

- M1.** (a) methane is produced
ignore bad smell 1
- which is a greenhouse gas / causes global warming 1
- (b) $(9.80 / 0.20 = 49 \text{ therefore})$ 49:1 1
- (c) horse (manure)
allow ecf from 11.2
- closest to 25:1 (ratio) 1
- (d) **Level 3 (5–6 marks):**
A detailed and coherent explanation is given, which logically links how carbon is released from dead leaves and how carbon is taken up by a plant then used in growth.
- Level 2 (3–4 marks):**
A description of how carbon is released from dead leaves and how carbon is taken up by a plant, with attempts at relevant explanation, but linking is not clear.
- Level 1 (1–2 marks):**
Simple statements are made, but no attempt to link to explanations.
- 0 marks:**
No relevant content.
- Indicative content**
- statements:**
- (carbon compounds in) dead leaves are broken down by microorganisms / decomposers / bacteria / fungi
 - photosynthesis uses carbon dioxide
- explanations:**
- (microorganisms) respire

- (and) release the carbon from the leaves as carbon dioxide
- plants take in the carbon dioxide released to use in photosynthesis to produce glucose

use of carbon in growth:

- glucose produced in photosynthesis is used to make amino acids / proteins / cellulose
- (which are) required for the growth of new leaves

6

(e) any **three** from:

(storage conditions)

- (at) higher temperature / hotter
- (had) more oxygen
- (had) more water / moisture
- (contained) more microorganisms (that cause decay)

allow reference to bacteria / fungi / mould

3

[13]

M2. (a)	(i)	A lung	1
		B rib	1
		C diaphragm	1
		D alveolus / alveoli	1
	(ii)	(B moves) up(wards) / out / up and out	1
		(C moves) down(wards) / flattens <i>do not allow inwards</i> <i>ignore outwards</i> <i>if neither mark gained allow 1 mark for correct reference to muscle contraction</i>	1
(b)	(i)	1640	1
		1440	1
		1720 <i>allow max 1 for 3 correct values using of bottom of piston:</i> <i>1380 + 1180 + 1480 to 1485</i>	1
	(ii)	1600 <i>correct answer gains 2 marks</i> <i>if answer incorrect allow 1 mark for evidence of</i> <i>(1640 + 1440 + 1720) ÷ 3</i> <i>allow ecf from (b)(i)</i> <i>allow use of two numbers divided by two if one is considered anomalous:</i> $\frac{(1640 + 1720)}{2} = 1680$ <i>for 2 marks</i>	2

(c) two groups of students – one group sports activity participants, other not
allow students as a group 1

fair test eg groups same height / same mass / same sex 1

measure air breathed in by each student / repeat previous experiment then
calculate mean for group 1

(d) pointer remains still after breathing / cylinder will move down after breathing
(in) 1

error reading volume less likely
allow more accurate / reliable 1

(e) (i) operator squeezes bag 1

air forced / pushed into lungs

or

positive pressure ventilator 1

(ii) any **two** from:

- air pressure / volume not regulated
- operator will tire / must be present at all times / variable intervals
- too much / too little air
allow may 'overbreathe' the patient

2

[20]

M3. (a) A

*no mark - can be specified in reason part
if B given - no marks throughout
if unspecified + 2 good reasons = 1 mark*

high(er) pressure in A

allow opposite for B

*do **not** accept 'zero pressure' for B*

pulse / described in A

accept fluctuates / 'changes'

allow reference to beats / beating

ignore reference to artery pumping

2

(b) (i) 17

1

(ii) 68

accept correct answer from student's (b)(i) × 4

1

(c) oxygen / oxygenated blood

allow adrenaline

ignore air

glucose / sugar

*extra wrong answer cancels - eg sucrose / starch / glycogen
/ glucagon / water*

allow fructose

ignore energy

ignore food

2

[6]

M4. (a) anaerobic respiration

allow phonetic spelling

1

(b) (i) 4.4

4.2, 4.3, 4.5 or 4.6 with figures in tolerance (6.7 to 6.9 and 2.3 to 2.5) and correct working gains 2 marks

4.2, 4.3, 4.5 or 4.6 with no working shown or correct working with one reading out of tolerance gains 1 mark

correct readings from graph in the ranges of 6.7 to 6.9 and 2.3 to 2.5 but no answer / wrong answer gains 1 mark

2

(ii) more energy is needed / used / released

*do **not** allow energy production*

(at 14 km per hour)

ignore work

1

not enough oxygen (can be taken in / can be supplied to muscles)

allow reference to oxygen debt

*do **not** allow less / no oxygen*

1

so more anaerobic respiration (to supply the extra energy) **or** more glucose changed to lactic acid

allow not enough aerobic respiration

1

[6]

M5. (a) $6\text{H}_2\text{O}$

in the correct order

1

$\text{C}_6\text{H}_{12}\text{O}_6$

1

(b) (i) control

do not accept 'control variable'

allow:

to show the effect of the organisms

or

to allow comparison

or

to show the indicator doesn't change on its own

1

(ii) snail respire

1

releases CO_2

1

(iii) turns yellow

1

plant can't photosynthesise so CO_2 not used up

1

but the snail (and plant) still respire so CO_2 produced

1

[8]