

- M1.(a)**
1. Calcium ions diffuse into myofibrils from (sarcoplasmic) reticulum;
 2. (Calcium ions) cause movement of tropomyosin (on actin);
 3. (This movement causes) exposure of the binding sites on the actin;
 4. Myosin heads attach to binding sites on actin;
 5. Hydrolysis of ATP (on myosin heads) causes myosin heads to bend;
 6. (Bending) pulling actin molecules;
 7. Attachment of a new ATP molecule to each myosin head causes myosin heads to detach (from actin sites).

5 max

- (b)
1. Releases relatively small amount of energy / little energy lost as heat;
Key concept is that little danger of thermal death of cells
 2. Releases energy instantaneously;
Key concept is that energy is readily available
 3. Phosphorylates other compounds, making them more reactive;
 4. Can be rapidly re-synthesised;
 5. Is not lost from / does not leave cells.

2 max

[7]

M2.(a)

	Photosynthesis	Anaerobic respiration	Aerobic respiration
ATP produced	✓	✓	✓
Occurs in organelles	✓		✓
Electron transport chain involved	✓		✓

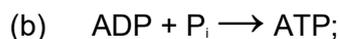
1 mark per column

Mark ticks only. Ignore anything else if different symbols such as crosses are used as well.

If crosses are used instead of ticks allow cross as equivalent to a tick.

Reject tick with a line through

3



Both sides correct, but allow other recognised symbols or words for phosphate ion. Reject P unless in a circle.

Accept = as equivalent to arrow

Accept reversible arrow

Ignore any reference to kJ / water

1

(c) 1. Energy released in small / suitable amounts;

2. Soluble;

3. Involves a single / simple reaction;

1. In context of release, not storage. Ignore producing energy / manageable amounts.

2. Reject "broken down easily / readily". Reject "quickly / easily resynthesised".

2 max

(d) 1. ATP cannot be stored / is an immediate source of energy;

2. ATP only releases a small amount of energy at a time;

2

[8]

M3. (a) Electrons transferred down electron transport chain;

Provide energy to take protons / H^+ into space between membranes;

Protons / H^+ pass back, through membrane / into matrix / through ATPase;

Energy used to combine ADP and phosphate / to produce ATP;

Accept: alternatives for electron transport chain.

3 max

- (b) (i) Prevent damage to mitochondria caused by water / osmosis / differences in water potential;
Accept: other terms that imply damage e.g. shrink / burst 1
- (ii) Glucose is used / broken down during glycolysis in cytoplasm / not in mitochondria;
Accept: 'glucose is converted to pyruvate' for description of breakdown
 Glucose cannot cross mitochondrial membrane / does not enter mitochondria;
Accept: only pyruvate can 2
- (iii) Terminal / final acceptor (in electron transport chain) / used to make water;
Could be shown by symbols 1 [7]
- M4.** (a) (i) 2 (molecules) 1
- (ii) Cannot pass out of cell;
 Quickly / easily broken down (hydrolysed) / broken down in a on-step reaction / immediate source of energy;
 Stores / releases small amounts of energy;
Do not credit "producing energy" max 2
- (b) Formed when reduced NAD used to reduce / donate H ions to pyruvate / convert pyruvate to ethanol; 1
- [4]

- M5.** (a) (more cristae / larger surface area) for electron transport chain / more enzymes for ATP production / oxidative phosphorylation; muscle cells use more ATP (than skin cells)(not just more respiration); 2
- (b) (i) pyruvate; 1
- (ii) carbon dioxide formed / decarboxylation; hydrogen released / reduced NAD formed; acetyl coenzyme A produced; 2 max
- (c) NAD / FAD reduced / hydrogen attached to NAD / FAD; H⁺ ions / electrons transferred from coenzyme to coenzyme / carrier to carrier / series of redox reactions; energy made available as electrons passed on; energy used to synthesise ATP from ADP and phosphate / using ATPase; H⁺ / protons passed into intermembrane space; H⁺ / protons flow back through stalked particles / enzyme; 3 max
- [8]**
- M6.** (a) (i) 29.47(29.5);
(2 marks for correct answer)
40% / 0.4 of 2800 / 38; 2
- (ii) released as heat; 1
- (b) (i) glucose only partly broken down / only broken down to lactate; 1
- (ii) lactate / lactic acid has built up / been produced; oxygen used to break down lactate / convert it back to pyruvate / glucose / glycogen; 2
- [6]**

M7. (a) ATP

1

(b) (i) 2.57:1/2.6:1/18:7; Correct answer however derived scores two marks
72:28 scores one mark
Correct working from wrong figures scores 1 mark

Accept

0.4 / 0.39 / 0.389 / 0.3889

2 max

(ii) Low intensity; At low intensity/below 40% mainly fat used / at high intensity/
above 40% mainly carbohydrate used; Long duration exercise; Percentage fat
used increases with time / percentage
carbohydrate used decreases with time;

3

[6]