1.9 Aerobic and Anaerobic Exercise: Definitions and Sporting Examples: 30-minute Pack

AQA 8582 · Calculators not allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 State a second factor that determines whether a sporting activity is performed aerobically or anaerobically, using the examples of a long-distance swim and a single long jump.

(Total for Question 1 is 1 mark)

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2 State two sporting examples, one aerobic and one anaerobic, taken from different sports, and name which is which.

(Total for Question 2 is 2 marks)

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3 State two sporting examples, other than a 100 m sprint, weightlifting or shot put, that would typically be classified as anaerobic exercise.

(Total for Question 3 is 2 marks)

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4 A boxer completes a single 3 minute round at a high work rate against an opponent. Describe why this round is best classified as involving mostly anaerobic exercise, referring to its duration and intensity.

(Total for Question 4 is 2 marks)

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5 A cross-country skier races over a 10 km course lasting around 30 minutes at a high but sustainable pace in cold conditions. Explain why this event is classified as aerobic exercise, using two features of the activity in your answer.

(Total for Question 5 is 2 marks)

6 A basketball match includes fast breaks where a player sprints the length of the court in a few seconds, and periods of slower, controlled play setting up an attack. State whether a single fast break alone should be classified as aerobic or anaerobic, and give one reason for your answer.

(Total for Question 6 is 2 marks)

7 Describe why an open water swim of 5 km, typically completed in around 1 hour 10 minutes, is classified as aerobic exercise even though the swimmer works continuously at a demanding pace.

(Total for Question 7 is 2 marks)

8 A gymnast performs a floor routine lasting around 90 seconds, made up of continuous tumbling, jumps and holds at high intensity throughout. State whether this routine is best classified as aerobic or anaerobic, and give one reason based on its duration and intensity.

(Total for Question 8 is 2 marks)

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9 A high jumper has one attempt at clearing the bar, involving a short run-up and a single explosive jump lasting only a few seconds in total. Explain why this single attempt is classified as anaerobic exercise.

(Total for Question 9 is 2 marks)

10 A triathlete's swim leg lasts around 20 minutes at a strong, continuous pace, immediately followed by a fast transition and the start of the cycle leg. Explain why the swim leg alone is classified as aerobic exercise.

(Total for Question 10 is 2 marks)

11 State one reason why understanding whether training for a sport is mainly aerobic or mainly anaerobic is useful for a coach designing a training programme.

(Total for Question 11 is 1 mark)

12 Evaluate whether it is always accurate to describe a whole team sport, such as hockey, as simply an 'aerobic sport', using evidence from what happens during a typical match to support your answer, and reach a judgement about a more accurate way to describe its energy demands.

(Total for Question 12 is 6 marks)

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13 A 10 km road runner paces at a steady speed for 40 to 50 minutes. Explain why this example is best classified as aerobic exercise, using two linked points about intensity and duration.

(Total for Question 13 is 3 marks)

14 A karate competitor performs a single kata (a fixed sequence of movements) lasting around 90 seconds at high intensity throughout, with no rest. Compare this with a 90 second period of gentle jogging, and explain why the two would be classified differently despite lasting the same length of time.

(Total for Question 14 is 3 marks)

15 A discus thrower has three attempts in a competition, each lasting only a couple of seconds, with several minutes of rest between each attempt. Explain why the long rest periods between attempts do not change the classification of each individual throw.

(Total for Question 15 is 2 marks)

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Mark scheme · 1.9 Aerobic and Anaerobic Exercise: Definitions and Sporting Examples: 30-minute Pack

Question 1

duration (how long the activity lasts) **B1**

Answer: Duration

Question 2

one correct aerobic example, e.g. 10 km run, long-distance cycling, 30 minute continuous swim, oe **B1**

one correct anaerobic example, e.g. 100 m sprint, shot putt, single maximal lift, oe **B1**

Answer: Aerobic example: 10 km run. Anaerobic example: 100 m sprint.

Question 3

one correct short, high-intensity example, e.g. javelin throw, volleyball spike, badminton smash, track cycling sprint, oe **B1**

a second, different correct short, high-intensity example, oe **B1**

Answer: For example, a javelin throw and a volleyball spike.

Question 4

a boxing round is relatively short in duration (3 minutes) and performed at high intensity (fast punches, quick footwork), oe **B1**

the high intensity means the body cannot supply energy fast enough aerobically alone, so much of the round's energy demand is anaerobic, oe **B1**

Answer: A boxing round is relatively short and performed at high intensity, so much of its energy demand is anaerobic because the body cannot supply energy fast enough aerobically alone during the fast exchanges.

Question 5

the race lasts a long time (around 30 minutes), which is far longer than a typical anaerobic effort, oe **B1**

the pace is sustainable rather than maximal, meaning the body can supply enough oxygen to meet the energy demand throughout, oe **B1**

Answer: The race lasts around 30 minutes, far longer than a typical anaerobic effort, and the pace is sustainable rather than maximal, meaning the body can supply enough oxygen to meet the energy demand throughout.

Question 6

anaerobic **B1**

because a single fast break lasts only a few seconds at near-maximal sprinting intensity, matching the short-duration, high-intensity definition, oe **B1**

Answer: Anaerobic, because a single fast break lasts only a few seconds at near-maximal sprinting intensity, which matches the short-duration, high-intensity definition.

Question 7

the swim lasts over an hour, which is far too long for the anaerobic system to supply the energy needed, oe **B1**

the pace, although demanding, is sustainable rather than maximal, so oxygen supply can keep up with energy demand throughout, oe **B1**

Answer: The swim lasts over an hour, far too long for the anaerobic system to supply the energy needed, and although the pace is demanding it is sustainable rather than maximal, so oxygen supply can keep up with energy demand throughout.

Question 8

anaerobic **B1**

because the routine is short (around 90 seconds) and performed at consistently high intensity throughout, matching the short-duration, high-intensity definition, oe **B1**

Answer: Anaerobic, because the routine is short, around 90 seconds, and performed at consistently high intensity throughout, matching the short-duration, high-intensity definition.

Question 9

the whole attempt lasts only a few seconds, far shorter than the duration typical of aerobic activity, oe **B1**

the jump itself requires a maximal, explosive effort from the leg muscles, matching the high-intensity part of the anaerobic definition, oe **B1**

Answer: The whole attempt lasts only a few seconds, far shorter than typical aerobic activity, and the jump requires a maximal, explosive effort from the leg muscles, matching the high-intensity part of the anaerobic definition.

Question 10

the swim lasts around 20 minutes, a long duration well beyond a typical anaerobic effort, oe **B1**

the pace, although strong, is sustained continuously rather than at a short maximal burst, so oxygen supply can meet the energy demand throughout, oe **B1**

Answer: The swim lasts around 20 minutes, a long duration well beyond a typical anaerobic effort, and although the pace is strong it is sustained continuously rather than at a short maximal burst, so oxygen supply can meet the demand throughout.

Question 11

it allows the coach to design training sessions/intensities that match the energy demands of the actual sport/event, oe **B1**

Answer: It allows the coach to design training sessions and intensities that match the energy demands of the actual sport.

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Question 12

Level 3 A well-developed evaluation that uses clear evidence of both aerobic periods (e.g. jogging, positional play) and anaerobic bursts (e.g. sprints, tackles) during a hockey match to challenge the single label, and reaches a well-justified, more accurate description of the sport's mixed energy demands.	**5-6**
Level 2 Some accurate evidence of both aerobic and anaerobic elements of a hockey match, but the evaluation or the final judgement may be underdeveloped or one-sided.	**3-4**
Level 1 Basic or generic statements about aerobic and/or anaerobic exercise with little or no application to what actually happens during a hockey match, and no clear judgement.	**1-2**
Level 0 No relevant content.	**0**

Indicative content:

- A hockey match lasts around 60 to 70 minutes in total, which on its own suggests a mainly aerobic classification, since the overall duration is far longer than any single anaerobic effort.
- During the match, players spend much of their time jogging, walking or in lower-intensity positional play, which is genuinely aerobic and matches the 'aerobic sport' label reasonably well for large parts of the game.
- However, the match also contains repeated short, maximal-intensity bursts, such as sprinting to win the ball, chasing down an opponent or a fast counter-attack, each of which individually matches the anaerobic definition and would rely on the anaerobic system.
- This pattern of many short high-intensity efforts within a long, mostly lower-intensity game means the true energy demand keeps switching between the two systems, rather than staying fixed as purely aerobic throughout.
- A more accurate description would call hockey a sport with a mixed (or intermittent) energy demand, mainly aerobic overall but with important repeated anaerobic bursts that a purely 'aerobic sport' label does not capture.
- A balanced judgement should note that the single label is a useful simplification for describing the dominant, overall energy source across a whole match, but it is not fully accurate for describing what individual players actually experience moment to moment, so a coach designing training should prepare both systems.

Question 13

the intensity is moderate so oxygen can be supplied to working muscles, oe	**B1**
the duration is long (40 to 50 minutes) requiring sustained energy production using oxygen, oe	**B1**
therefore the activity relies on aerobic processes and is classified as aerobic, oe	**B1**

Answer: The runner is working at a moderate intensity, so oxygen can be supplied to the muscles, and the duration is long (40 to 50 minutes) requiring sustained energy production using oxygen, therefore the run is classified as aerobic.

Question 14

both activities last the same 90 seconds, so duration alone does not decide the classification here, oe	**B1**
the kata is performed at high, near-maximal intensity throughout, so it is classified as anaerobic, oe	**B1**
the gentle jog is a low, sustainable intensity, so it is classified as aerobic, oe	**B1**

Answer: Both activities last the same 90 seconds, so duration alone does not decide the classification. The kata is performed at high, near-maximal intensity throughout, so it is anaerobic, while the gentle jog is a low, sustainable intensity, so it is aerobic.

Question 15

each throw itself is still a short, maximal-intensity effort of only a couple of seconds, oe	**B1**
classification is based on the duration and intensity of the activity being performed, not the length of the rest period around it, oe	**B1**

Answer: Each throw itself is still a short, maximal-intensity effort of only a couple of seconds, and classification is based on the duration and intensity of the activity itself, not on the length of the rest period around it.

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