

MARK SCHEME:

Target heart rate zones are used to maximise fitness adaptations. The heart rate at which Paul and Alana will improve for their event is different.

This is because Paul will concentrate on improving his cardiovascular fitness and Alana will concentrate on improving speed.

In order to improve his cardiovascular fitness Paul will need to work within the aerobic training zone. His aerobic training zone is between 60 and 80% of his maximum heart rate.

$$220 - 16 = 204\text{bpm}$$

$$80 \times 204/100 = 163\text{bpm}$$

$$60 \times 204/100 = 122 \text{ bpm}$$

Paul will need to work between 122 and 163bpm in order to improve his cardiovascular fitness.

In order to improve her speed, Alana will need to focus her training on working within the anaerobic training zone. Her anaerobic training zone is between 80 and 90% of her maximum heart rate.

$$163 \text{ bpm}$$

$$90 \times 204/100 = 183$$

Alana will need to work between 163 and 183 to improve her speed.

The percentages differ for each performer due to the different nature of the events. Aerobic training is done at a lower intensity, as is the race because it is done over a longer period of time. Aerobic exercise means 'with oxygen', so the heart needs time to supply all the oxygen the muscles need. Anaerobic exercise takes place without oxygen, as with short fast bursts the heart cannot supply blood and oxygen to the muscles as fast as the cell use them.