

SCIENCE COORDINATE

0654 | Paper 6

2017 — 2023

Chapter 1 - BIOLOGY

Page 1

CH 1 - B1. Characteristics Of Living Organisms

CH 2 - B2. Cells

CH 3 - B3. Biological Molecules

CH 4 - B4. Enzymes

CH 5 - B5. Plant Nutrition

CH 6 - B6. Animal Nutrition

CH 7 - B7. Transport

CH 8 - B8. Gas Exchange And Respiration

CH 9 - B9. Coordination And Response

CH 10 - B10. Reproduction

CH 11 - B11. Inheritance

CH 12 - B12. Organisms And Their Environment

CH 13 - B13. Human Influences On Ecosystems

Chapter 2 - CHEMISTRY

Page 253

CH 14 - C1. The Particulate Nature Of Matter

CH 15 - C2. Experimental Techniques

CH 16 - C3. Atoms, Elements And Compounds

CH 17 - C4. Stoichiometry

CH 18 - C5. Electricity And Chemistry

CH 19 - C6. Energy Changes In Chemical Reactions

CH 20 - C7. Chemical Reactions

CH 21 - C8. Acids, Bases And Salts

CH 22 - C9. The Periodic Table

CH 23 - C10. Metals

CH 24 - C11. Air And Water

CH 25 - C12. Sulfur

CH 26 - C13. Carbonates

CH 27 - C14. Organic Chemistry

Chapter 3 - PHYSICS

Page 543

CH 28 - P1. Motion

CH 29 - P2. Work, Energy And Power

CH 30 - P3. Thermal Physics

CH 31 - P4. Properties Of Waves, Including Light And Sound

CH 32 - P5. Electricity And Magnetism

CH 33 - P6. Electric Circuits

CH 34 - P7. Electromagnetic Effects

CH 35 - P8. Atomic Physics

ANSWERS

Page 851

1 - (0654/61_Summer_2019_Q1) - B1. Characteristics Of Living Organisms

A student investigates the loss of body heat from an adult animal and from a baby animal, by using a large test-tube and a small test-tube to represent the animals.

(a) (i) Read through part (a)(ii) and complete the heading of the first column of Table 1.1, including units. [1]

(ii) • He fills each test-tube with hot water as shown in Fig. 1.1, and immediately reads and records the temperature of the water to the nearest 0.5°C in each test-tube for time = 0.

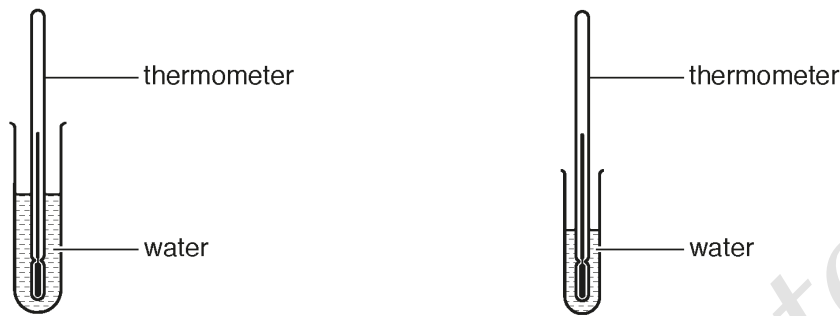


Fig. 1.1

- He starts a stopclock.
- He reads and records the temperatures of the water to the nearest 0.5°C in each test-tube every minute, for 5 minutes.
- Some of his results are shown in Table 1.1.

Table 1.1

..... /	Temperature of water in large test-tube/°C	Temperature of water in small test-tube/°C
0	80.0	78.0
1	69.0	64.5
2	61.5	56.0
3	55.0	50.0
4		
5	47.5	44.0

Use the thermometer diagrams in Fig. 1.2 to read the missing temperature values for each test-tube after 4 minutes, and record these in Table 1.1.

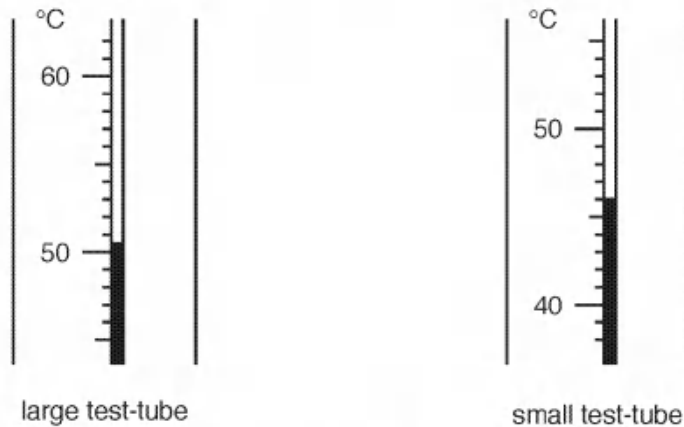


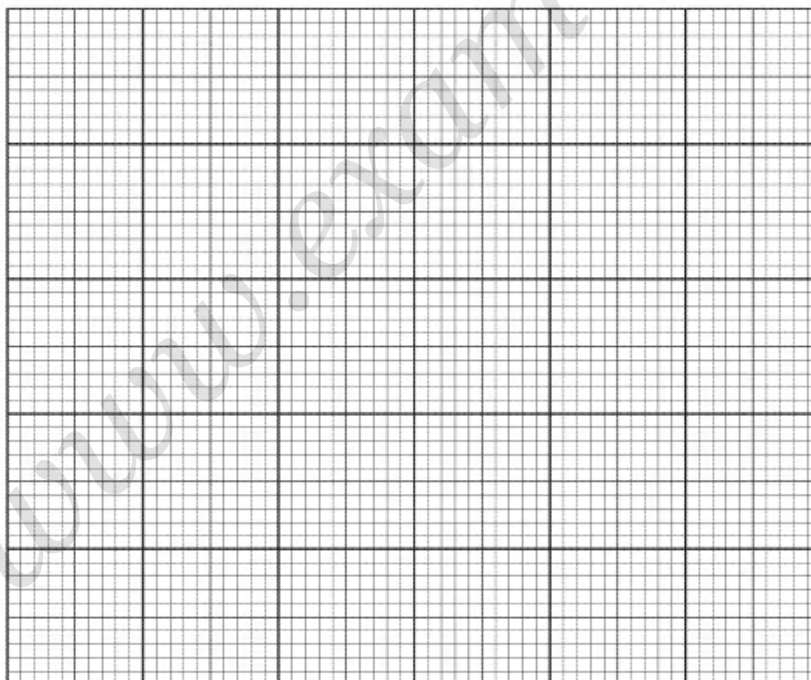
Fig. 1.2

[2]

- (b) (i) On the grid provided, draw and label the axes for a graph of temperature (vertical axis) against time.

Choose a scale for the temperature axis suitable to plot all the data in Table 1.1. [2]

- (ii)
- Plot the points for the large test-tube.
 - Draw the smooth curve of best fit and label the line L.
 - Using the same axes, plot the points for the small test-tube.
 - Draw the smooth curve of best fit for the small test-tube and label the line S.



[2]

(c) (i) Use the results in Table 1.1 to calculate the drop in temperature of the water over 5 minutes for each test-tube.

large test-tube =°C

small test-tube =°C

[1]

(ii) State and explain what the graphs show about the rate of heat loss from the test-tubes.

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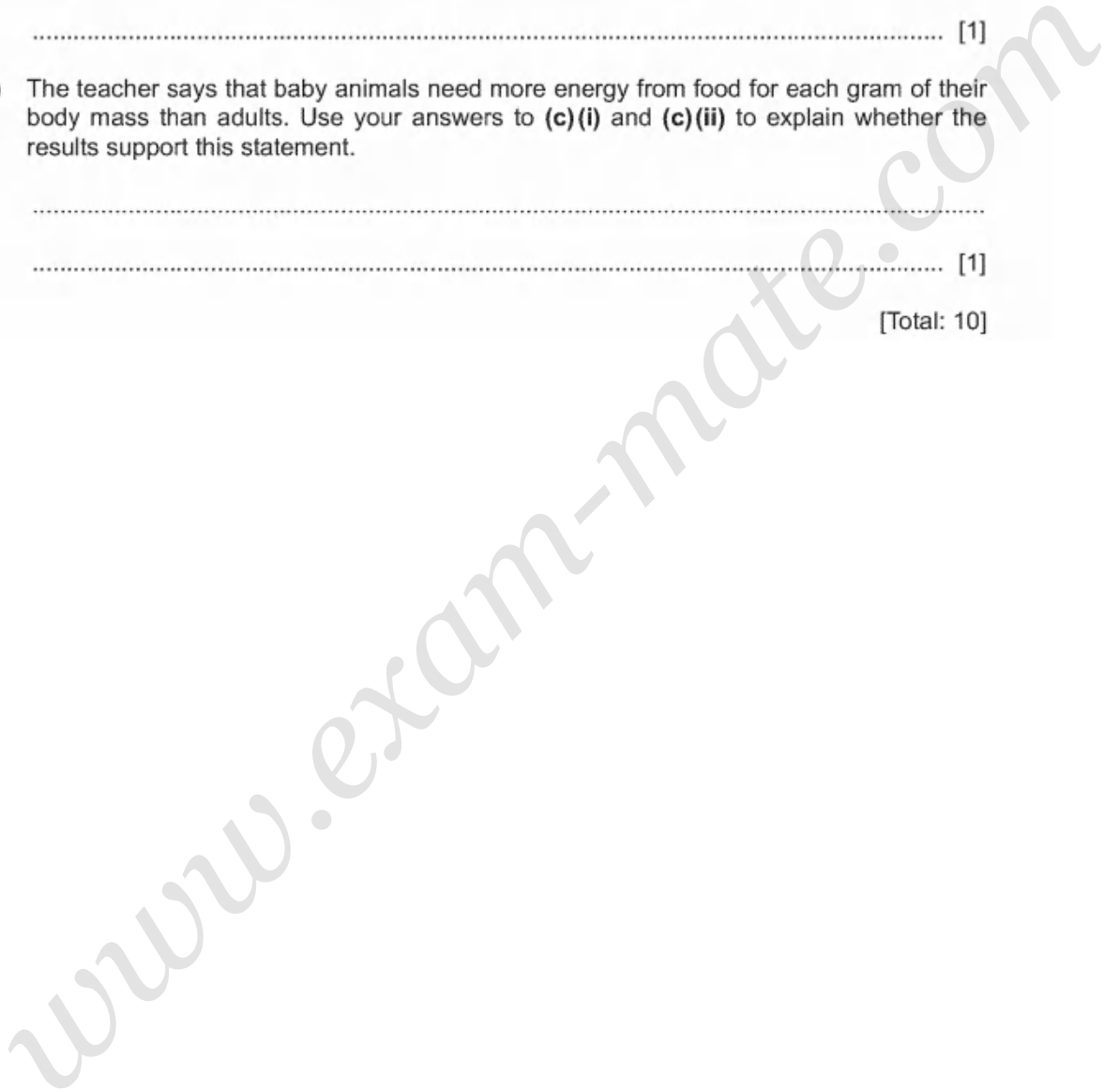
..... [1]

(iii) The teacher says that baby animals need more energy from food for each gram of their body mass than adults. Use your answers to (c)(i) and (c)(ii) to explain whether the results support this statement.

.....

..... [1]

[Total: 10]



2 - (0654/62_Summer_2021_Q2) - B1. Characteristics Of Living Organisms

Small maggots (insect larvae), as shown in Fig. 2.1, live in damp, warm environments.



Fig. 2.1

A student wants to find out if maggots are attracted to different colours of light.

Plan an investigation to find out to which colour of light maggots are most attracted.

The student is provided with some maggots which need to be kept alive during the investigation, lamps of different colours and any other common laboratory apparatus.

Include in your plan:

- the apparatus needed
- a brief description of the method, explaining any safety precautions
- the measurements you will make, including how to make them as accurate as possible
- the variables you will control
- how you will use your results to draw a conclusion.

You may include a labelled diagram if you wish.

You may also include a table that can be used to record results if you wish. You are **not** required to include any results.

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..... [7]

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1 - (0654/62_Summer_2017_Q1) - B2. Cells

Fig. 1.1 shows a flower that has been cut in half lengthways. The photograph is life-size.

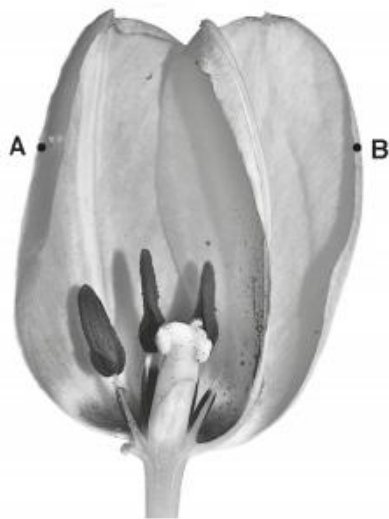


Fig. 1.1

- (a) (i) In the box shown, make a **large** pencil drawing of the flower. This should show all the flower parts including the petals.



[4]

(ii) On your drawing, use label lines to **label only** the following structures.

- an anther
- a stigma

[2]

(b) You are going to calculate the magnification of your drawing.

(i) On Fig. 1.1 draw a straight line between points **A** and **B**.

Measure the length of this line in millimetres to the nearest millimetre.

length = mm

Draw a matching line **A–B** on your pencil drawing.

Measure the length of this line in millimetres to the nearest millimetre.

length = mm

[2]

(ii) Use your two measurements to calculate the magnification of your drawing.

Show your working in the space below.

magnification = [1]

(c) On Fig. 1.1, circle the structure that receives pollen during pollination.

[1]

2 - (0654/61_Summer_2017_Q4) - B2. Cells

A nurse takes a blood sample from a patient.

- (a) Describe a safety precaution the nurse should take when obtaining the blood sample from the patient.

.....
[1]

- (b) Fig. 4.1 shows a photograph of some of this blood as seen under a microscope.

A white blood cell has been labelled.

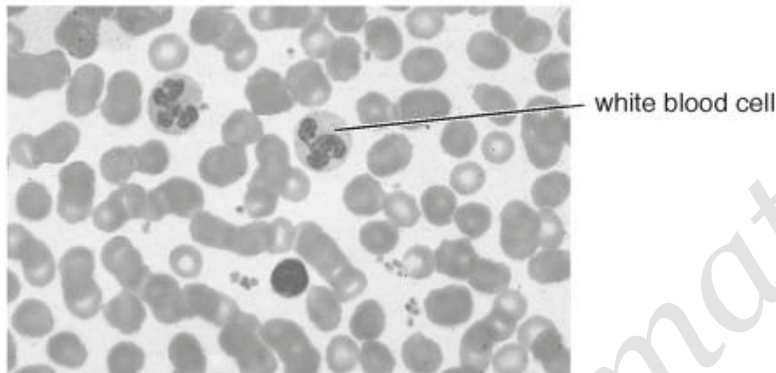


Fig. 4.1

- (i) On Fig. 4.1 draw label lines and label **one** red blood cell and **one** platelet. [2]

- (ii) In the box make a large pencil drawing of the labelled white blood cell.

Label the visible components.



[4]

(c) (i) Measure to the nearest 0.5 mm the diameter of the labelled white blood cell in Fig. 4.1.

diameter = mm [1]

(ii) Measure to the nearest 0.5 mm the diameter of this cell in your drawing.

diameter = mm [1]

(iii) Use these measurements to calculate the magnification of your drawing to the nearest whole number.

magnification = [1]

3 - (0654/62_Winter_2017_Q1) - B2. Cells, B3. Biological Molecules

Fig. 1.1 shows a bean seedling from a seed that has germinated and has started to grow.



Fig. 1.1

(a) In the box provided, make an enlarged pencil drawing of the seedling.

Label the root and stem.

[3]

(b) (i) Measure the length of the bean **seed** in Fig. 1.1, excluding the root and stem.

Record this length, in millimetres, to the nearest millimetre.

length of seed in Fig. 1.1 mm [1]

(ii) Use a straight line to show this length on your drawing.

Record the length of this line, in millimetres, to the nearest millimetre.

length of seed in drawing mm [1]

(iii) Use your measurements in (i) and (ii) to calculate the magnification of your drawing.

magnification =[1]

(c) (i) A student wants to carry out an experiment on some germinated bean seeds.

Describe how the student can germinate the seeds.

.....

[2]

(ii) The student tests the bean seeds for their nutrient content.

Her results are shown in Table 1.1.

Table 1.1

	Benedict's test	biuret test	iodine test
colour observed	clear blue	purple	blue-black

Use the information in Table 1.1 to identify the nutrients present in the bean seeds.

.....[2]

ANSWERS

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1 - (0654/61_Summer_2019_Q1) - B1. Characteristics Of Living Organisms

(a)(i)	time and minutes ;	1
(a)(ii)	50.5 ; 46.0 ;	2
(b)(i)	axes labelled including units ; sensible linear scale and uses at least half the space ;	2
(b)(ii)	at least 4 correct plots \pm half small square for each line ; two smooth curves of best fit correctly labelled ;	2
(c)(i)	32.5 and 34(.0) ;	1
(c)(ii)	greater loss of heat in small test-tube because steeper graph ;	1
(c)(iii)	(yes), because small test-tube / baby has greater heat loss / loses heat faster / greater temperature loss (same time) ;	1

2 - (0654/62_Summer_2021_Q2) - B1. Characteristics Of Living Organisms

<p>1 mark must be from each section, plus any other 2</p> <p>Apparatus suitable container / card or paper with markings ; ruler ;</p> <p>Method use different colours ; lots of maggots (min 5 if give number) / repeats ; moisture ; gloves / wash hands afterwards to protect from disease / bacteria / pathogens (from maggots) ; ref. animal welfare ;</p> <p>Measurement number moved to the lights ; distance moved towards the lights ;</p> <p>Controlled variables distance of lamp / intensity / brightness of light ; time ; same size / type / age of maggots ; number of maggots ; temperature ;</p> <p>Conclusion bar chart of number to each colour / distance to each colour ; colour of light with most maggots is the one they are most attracted to</p>	7
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1 - (0654/62_Summer_2017_Q1) - B2. Cells

(a)(i)	quality drawing using at least half the space and not feathery ; male parts – anther and filament ; female parts – stigma (and ovary) ; some petals ;	4
(a)(ii)	correctly labelled: anther ; stigma ;	2
(b)(i)	2 lines drawn edge to edge ; correct measurement of photograph $47 \text{ mm} \pm 1 \text{ mm}$ AND (sensible) flower measurement (larger than photograph) ;	2
(b)(ii)	correct calculation ;	1
(c)	stigma circled (on Fig.1.1) ;	1

2 - (0654/61_Summer_2017_Q4) - B2. Cells

(a)	wear gloves / safe disposal of needle / use sterilised/clean needle/equipment ;	1
(b)(i)	line to a red blood cell and labelled ; line to a platelet and labelled ;	2
(b)(ii)	quality drawing more than half of box with nucleus ; irregular cell (freehand) with nucleus – 3 lobes ; two of: nucleus labelled ; cytoplasm labelled ; (cell) membrane ;	4
(c)(i)	measurement $8(.0)/8.5/9(.0)/9.5/10(.0)\text{mm}$;	1
(c)(ii)	measurement to the nearest 0.5 mm AND larger than (c)(i) ;	1
(c)(iii)	magnification correctly calculated to the nearest whole number ;	1

3 - (0654/62_Winter_2017_Q1) - B2. Cells, B3. Biological Molecules

(a)	quality of drawing ; larger than original ; root and stem correctly labelled ;	3
(b)(i)	14 ± 1 ;	1
(b)(ii)	correct measurement (in mm) ;	1
(b)(iii)	magnification correctly calculated and rounded correctly ;	1
(c)(i)	(placed in a suitable container with) water ; kept in a warm place ;	2
(c)(ii)	protein ; starch ;	2

4 - (0654/61_Winter_2017_Q4) - B2. Cells

(a)	Root hair ;	1
(b)(i)	Quality drawing using at least half the box ; Nucleus correctly labelled ; Cell wall correctly labelled ;	3
(b)(ii)	34 ± 1 ;	1
(b)(iii)	Measurement to nearest mm ;	1
(b)(iv)	Magnification correctly calculated ;	1
(c)	Starch present ;	1
(d)	select <u>anther</u> ; use a microscope to observe ;	2

5 - (0654/62_Summer_2018_Q1) - B2. Cells, B3. Biological Molecules

(a)(i)	quality drawing and at least half the box ; some detail in the centre ;	2
(a)(ii)	41 ± 1 ; line and measured to nearest mm ± 3 ;	2
(a)(iii)	correct calculation of magnification ;	1
(b)	no protein ;	1
(c)(i)	heat (with benedict's solution) ; reducing sugar present ; yellow / green / orange / red ;	3
(c)(ii)	goggles because of hot water / chemicals in eye ; OR use of hot water bath so hot liquid not ejected ;	1

6 - (0654/61_Summer_2018_Q4) - B2. Cells, B3. Biological Molecules

(a)(i)	clear outline of cell (not feathery) ; approximately the correct shape and nucleus ; larger than original AND one cell ;	3
(a)(ii)	nucleus correctly labelled ;	1
(b)(i)	51 ± 2 ;	1
(b)(ii)	Drawn line and measure length ;	1
(b)(iii)	correct calculation of magnification ;	1
(c)	add alcohol ; pour into water ; white emulsion ;	3

7 - (0654/61_Winter_2018_Q1) - B2. Cells, B3. Biological Molecules

(a)(i)	smooth continuous outline ; bigger than original ; correct number of spikes ;	3
(a)(ii)	50 ;	1
(a)(iii)	(correct placement of AB on drawing and) line and measured to nearest mm ;	1
(a)(iv)	correct calculation ;	1
(b)(i)	heat in alcohol / water ; alcohol ; iodine solution ;	3
(b)(ii)	blue-black;	1

8 - (0654/63_Winter_2018_Q1) - B2. Cells, B3. Biological Molecules

(a)(i)	smooth continuous outline; larger than original drawing ; anther and filament clearly visible ; stigma and style clearly visible ;	4
(a)(ii)	petal correctly labelled ; stigma correctly labelled ; anther correctly labelled ;	3
(b)(i)	ethanol ; water and white emulsion ;	2
(b)(ii)	opaque so masks observation ;	1

9 - (0654/62_Winter_2018_Q4) - B2. Cells, B8. Gas Exchange And Respiration

(a)	red blood cell labelled R and white blood cell labelled W ;	1
(b)(i)	clear and continuous single outline ; nucleus lobes ; larger than original ;	3
(b)(ii)	Correct magnification (width of cell in drawing in mm / 35) ;	1
(c)(i)	203 ;	1
(c)(ii)	rest before taking pulse (minimum 1 minute) ; pulse taken on suitable location on body ; count beats / pulse ; specified time ; rate = beats divided by time / multiply correctly to give beats / min (e.g. beats in 10 seconds × 6 to give bpm) ; takes it several times until similar / repeat to check ;	max 4