3.8 Evaluating Fitness Test Results: Reliability, Validity and Normative Data: 30-minute Pack

AQA 8582 · Calculators not allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 State one piece of equipment used in the sit-and-reach test that must be standardised across all testing sessions to keep results reliable.

(Total for Question 1 is 1 mark)

2 State one example of a subjective judgement a coach might make during fitness testing that could reduce the objectivity of the results.

(Total for Question 2 is 1 mark)

3 State two features a fitness test could have that would make it more objective when used by several different testers in a school.

(Total for Question 3 is 2 marks)

4 State one reason why the normative data used to rate fitness test results should be updated regularly rather than used unchanged for many years.

(Total for Question 4 is 1 mark)

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5 Other than removing the tester's reaction time, state one advantage of using electronic timing gates rather than a hand-held stopwatch when testing a group of athletes over 30 m.

(Total for Question 5 is 1 mark)

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6 A tester plans to repeat a grip strength test on the same group of pupils one week later. State two things the tester should standardise between the two testing sessions to keep the results reliable.

(Total for Question 6 is 2 marks)

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7 State one limitation of comparing an athlete's fitness only against a single normative data table, rather than tracking their own scores over time.

(Total for Question 7 is 1 mark)

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8 Table D shows normative data for the Illinois agility run test, male age 15. Use the table to rate the two times below.

Table D, male age 15 normative bands
Illinois agility run time: Excellent ≤ 15.0 s, Good 15.1-16.5 s, Average 16.6-18.0 s, Below average > 18.0 s

(a) For an Illinois agility run time of 16.0 seconds, state the rating from Table D for a male aged 15. **(1)**

(b) For an Illinois agility run time of 18.9 seconds, state the rating from Table D for a male aged 15. **(1)**

(Total for Question 8 is 2 marks)

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9 Table A shows normative data for male 15 year olds for three common tests. Use the table and read off: a 30 m sprint time of 4.35 seconds, a vertical jump of 44 cm, and a sit-and-reach of 28 cm. For each score, state the performance rating band from Table A.

Table A, male age 15 normative bands
30 m sprint time: Excellent ≤ 4.20 s, Good 4.21-4.50 s, Average 4.51-4.80 s, Below average > 4.80 s
Vertical jump height: Excellent ≥ 50 cm, Good 45-49 cm, Average 40-44 cm, Below average < 40 cm
Sit-and-reach flexibility: Excellent ≥ 35 cm, Good 30-34 cm, Average 25-29 cm, Below average < 25 cm

(a) For the 30 m sprint time of 4.35 seconds, state the rating from Table A for a male aged 15. **(1)**

(b) For the vertical jump height of 44 cm, state the rating from Table A for a male aged 15. **(1)**

(c) For the sit-and-reach score of 28 cm, state the rating from Table A for a male aged 15. **(1)**

(Total for Question 9 is 3 marks)

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10 State one way a tester could improve the reliability of vertical jump testing in a school setting.

(Total for Question 10 is 1 mark)

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11 Explain why the Illinois agility run test, although widely used, may have low validity for testing a competitive swimmer's agility.

(Total for Question 11 is 3 marks)

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12 Evaluate the reliability, validity and practicality of using the 30 m sprint test to assess a youth rugby player aged 14 who plays as a winger. Make a reasoned judgement about whether the 30 m sprint is an appropriate test for this player and suggest one improvement or alternative test. Use the rugby winger context in your answer.

(Total for Question 12 is 6 marks)

13 A PE department is deciding between two fitness tests to assess the strength of its GCSE PE class: the handgrip dynamometer test and a one rep max test on a leg press machine. Discuss the reliability, validity, objectivity and practicality of each test, and reach a reasoned judgement about which test the department should use. Apply your answer to a GCSE PE class of 30 students in a school with one handgrip dynamometer and a small fitness suite with a single leg press machine.

(Total for Question 13 is 9 marks)

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Mark scheme · 3.8 Evaluating Fitness Test Results: Reliability, Validity and Normative Data: 30-minute Pack

Question 1

the sit-and-reach box (same box/scale used every time), oe **B1**

Answer: The sit-and-reach box, which must be the same box and scale used for every trial.

Question 2

example such as visually estimating a jump height instead of measuring it, or deciding by eye whether a press-up counted, oe **B1**

Answer: For example, a coach visually estimating a vertical jump height instead of measuring it with a device.

Question 3

a clearly written, standardised test protocol that every tester follows in the same way, oe **B1**

automated or electronic scoring (e.g. an electronic timing gate) that removes the need for personal judgement, oe **B1**

Answer: A standardised written protocol followed by every tester, and automated or electronic scoring that removes personal judgement.

Question 4

average fitness levels in the population change over time, so old data no longer gives a fair comparison, oe **B1**

Answer: Average fitness levels in the population change over time, so data collected years ago no longer gives a fair comparison.

Question 5

gives an automatic, permanent digital reading, removing the risk of the tester misreading or mis-recording the stopwatch value, oe **B1**

Answer: Electronic gates give an automatic, permanent digital reading, removing the risk of the tester misreading the stopwatch or writing down the wrong value.

Question 6

use the same hand/grip position and arm angle each time, oe **B1**

test at a similar time of day and with a similar warm up each time, oe **B1**

Answer: Use the same hand, grip position and arm angle both times, and test at a similar time of day with a similar warm up.

Question 7

a single table only gives a one-off snapshot and cannot show whether the athlete's own fitness is improving, oe **B1**

Answer: A single normative table only gives a one-off snapshot and cannot show whether the athlete's own fitness is improving over time.

Question 8

(a) Good **B1**

(a) Answer: Good

(b) Below average **B1**

(b) Answer: Below average

Question 9

(a) Good **B1**

(a) Answer: Good

(b) Average **B1**

(b) Answer: Average

(c) Average **B1**

(c) Answer: Average

Question 10

examples such as: use the same warm up, use the same surface and shoes, conduct all trials at the same time of day, use a standardised measurement device, oe **B1**

Answer: Use the same warm up and test surface for every athlete and measure with the same device each time.

Question 11

the Illinois agility run is a land-based, weight-bearing test using cones and sprinting/turning, oe **B1**

swimming agility is performed in water, using different muscle groups and a different movement pattern, oe **B1**

so a land-based sprint-and-turn test does not measure the specific agility demands of swimming, making it low in validity for this athlete, oe **B1**

Answer: The Illinois agility run is a land-based test using running and turning around cones, but swimming agility happens in water and uses different muscle groups and movement patterns. A land-based test therefore does not measure a swimmer's specific agility, so it has low validity for this athlete.

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Question 12

Level 3 A well-developed evaluation that discusses reliability, validity and practicality in the context of a 14 year old rugby winger, uses evidence and examples to support points, compares strengths and limitations, and reaches a clear, justified judgement with an appropriate suggestion for improvement or an alternative test.	**5-6**
Level 2 A reasonable evaluation that covers at least two of reliability, validity or practicality with some application to the rugby winger, offers a conclusion but with limited justification or a weak suggestion for improvement.	**3-4**
Level 1 Simple statements about reliability, validity or practicality with little or no application to the rugby winger and no clear judgement.	**1-2**
Level 0 No relevant content.	**0**

Indicative content:

- Reliability: the 30 m sprint can be reliable if conditions are standardised, using electronic timing or the same tester, same surface and warm up; variable surfaces, inconsistent timing or fatigue reduce reliability.
- Validity: for a rugby winger the 30 m sprint measures straight-line speed which is relevant to sprinting down the wing, but it does not assess acceleration over the first 5-10 m, multi-directional speed or rugby-specific movements such as evasion, so it is partially valid rather than fully sport specific.
- Practicality: the 30 m sprint is practical in most school or club settings, needs minimal equipment and time, and can test individuals quickly, but requires safe straight run area and some organisation for many players.
- Judgement guidance: a balanced answer might conclude the 30 m sprint is an appropriate baseline test for speed for a 14 year old winger, but should be complemented by a short acceleration test (e.g. 5 or 10 m sprint) or an agility test to capture sport-specific demands; this improves validity while keeping practical benefits.
- Improvement/alternative: suggest adding electronic timing to improve reliability, or use a 5 m and 30 m split test or a rugby-specific sprint with evasion cones to improve validity.

Question 13

Level 3 A well-developed discussion that compares BOTH tests across reliability, validity, objectivity and practicality, uses evidence and examples to support points, applies the comparison clearly to a class of 30 with one dynamometer and one leg press, and reaches a clear, fully justified judgement.	**7-9**
Level 2 A reasonable discussion that covers at least two of reliability, validity, objectivity or practicality for each test, with some application to the class of 30, and offers a conclusion with limited justification.	**4-6**
Level 1 Simple, largely unlinked statements about one or both tests with little or no application to the class of 30 and no clear judgement.	**1-3**
Level 0 No relevant content.	**0**

Indicative content:

- Handgrip reliability: can be highly reliable if the same dynamometer, grip setting and arm position are used every time, taking the best of several attempts with rest between them; changing the grip width or body position between attempts reduces it.
- Handgrip validity: a valid measure of grip (hand and forearm) strength, but less valid as a measure of the leg or whole-body strength most sports demand.
- Handgrip objectivity and practicality: the score is read directly from the dial or display, so it is objective; each student takes under a minute and needs no lifting warm-up, so one dynamometer can test 30 students in a single lesson.
- One rep max reliability: reliable if the same machine, seat setting and technique are used, but results depend on each student's familiarity with maximal lifting and on how many attempts they make before fatigue sets in, which is harder to keep consistent.
- One rep max validity: a valid measure of the maximal strength of the leg muscles, arguably closer to the demands of sports involving pushing, jumping or sprinting than grip strength.
- One rep max objectivity and practicality: the heaviest weight lifted once with correct technique is an objective score, but finding it needs a warm-up, several progressively heavier attempts with rest and close supervision on the school's only leg press, making it slow for 30 students, and maximal lifts carry a greater injury risk for inexperienced students.
- Judgement guidance: given one dynamometer and a single leg press machine, a balanced answer is likely to recommend the handgrip test as more practical and safer for testing 30 students in one lesson, while accepting the one rep max test would be more valid for leg strength if time allowed, with a suggestion such as testing small groups over several lessons with a supervised, gradual build-up of weight.

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