Mark schemes

1

(a) (i) A or C
   
   allow lower case
   
   (ii) B or D
   
   allow lower case

(b) (i) 60
   
   (ii) 4

(c) red blood cells

2

(a) (i) 150
   
   (ii) any two from:
       accept correct use of numbers
       accept pulse rate
       • lower resting rate
       • lower rate during exercise
       • recovers faster after exercise
       
       allow a general statement about lower rate if neither of the first two points given

(b) glucose
   
   oxygen
3

(a)  B = rib  
     C = diaphragm  

(b)  (i)  D  
     allow lower case  

(ii) carbon dioxide  

4

(a)  A  
     no mark – can be specified in reason part  
     if B given = no marks throughout  
     if unspecified plus two 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  

(b)  (i)  17  

(ii)  68  
     accept correct answer from candidate’s (b)(i) × 4
(c) (i) oxygen / oxygenated blood
   allow adrenaline
   ignore air

   glucose / sugar
   extra wrong answer cancels eg
   sucrose / starch / glycogen / glucagon / water
   allow fructose as an alternative to glucose
   ignore energy
   ignore food

1

(ii) carbon dioxide / CO$_2$ / lactic acid
   allow CO$_2$ / CO$_2$
   ignore water

1

1 [7]

(a) (i) 120

1

(ii) 11 760 or
correct answer from candidate’s answer to (a)(i)
correct answer with or without working
if answer incorrect
120 × 98 or
candidate’s answer to (a)(i) × corresponding SV gains 1 mark
if candidate uses dotted line / might have used dotted line(bod) in
(a)(i) and (a)(ii) no marks for (a)(i) but allow full ecf in (a)(ii) eg 140
x 88 = 12320 gains 2 marks

2

(b) trained athlete has higher stroke volume / more blood per beat

1

same volume blood expelled with fewer beats

or for same heart rate more blood is expelled

1
(c) increased *aerobic respiration*

or

decreased *anaerobic respiration*

    *allow correct equation for aerobic respiration*

    *accept don’t have to respire anaerobically*

increased *energy* supply / need

less lactic acid formed

*or* to breakdown lactic acid *or* less O$_2$-debt

can do *more work* *or* can work *harder* / *faster* / *longer*

    *accept muscle contraction for work*

*or less* fatigue / cramp / pain


\[9\]

(a) (i) B *or* D

(ii) A *or* B
(b) any four from:

more / faster must be implied at least once for full marks

- increased blood (flow)
  
  ignore reference to breathing

- (more) oxygen supplied or aerobic respiration
  
  allow less anaerobic (respiration) or prevents oxygen debt

- (more) glucose / sugar / food supplied
  
  ignore feeding

- (higher rate of) respiration

- (more) energy needed / released
  
  allow made

- (more) carbon dioxide removed

- (muscles) doing (more) work or muscles contracting

- remove heat / cooling

- remove lactic acid or less lactic acid formed

4

(a) (i) 6 peaks in heart rate

accept 6 increases / spikes or goes very high 6 times

allow heart rate increases each time he runs

1

(ii) 2.5 / 2½

allow 2 minutes 30 seconds

do not accept 2.3 / 2:3 / 2.30

1

(b) more / faster / a lot must be stated at least once for full marks

(more) oxygen supplied / needed

allow less anaerobic (respiration)

or (more) aerobic respiration

or prevents oxygen debt

1

(more) glucose / sugar / food supplied / needed

ignore feeding

1
(more) energy needed / released
allow energy produced / made

(more) carbon dioxide / heat / lactic acid removed (from muscles) or more cooling
or less lactic acid formed

insufficient / no oxygen available
for (just) aerobic respiration
or
respires anaerobically

(a) (i) glycogen
(ii) respiration

(b) (i) 483 kJ
(ii) oxygen
(iii) dilate

(c) supplies more / a lot of oxygen or removes more carbon dioxide
or release more energy / faster respiration