



## PE.AP9 Aerobic and Anaerobic Exercise: Definitions and Sporting Examples

AQA 8582 · Calculators not allowed · about 30 minutes

Total Marks

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Name: \_\_\_\_\_ Date: \_\_\_\_ / \_\_\_\_ / \_\_\_\_

**Answer ALL questions. Show all your working.**

- 1** Which of the following best describes aerobic exercise in the context of sport and training, for example a steady 10 km run?

- ☐ A) Very high intensity, short duration activity where oxygen supply cannot meet demand
- ☐ B) Moderate to low intensity, sustained activity where oxygen supply meets energy demand
- ☐ C) Any activity performed while holding the breath
- ☐ D) Activity that only uses the arms and shoulders

(Total for Question 1 is 1 mark)

- 2** Define anaerobic exercise as used in AQA GCSE PE, naming the key features of intensity and duration in a sporting context such as a 100 m sprint or a heavy lift.

(Total for Question 2 is 1 mark)

- 3** State one factor that determines whether a sporting action is aerobic or anaerobic, using the example of a 10 km run compared with a 100 m sprint.

(Total for Question 3 is 1 mark)

- 4** 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 4 is 1 mark)

**5** Tick the box that best describes a typical duration for activities usually classed as anaerobic in sport, giving the context of short track events or single maximal efforts.

- ☐ A) More than 20 minutes
- ☐ B) 3 to 10 minutes
- ☐ C) Less than about 2 minutes, often under 30 seconds for maximal efforts
- ☐ D) Continuous all-day activity

**(Total for Question 5 is 1 mark)**

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**6** 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 6 is 3 marks)**

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**7** A weightlifter performs a set of three maximal lifts, each lasting a few seconds with long rests between. Name whether this set is anaerobic or aerobic and give one reason.

**(Total for Question 7 is 2 marks)**

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**8** A football match contains periods of steady jogging and long runs interspersed with short high-speed sprints. Describe why the match contains both aerobic and anaerobic activity and give one example of each from the match.

**(Total for Question 8 is 3 marks)**

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**9** A 400 m runner completes their race in around 50 seconds at near-maximal effort. State whether this event is best described as aerobic, anaerobic or mixed, and give one brief reason.

**(Total for Question 9 is 2 marks)**

- 10** Describe why a 20 minute continuous swim at moderate effort is classified as aerobic, including a comment on oxygen supply and energy demand.

(Total for Question 10 is 2 marks)

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- 11** A shot putt is a single effort lasting less than 2 seconds. Explain in two sentences why this action is anaerobic and name the sporting example.

(Total for Question 11 is 2 marks)

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

(Total for Question 12 is 2 marks)

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- 13** Explain briefly why training intensity, not just the name of the sport, determines whether a session is aerobic or anaerobic, using rowing as the named sport in your explanation.

(Total for Question 13 is 1 mark)

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- 14** Analyse the differences in aerobic and anaerobic demands between a 5 km road race completed in around 20 to 25 minutes and a 100 m sprint. Use named sporting actions from each example and make a judgement about which system is dominant in each event.

(Total for Question 14 is 6 marks)

# Mark scheme · PE.AP9 Aerobic and Anaerobic Exercise: Definitions and Sporting Examples

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## Question 1

- **B1 B**
- **Answer: B**

## Question 2

- **B1 high intensity, short duration activity where oxygen supply does not meet demand, oe**
- **Answer: High intensity, short duration activity where oxygen supply does not meet demand.**

## Question 3

- **B1 intensity (how hard the performer is working)**
- **Answer: Intensity**

## Question 4

- **B1 duration (how long the activity lasts)**
- **Answer: Duration**

## Question 5

- **B1 C**
- **Answer: C**

## Question 6

- **B1 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**
- **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 7

- **B1 anaerobic**
- **B1 high intensity and very short duration for each lift, so oxygen supply cannot meet immediate demand, oe**
- **Answer: Anaerobic, because each maximal lift is high intensity and very short in duration, so oxygen supply cannot meet immediate demand.**

## Question 8

- **B1 steady jogging and long runs are lower to moderate intensity and last for longer periods, so are aerobic, oe**
- **B1 short high-speed sprints are very high intensity and short duration, so are anaerobic, oe**
- **B1 examples: aerobic example: sustained midfield running; anaerobic example: a 10 to 30 m sprint to chase the ball, oe**
- **Answer: The steady jogging and long runs are lower to moderate intensity and sustained, so aerobic; the short high-speed sprints are very high intensity and short duration, so anaerobic. Example aerobic: sustained midfield runs. Example anaerobic: a 10 to 30 m sprint to chase the ball.**

## Question 9

- **B1 mixed**
- **B1 race duration around 50 seconds means both high intensity short-term energy and some aerobic contribution, oe**
- **Answer: Mixed, because the 50 second near-maximal effort uses high intensity anaerobic work for much of the race but also involves an aerobic contribution over the near one-minute duration.**

### Question 10

- **B1** duration is long enough (20 minutes) to require sustained energy production, oe
- **B1** moderate effort means oxygen supply can meet demand, so energy is produced aerobically, oe
- **Answer: A 20 minute continuous swim is aerobic because the duration requires sustained energy production and at moderate effort oxygen supply can meet the muscles' energy demand so the swimmer works aerobically.**

### Question 11

- **B1** it is very high intensity and extremely short duration so oxygen cannot be supplied quickly enough, oe
- **B1** example named: shot putt (single explosive throw), oe
- **Answer: This action is anaerobic because it is very high intensity and extremely short in duration, so oxygen cannot be supplied quickly enough. Example: shot putt, a single explosive throw.**

### Question 12

- **B1** 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
- **Answer: Aerobic example: 10 km run. Anaerobic example: 100 m sprint.**

### Question 13

- **B1** intensity and duration of the session determine oxygen demand; rowing can be aerobic when done steadily for long periods or anaerobic when done as short maximal sprints, oe
- **Answer: Because intensity and duration determine oxygen demand; for example rowing can be aerobic if done steadily over many minutes, but anaerobic if done as short maximal sprints.**

### Question 14

- **Level 2** (4-6): A clear, specific analysis that compares at least three relevant differences in intensity, duration and oxygen supply between the 5 km race and the 100 m sprint, uses named sporting actions (for example sustained steady pace in the 5 km and an explosive start and maximal sprint in the 100 m), and reaches a supported judgement on which system is dominant in each event.
- **Level 1** (1-3): A simple comparison that makes one or two relevant points about intensity or duration with some reference to the sporting examples, and gives a basic judgement on dominance of aerobic or anaerobic without full development.
- **Level 0** (0): No relevant content.
- **Indicative content:**
  - 5 km race: duration approximately 20 to 25 minutes, so sustained energy over many minutes favors aerobic supply as dominant.
  - 5 km race: intensity is moderate to high but submaximal, oxygen can be supplied to meet much of the demand during steady-state sections, enabling aerobic metabolism to dominate.
  - 5 km race action example: repeated steady pace and tactical surges, with aerobic system supporting endurance and repeated efforts over the whole distance.
  - 100 m sprint: duration under 15 seconds with maximal intensity, oxygen cannot be supplied quickly enough, so anaerobic processes are dominant.
  - 100 m sprint action example: explosive block start, rapid acceleration and maximal velocity using short-term high intensity power, which relies on anaerobic energy.
  - Comparison: 5 km requires efficient oxygen delivery and sustained cardiac output, while 100 m requires immediate high power output and phosphagen/anaerobic sources, so the physiological demands differ in time course and fuel use.
  - Judgement guidance: conclude 5 km is predominantly aerobic with possible brief anaerobic bursts near the finish, and 100 m is predominantly anaerobic with negligible aerobic contribution to peak speed, supporting a clear dominance statement for each event.