWER**

Viruses can cause diseases.

(a) (i) State **two** other features of all viruses.

1

2

[2]

(ii) Describe how vaccination can prevent the spread of disease.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

[5]

(b) Fig. 6.1 shows four different viruses.

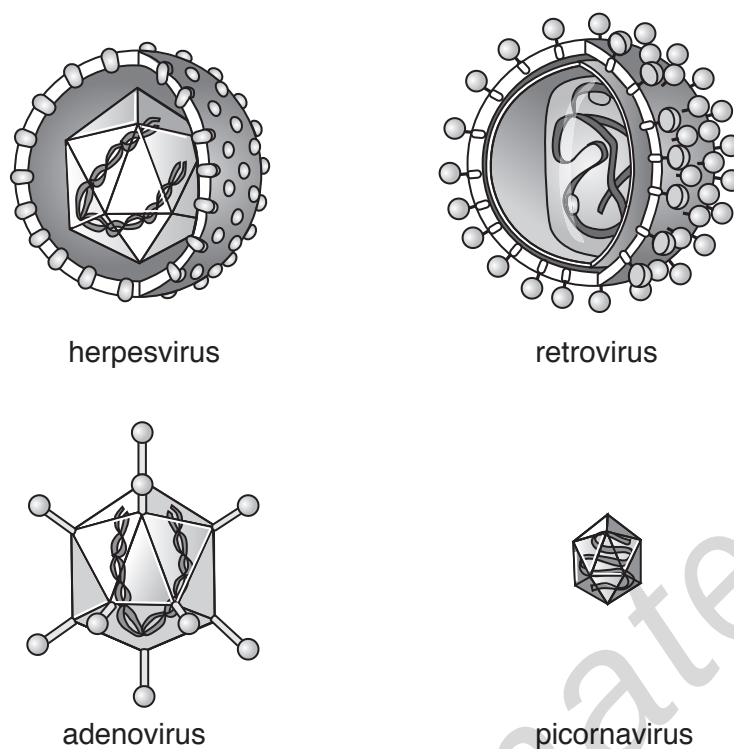


Fig. 6.1

Suggest **one** feature that could be used to classify viruses into groups.

.....
.....[1]

[Total: 8]

4 - (0610/42_Winter_2017_Q5)

ANSWER

Fig. 5.1 shows the bacterium *Helicobacter pylori*, which is a human pathogen.



Fig. 5.1

(a) State the genus of *Helicobacter pylori*.

.....[1]

(b) *H. pylori* is placed in the prokaryote kingdom.

State **two** structural features that *H. pylori* shares with other prokaryotes.

1

2[2]

(c) (i) *H. pylori* can cause infections in the stomach.

Suggest how this infection could be treated.

.....[1]

(ii) State **one** natural body defence that is found in the stomach.

.....[1]

ate.com

[4]

5 - (0610/43_Winter_2017_Q5)

The kingdom Fungi contains a great diversity of organisms including yeasts, moulds and mushrooms.

Like plants, fungi contain nuclei and mitochondria.

(a) (i) State the function of mitochondria.

.....
.....[2]

(ii) State **two** characteristics of fungi that are used to distinguish them from plants.

1
2
[2]

(b) Yeast is a single-celled fungus that is used in bread-making.

Explain why yeast is used in bread-making.

.....
.....
.....
.....
.....
.....
.....
.....[3]

(c) *Penicillium* is a mould fungus that is used to make antibiotics.

(i) Describe how *Penicillium* is used to make the antibiotic penicillin.

.....

.....

.....

.....

.....

.....

.....[3]

(ii) Explain why antibiotics can be used to treat bacterial infections but not viral infections.

.....

.....

.....[1]

(d) Some fungi are human pathogens.

Describe how the human body prevents pathogens from entering.

.....

.....

.....

.....

.....

.....

.....[3]

[Total: 14]

6 - (0610/42_Summer_2018_Q5)



Fig. 5.1 shows an adult fly, *Chrysomya megacephala*.



Fig. 5.1

- (a) State **three** visible features from Fig. 5.1 that could be used to distinguish adult insects from other arthropods.

1
2
3

[3]

- (b) Fly larvae are immature insects that are often used in experiments on respiration.

Give the balanced chemical equation for aerobic respiration.

..... [2]

(c) A respirometer is shown in Fig. 5.2. It can be used to estimate an organism's rate of respiration.

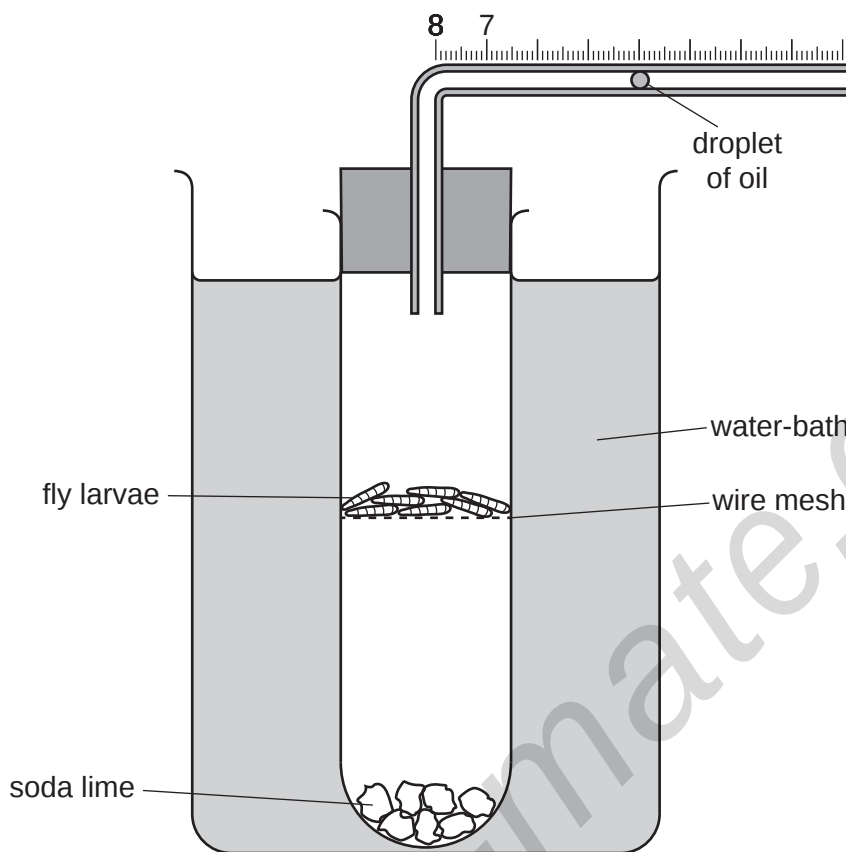


Fig. 5.2

(i) Complete the sentences:

A respirometer can be used to calculate the of oxygen used by the fly larvae by measuring the the droplet of oil moves in one minute. A water-bath is used to the temperature of the apparatus.

[3]

(ii) The soda lime in the respirometer absorbs carbon dioxide.

Explain why this is important in this investigation.

.....

 [1]

(iii) Fly larvae respire to release energy.

State **two** uses of energy in a fly larva.

1
 2 [2]

- (d) A student used a respirometer to investigate the effect of temperature on the rate of respiration of germinating seeds.

Predict the results of this investigation and explain your prediction.

prediction

.....

.....

explanation

.....

.....

.....

.....

.....

[4]

[Total: 15]

1 - (0610/42_Summer_2017_Q6)



(a)(i)	Cell membrane; DNA; ribosomes; cytoplasm ;	2																											
(a)(ii)	<table> <tr> <td></td><td><i>white blood cell (S)</i></td><td><i>prokaryote (R)</i></td></tr> <tr> <td>1</td><td>no cell wall</td><td>cell wall ;</td></tr> <tr> <td>2</td><td>(named) organelles</td><td>no (membrane-bound) organelles ;</td></tr> <tr> <td>3</td><td>nucleus</td><td>nucleoid / no nucleus ;</td></tr> <tr> <td>4</td><td>linear, chromosomes / DNA</td><td>loop of DNA / circular / naked, chromosome ;</td></tr> <tr> <td>5</td><td>large ribosomes</td><td>small ribosomes ;</td></tr> <tr> <td>6</td><td>no plasmids (in cytoplasm)</td><td>plasmids (in cytoplasm) ;</td></tr> <tr> <td>7</td><td>large</td><td>small ;</td></tr> <tr> <td>8</td><td>antibodies</td><td>no antibodies ;</td></tr> </table>		<i>white blood cell (S)</i>	<i>prokaryote (R)</i>	1	no cell wall	cell wall ;	2	(named) organelles	no (membrane-bound) organelles ;	3	nucleus	nucleoid / no nucleus ;	4	linear, chromosomes / DNA	loop of DNA / circular / naked, chromosome ;	5	large ribosomes	small ribosomes ;	6	no plasmids (in cytoplasm)	plasmids (in cytoplasm) ;	7	large	small ;	8	antibodies	no antibodies ;	3
	<i>white blood cell (S)</i>	<i>prokaryote (R)</i>																											
1	no cell wall	cell wall ;																											
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6	no plasmids (in cytoplasm)	plasmids (in cytoplasm) ;																											
7	large	small ;																											
8	antibodies	no antibodies ;																											
(b)(i)	T = antigen ; U = <u>mitosis</u> ; I cell division V = antibodies ;	3																											
(c)(i)	<u>phagocytosis</u> ;	1																											
(c)(ii)	(phagocyte) engulfs pathogen ; phagosome / vacuole, forms ; (enzymes) digest / breakdown / destroy, pathogen ; AVP ;	1																											
(d)(i)	incisors ;	1																											
(d)(ii)	bacteria use sugar / AW (on teeth as a food source) ; bacteria respire ; acid is produced ; AVP ;	2																											
(e)	regular brushing / mouthwash / flossing / wash / clean, teeth ; avoid sugary foods / diet described ; dental check-ups ; fluoride, toothpaste / in water ;	2																											

2 - (0610/43_Summer_2017_Q4)



(a)	birds / Aves ; <i>Any two features for max 1 ;</i> • feathers • beak / bill • hard-shelled eggs • scaly legs • no teeth • air sacs • light-weight skeletons • AVP	2
(b)	1 (isolated) group of individual animals / AW ; 2 of, one / the same, <u>species</u> ; 3 living in the same, habitat / ecosystem / environment / area / place / location ; 4 at the same time ;	3
(c)	1 killed by predators / not able to evade predators / new predators ; 2 not able to find food ; 3 more prone to disease / AW ; 4 poaching ; 5 ref to, low genetic variation ; 6 competition with new species ; 7 idea of no survival instinct /AW ; 8 AVP ; e.g. techniques not as advanced in 1980	2

(d)	1 inbreeding / described ; 2 less / little, (genetic) variation ; 3 reduced number of alleles ; 4 increased risk of <u>genetic</u> disease ; 5 cannot reproduce / sterile ; 6 not enough animals to breed ; 7 less likely to, adapt / to evolve to / cope with, (named) change in environment ; 8 cost ; 9 AVP ;;	3
(e)	1 to prevent extinction (of many species) / maintain (bio)diversity ; 2 ref to preventing disruption of food, chains / web ; 3 provide, habitats (for shelter / breeding grounds / AW) for many species ; 4 and 5 ecosystems provide, 'service', for humans ; ; 6 idea of areas for, recreation / (eco)tourism / education ; 7 ethical reasons / aesthetic reasons / AW ;	3

3 - (0610/41_Winter_2017_Q6)

(a)(i)	genetic material ; protein coat ; parasitic / pathogenic ; only reproduce in a host / do not show (other) features of living organisms / AW ; very small ; they are not cellular / absence of named organelle; AVP ; cannot be killed / cannot be treated, with antibiotics.	2
(a)(ii)	active immunity ; harmless / dead / weakened / attenuated pathogen / microorganisms ; injected / ingested ; ref. to antigens ; (antigen) triggers antibody production ; by lymphocytes ; memory cells (are produced) ; rapid response to reinfection ; long-term immunity ; prevention of spread person to person e.g. no host for pathogen / herd ref to programmes of mass vaccination ; AVP ;	5
(b)	shape / size / AW ; genetic material (sequence / type) ; host species / type of disease it causes ; AVP ;	1

4 - (0610/42_Winter_2017_Q5)



(a)	<i>Helicobacter</i> ;	1
(b)	circular DNA / chromosome ; plasmid(s) ; cell membrane ; cell wall (not made of cellulose) ; cytoplasm ; capsule ; (small) ribosomes ; flagella ; AVP ;	2
(c)(i)	antibiotic(s) ;	1
(c)(ii)	(stomach / hydrochloric / gastric) acid / HCl / mucus ;	1
(d)	<i>active immunity</i> 1 exposure to <u>antigen</u> ; ora 2 after, infection by pathogen / vaccination ; 3 immune response occurs / antibodies produced ; <i>passive immunity</i> 4 <u>antibodies</u> acquired from another individual ; 5 e.g. by breast milk / injection of antibodies ; 6 active is, permanent / long-term (immunity) ; ora 7 ref to memory cells, in active / not in passive ; 8 response is slow on first exposure in active ; ora	4

5 - (0610/43_Winter_2017_Q5)



(a)(i)	respiration ; aerobic (respiration) ; release energy / make ATP ;	2
(a)(ii)	different composition of cell wall ; no, chlorophyll / chloroplasts / heterotrophic ; extracellular digestion / saprophytic / decomposer / AW ; hyphae / mycelium ; no (central) vacuole ; AVP ;	2
(b)	respiration / fermentation ; carbon dioxide released ; (bubbles / carbon dioxide) causes, dough / bread, to rise ; (yeast produces) enzymes ; enzymes / amylase, digest starch ; AVP ;	3
(c)(i)	(fungus) grown / put, in fermenters ; aerobic conditions / AW ; (provide) sugars / nitrogen source / nutrients ; purification / filtration, of product / penicillin ; batch culture / AW ; sterile conditions ; AVP ;	3
(c)(ii)	bacteria are made of cells ; ora	1
(d)	mechanical barriers ; example of mechanical barriers ;; chemical barriers ; example of chemical barriers ;; blood clotting ;	3

6 - (0610/42_Summer_2018_Q5)



(a)	three pairs of legs ; three (named) body segments ; wings ; (pair of) antennae ; <u>compound</u> eyes ;	3	
(b)	$6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O}$ (+ energy released) ;;	2	one mark for correct symbols one mark for correct balancing
(c)(i)	volume ; distance / length ; control / maintain / regulate / stabilise / keep / constant / sustain ;	3	
(c)(ii)	carbon dioxide will affect, results / volume of gas (in respirometer) / carbon dioxide could kill the larvae ;	1	A to measure (changes in) oxygen only
(c)(iii)	growth / development ; active transport ; protein synthesis ; cell division / mitosis ; passage of nerve impulses ; muscle contraction ; AVP ; e.g. metabolism / (description of) metamorphosis	2	A movement / breathe / egestion / digestion / excretion
(d)	<i>prediction</i> as temperature increases the respiration rate will increase ; ora and then decrease ; <i>explanation:</i> there will be an <u>optimum</u> temperature (at a particular temperature) for seed germination ; <i>ref to</i> (respiratory / germination) <u>enzymes</u> ; at high temperatures enzymes denature / described ; at low temperatures not enough (kinetic) energy for, effective collisions / biochemical reactions / respiration / digestion ; ora AVP ;	4	max 3 for explanation e.g. temperature will also affect the gas pressure in the respirometer

7 - (0610/41_Summer_2019_Q1)



(a)	(group of) organisms that can reproduce ; to produce fertile offspring ;	2	
(b)	pinna(e) / external ears ; mammary glands / milk glands / production of milk / lactating / suckling / breast feeding / nipples / AW ; diaphragm ; (three) <u>bones</u> in the middle ear ; (four) different types of teeth / two sets of teeth ; sweat glands ; enucleated red blood cells ; uterus / placenta / navel / AW ; AVP ;	2	
(c)	select, parent(s) / sheep / AW, with, fine / thin, hairs (in wool) OR use Merino sheep from South Africa and NZ sheep ; cross them together / use artificial insemination / IVF / AW ; measure / AW, the hairs in the wool of all the offspring ; select offspring with, fine / thin, hairs (in wool) ; cross / AW, offspring together ; continue / repeat, selection and/or breeding ; over many generations ; AVP ;	5	max 4 if no reference to quality of wool
(d)	features are, adaptive / adaptations (for environment) ; caused by / AW, the, environment / surroundings ; competition between individuals for (named) resource(s) ; reference to named selective agent(s) ; slow(er) ; increase in fitness ; explained: ability to survive AND reproduce (in natural environment) ; maintains (genetic) variation / less (genetic) variation in selective breeding ; random mating ;	3	