Making it fair

In-class investigation
Solutions and marking key

Question 1

(a) Solution

Science marks for Classes 8.1 and 8.2 (out of 50)

Statistic	Class 8.1	Class 8.2
Range	28	26
Inter-quartile range	9	7

Marking key/mathematical behaviours	Marks
• Calculates the range	1
• Calculates interquartile range	1

	Solution	Marking key/mathematical behaviours	Marks
(b)	Class 8.1 Mean is higher i.e.,33.76 cf 25.16	• Determines better performance • Justifies selection by comparing a summary statistic	1 1
(c)	They could have earned more marks in the extra time	• Provides fair reason for adjustment	1
(d)	If all the students had already finished	• Provides valid reason not to adjust	1

Question 2

	Solution	Marking key/mathematical behaviours	Marks
(a)	The decrease needs to be proportional to the achievement The loss affects some more than others with respect to % scores	• Identifies differentiated effect on students.	1
(b)	Contains sufficient number of students Good variation within sample	• Identifies one or two features of representative samples	1 1
(c)	Yes. She goes from 40% to 50%.	• Provides valid reason to explain impact on Ria	1

Question 3

	Solution	Marking key/mathematical behaviours	Marks
(a)	The test allowed a mark a minute and 10 minutes could give 10 marks.	• Relates 10 to test time	1
(b)	Tom 51, Don 25, Sam 35, Ria 30, Fay 37	• Adds 10 to original scores	1

Question 3 (cont'd)

(c)	Range = 26 Interquartile range = 7 Mean = 35.16	• Calculates each statistic accurately	3
(d)	Tom is over 100% It is unlikely that all students would have got 10 marks in the remaining time – the harder questions may have been at the end.	• States two reasons to explain why adding 10 is inappropriate	2

Question 4

(a) Solution

Student	Tom	Don	Sam	Ria	Fay
Original mark	41	15	25	20	27
One fifth of original mark	8.2	3	5	4	5.4
Adjusted mark	49.2	18	30	24	32.4
Round to the nearest whole number	49	18	30	24	32

Marking key/mathematical behaviours	Marks
• Calculates one fifth of originals	1
• Adds on one fifth	1
• Rounds to whole number	

	Solution	Marking key/mathematical behaviours	
(b)	Range = 31.2 (or 31) Interquartile range = 8.4	• Calculates range • Calculates interquartile range	1 1
(c)	The increase varies according to student performance Proportion of time lacking to do test is considered	• States two reasons to explain why adding a fifth is better than adding 10	2

Question 5

(a) Solution

Student	Tom	Don	Sam	Ria	Fay
Original mark	41	15	25	20	27
Multiply by 1.25 to get new score	51.25	18.75	31.25	25	33.75
Gain in marks	10.25	3.75	6.25	5	6.75
Round new score to nearest whole number	51	19	31	25	34

Marking key/mathematical behaviours	Marks
• Multiplies by 1.25 accurately	1
• Determine increase in marks	1
• Rounds correctly to nearest whole number	1

Question 5 (cont'd)

	Solution	Marking key/mathematical behaviours	
(b)	32.5	• Calculates range of new scores	1
(c)	No. Tom gets 49.2 when a fifth is added and 51.25 when original score is multiplied by 1.25	• Explains why the effect is different or provides example to justify	1
(d)	Don, Ria, Sam, Fay, Tom	• Provides student in ascending order of original marks	1
(e)	Don, Ria, Sam, Fay, Tom	• Provides student in ascending order of gain from original marks	1
(f)	The lists are the same because the increase is proportional to the original marks.	• Compares lists and justifies	1
(g)	Multiplying by 1.25 Assuming 50 marks in 50 minutes then in 40 minutes to get 50 marks you need to multiply by 1.25. Adding on one fifth ony gives 48	• Identifies correct method • Gives mathematical argument for the method	1 1

Question 6

	Solution	Marking key/mathematical behaviours	
(a)	844	• Determines class total	1
(b)	629	• Determines class total	1
(c)	(i) 33.76 – 25.16 (ii) (844-629)÷ 25	• Recognises both methods to determine change in mean	1 1
(d)	Tom Don Original 41 15 Marks added 8.6 8.6 % increase 21% 57%	• • Complete table with known values • Calculates % increase for Tom • Calculates % increase for Don	 1 1 1
(e)	Median = 25 + 8.6 = 33.6 IQR = 35.6 – 28.6 = 7	• Calculates median • Calculates IQR	1 1
(f)	No. The % gain is much higher for Don than Tom	• Concludes that the process is unfair and justifies conclusion	1

Question 7

Solution

Process Student	Original marks	Add 10 to original marks	Add a fifth of the original marks	Multiply original marks by 1.25	Add 8.6 to original marks
Tom	41	51	49	51	50
Don	15	25	18	19	24
Sam	25	35	30	31	34
Ria	20	30	24	25	29
Fay	27	37	32	34	36

Marking key/mathematical behaviours	Marks
• Copies all data from earlier questions accurately	2
• Identifies best option is add 10 for all students	1
• Identifies worst option is adding a fifth for all students	1