

Pearson BTEC Level 3 Nationals Diploma

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Centre Number

Learner Registration Number

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Time 1 hour 30 minutes

**Paper
reference**

31813H

Sport and Exercise Science

UNIT 1: Sport and Exercise Physiology

You do not need any other materials.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and learner registration number.
- Answer **all** questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*

Information

- The total mark for this paper is 70.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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Answer ALL questions. Write your answers in the spaces provided.

Ronald is a rower.

Figure 1 shows Ronald rowing with his team mates.



(Source: © Sigi Tischler/EPA/Shutterstock)

Figure 1

Weather conditions can make the air temperature extremely cold for the rowers.

One effect of extreme cold on the body is a drop in core body temperature.

1 (a) (i) State the term used when there is a drop in core body temperature.

(1)

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(ii) State **one other** effect of extreme cold on the body.

(1)

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Non-shivering thermogenesis is a method of reducing heat loss from the body.

(b) Explain how non-shivering thermogenesis reduces heat loss from the body.

(2)

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When it is windy the rowers can get even colder.

(c) (i) Explain why heat loss would be greater on a windy day.

(2)

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The water temperature of the river Ronald rows on is much colder than the air temperature.

(ii) Describe **one** method of heat loss from Ronald's body if he falls into the cold water.

(2)

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Ronald uses strength training **and** aerobic training to cause **adaptations** to his muscular system.

- (d) Evaluate which of these training methods will provide the most beneficial adaptations to Ronald's **muscular system**, so he can perform well in a long-distance rowing race.

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(Total for Question 1 = 16 marks)



Wendy is a marathon runner. She trains at high altitude.

- 2 (a) State the **minimum** height at which high altitude training can take place.

(1)

- (b) Explain the difference in the partial pressure of oxygen at high altitude compared to the partial pressure of oxygen at sea level.

(2)

When Wendy first gets to a high altitude, one of the **initial responses** she has is altitude sickness.

- (c) (i) State **one** symptom of altitude sickness.

(1)

- (ii) State **one other** initial response of the body to high altitude.

(1)

Some athletes do not train at high altitudes, but they sleep in specialised chambers designed to copy the effects of being at high altitude.

- (iii) State the name of these specialised chambers.

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Two **adaptations** to training at high altitude are:

- increased red blood cell production
- increased number of mitochondria.

(d) Explain why each of these adaptations will improve Wendy's marathon performance.

(i) Increased red blood cell production

(2)

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(ii) Increased number of mitochondria

(2)

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Wendy is taking part in the London Marathon.

As Wendy starts the race one of the **initial responses** of her cardiovascular system is an increase in her heart rate.

- (e) Assess the importance of the initial responses of Wendy's **cardiovascular system** to her running performance in the first few minutes of the marathon.

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(Total for Question 2 = 18 marks)



Byron is a long-distance cyclist.

As soon as Byron begins to cycle his minute volume increases from 6 litres per minute to 60 litres per minute.

3 (a) State **two** changes to Byron's breathing that cause his minute volume to increase.

(2)

1

2

(b) Name **two** respiratory muscles used when breathing.

(2)

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Increased sweat production is one adaptation to training in excessive heat.

(c) Explain **one** reason why an increase in sweat production is an advantage when cycling long distances in very hot conditions.

(3)

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(d) Explain **one** reason why long-distance cyclists drink water during their event.

(3)

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Byron takes part in two long-distance races with only one day's rest between each race.

Byron knows that rest is essential to allow all three of his energy systems time to recover.

(e) Evaluate whether 24 hours is long enough for all three of Byron's energy systems to fully recover so he can perform well in his second race.

(8)

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(Total for Question 3 = 18 marks)



Figure 2 shows athletes competing in a 100m wheelchair race.



(Source: © FocusDzign/Shutterstock)

Figure 2

Bill is a wheelchair athlete. He competes in 100m and 400m races.

Before the start of a race Bill's heart rate increases.

- 4** (a) (i) State the term used when heart rate increases just before exercise starts. (1)

- (ii) State the hormone responsible for this increase in heart rate. (1)

Training can produce micro-tears in muscles.

- (b) (i) State what causes micro-tears in muscles during training. (1)



(b) (ii) Explain **one** advantage of producing micro-tears in Bill's muscles.

(2)

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During the race Bill's muscles will increase in temperature.

(c) Explain why exercise causes an increase in muscle temperature.

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(Total for Question 4 = 18 marks)

TOTAL FOR PAPER = 70 MARKS

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