



## S09-test Combined Mean: Test Pack

EDEXCEL 1ST0 · Calculator allowed · about 30 minutes

Total Marks

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

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

- 1** The mean number of laps swum by 6 swimmers in a training session is 8. Work out the total number of laps swum by the 6 swimmers.

(Total for Question 1 is 1 mark)

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- 2** The mean number of press-ups done by 8 members of Group P in one session is 20. The mean number of press-ups done by 12 members of Group Q is 25. Work out the total number of press-ups done by all 20 members.

(Total for Question 2 is 2 marks)

**3** For each statement about combined means, write down whether it is True or False.

**(i)** If two groups are exactly the same size, the combined mean is the mean of the two individual means. **(1)**

**(ii)** The combined mean of two groups is always exactly halfway between the two individual means, whatever the group sizes. **(1)**

**(iii)** A larger group has a bigger effect on the combined mean than a smaller group. **(1)**

**(iv)** If one of the two groups has 0 members, the combined mean equals the mean of the other group. **(1)**

**(Total for Question 3 is 4 marks)**

**4** Write down whether the following statement is True or False.

If a new value is added to a data set and that value is greater than the current mean, the new mean must be greater than the old mean.

**(Total for Question 4 is 1 mark)**

**5** 12 pupils in Class 7X have a mean spelling score of 6. 18 pupils in Class 7Y have a mean spelling score of 9. Work out the combined mean score for all 30 pupils.

**(Total for Question 5 is 2 marks)**

- 6** Three classes sit the same maths test. Class X: 20 pupils, mean score 58. Class Y: 25 pupils, mean score 66. Class Z: 15 pupils, mean score 70.
- (a) Work out the total score for all three classes combined.
  - (b) Work out the combined mean score for all 60 pupils.

**(Total for Question 6 is 3 marks)**

7 A school wants to estimate the combined mean number of books read per pupil over the summer, across the whole of Year 8 (120 pupils in 4 tutor groups).

- (a) Before collecting the data, write down one decision the school should make so that the data collected from each tutor group can be fairly combined. (1)

- (b) Each tutor group's mean number of books read is recorded below. (4)

| Tutor group | Number of pupils | Mean books read |
|-------------|------------------|-----------------|
| 8A          | 28               | 5               |
| 8B          | 32               | 4               |
| 8C          | 30               | 6               |
| 8D          | 30               | 7               |

Work out the combined mean number of books read per pupil across all of Year 8.

- (c) A tutor claims: 'More than half of the tutor groups read above the whole-year average.' Use the table and your answer to part (b) to assess whether this claim is correct. (2)

- (d) Give one reason why the school should be cautious about using this combined mean to describe how much all pupils nationally read over the summer. (1)

(Total for Question 7 is 8 marks)

- 8** Group A has  $a$  members with a mean of  $p$ . Group B has  $b$  members with a mean of  $q$ , where  $a$  is not equal to  $b$ . Write down, in terms of  $a$ ,  $b$ ,  $p$  and  $q$ , an expression for the combined mean of both groups.

(Total for Question 8 is 3 marks)

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- 9** Group A has  $a$  members with mean  $p$ . Group B has  $b$  members with mean  $q$ , where  $a$  is not equal to  $b$ .

Explain why the combined mean of the two groups is not, in general, equal to  $(p+q) / 2$  unless  $a = b$ .

(Total for Question 9 is 3 marks)

## Mark scheme · S09-test Combined Mean: Test Pack

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### Question 1

- **B1** 48 cao
- **Answer: 48**

### Question 2

- **M1** correct method,  $(8 \times 20) + (12 \times 25)$
- **A1** 460 cao
- **Answer: 460**

### Question 3

- (i) **B1** True cao
- (i) **Answer: True**
- (ii) **B1** False cao
- (ii) **Answer: False**
- (iii) **B1** True cao
- (iii) **Answer: True**
- (iv) **B1** True cao
- (iv) **Answer: True**

### Question 4

- **B1** True cao
- **Answer: True**

### Question 5

- **M1** correct method,  $((12 \times 6) + (18 \times 9)) / 30$
- **A1** 7.8 cao
- **Answer: 7.8**

### Question 6

- **M1** correct method,  $(20 \times 58) + (25 \times 66) + (15 \times 70)$
- **A1** 3860 cao
- **B1** 64.33 (2 dp) or 3860/60, correctly following through
- **Answer: (a) 3860. (b) 64.33 (2 dp)**

### Question 7

- (a) **B1** any sensible planning decision, e.g. using the same time period and the same definition of 'a book read' for every tutor group, oe
- (a) **Answer: e.g. Use the same time period (the whole summer holiday) and the same definition of 'a book read' for every tutor group.**
- (b) **M1**  $28 \times 5 + 32 \times 4 + 30 \times 6 + 30 \times 7$  (= 658), oe (total books read)
- (b) **M1**  $28 + 32 + 30 + 30$  (= 120), oe (total pupils)
- (b) **M1**  $658 / 120$  (dep on both previous method marks)
- (b) **A1** awrt 5.48 cao
- (b) **Answer: awrt 5.48**
- (c) **B1** the claim is not correct (False) cao
- (c) **B1** reason: only 8C (6) and 8D (7) have means above 5.48, which is 2 out of 4 tutor groups, exactly half rather than more than half, oe
- (c) **Answer: No; only 8C and 8D (2 of the 4 tutor groups) have a mean above 5.48, which is exactly half, not more than half.**
- (d) **B1** the data comes from only one school, so may not be representative of pupils nationally, oe
- (d) **Answer: The sample is only from one school (one Year 8 cohort), so it may not represent pupils nationally.**

### Question 8

- **M1** recognises total for A is  $a \times p$  and total for B is  $b \times q$
- **M1** recognises combined total is divided by combined number of members,  $a + b$
- **A1**  $(ap + bq)/(a + b)$  oe cao
- **Answer:  $(ap + bq)/(a + b)$**

### Question 9

- **B1** combined mean =  $(ap + bq)/(a+b)$ , oe (correct weighted formula stated)
- **B1**  $(p+q)/2$  treats both groups as equally weighted, which is only valid when  $a = b$ , oe
- **B1** since  $a$  is not equal to  $b$ , the larger group contributes more to the total, so the combined mean is pulled towards the mean of the larger group and is generally not equal to  $(p+q)/2$ , oe
- **Answer: The combined mean is  $(ap+bq)/(a+b)$ , which only simplifies to  $(p+q)/2$  when  $a=b$ ; since  $a$  is not equal to  $b$ , the larger group has more influence, pulling the combined mean towards its own mean.**