Q1 (a)

The following target zone:

108:144 bpm

Q1 (b)

Credit explanation consisting of any three aspects of following linked explanation:

1. Maximum heart rate = 220 - age (1)

2. Therefore as you age your maximum heart reduces (1)

3. Target zones are worked out as a percentage of maximum heart rate (1)

4. Thus the 20 year old would have a higher maximum heart rate/higher target zone. OR Thus the 40 year old would have a lower maximum heart rate/ lower target zone (1).

<u>Do not accept</u>

- **Because 20 year old is younger**
- **Do not credit figures relating to bpm from (a)**

Q2

Aspect 1 - covers points 1-8

Immediate/short-term effects (cardiovascular system)

1. Increased heart rate
2. Increased systolic blood pressure (if stated credit point 3 as well)
3. Increased blood pressure

Immediate/short-term effects (muscular system)

4. increased demand for oxygen/energy for muscular work
5. increased carbon dioxide production
6. increased temperature
7. lactic acid production (during anaerobic work) (energy conversion)
8. muscle fatigue (Do not accept tire/ache)

Aspect 2 - covers points 9 - 18

Regular participation/long term effects (cardiovascular system)

9. increased strength / size of heart muscle
10. increased stroke volume (due to increased strength of cardiac muscle)
11. increased maximum cardiac output
12. increased capillarisation (accept increased capillaries)
13. increase in number of red blood cells
14. drop in resting heart rate (due to increased stroke volume) (accept quicker return to RHR for same reason)

Regular participation/long term effects (muscular system)

15. increased strength of ligaments/tendons
16. increased size/strength of skeletal muscle / muscular endurance
17. increased mitochondria (site of aerobic respiration)
18. increased myoglobin (equivalent to an oxygen 'store' in the muscle).

NB must be clear whether candidate is referencing immediate or long-term effects

NB if system not stated can still gain credit