REGULAR QUIZ 09

Form 5

Statistics

Part A – MC (18 marks@2 marks)

1.	C	$8<8+x$ and $8+8>x$ $x>0$ $x<16$ $\therefore 0<x<16$ Largest value of x is 15
2.	C	$\text{Mean}=\dfrac{1\times 8+2\times 8+3\times 15}{8+8+15}\approx 2.2$
3.	D	Let $\bar{x}$ be the mean. $\dfrac{86-\bar{x}}{4}=\dfrac{51-\bar{x}}{-3}$ $-258+3\bar{x}=204-4\bar{x}$ $\bar{x}=66$ Thus, the mean is 66 marks.
4.	B	Let a kg, b kg be their weights. $\dfrac{(32+28)(54)-a-b}{32+28-2}\le 53.8$ $a+b\ge 119.6$ $\dfrac{a+b}{2}\ge 59.8$ Thus, the minimum value of mean is 59.8 kg.
5.	C	
6.	A	Note that $p=\dfrac{70+n}{15}$, $q=n$, $r=1$. I must be true: Since $1\le n\le 5$, $\dfrac{71}{15}\le p\le 5$, $p>1$. II must not be true: Since $q=n$, when $n=1$, $q=1=r$. III must not be true: When $n=5$, $p=5$, $q=5$.
7.	B	I is true: $q=38-15=23$

		II is false: Since mode = 38, $0 \le a \le 2$. $m = \frac{27+30+a}{2} = \frac{57+a}{2}$ $\therefore \frac{57+0}{2} \le m \le \frac{57+2}{2}$ $28.5 \le m \le 29.5$ III is true: Since mode = 38, $1 \le b \le 9$, $r = 40+b-11 = 29+b \ge 30$
8.	A	
9.	A	I is not true: Let $M = \{1,10,12,20,21\}$, then $N = \{-2,7,17,18\}$. Median of M = 12 Median of $N = \frac{7+17}{2} = 12$ II is true: Range of $M = e-a$ Range of $N = (e-3)-(a-3) = e-a$ III is not true: Let $M = \{10,200,210,300,400\}$, then $N = \{7,197,297,397\}$. Mean of $M = \frac{10+200+210+300+400}{5} = 224$ Mean of $N = \frac{7+197+297+397}{4} = 224.5$

Part B – Short Questions (26 marks)

1. Since the mode is 15, any two of x, y and z are 15. 2A

Since the median is 10, one of x, y and z is 10. 1M+1A

Mean

$= \frac{6+9\times2+10\times2+15\times3+20}{9}$ 1M

$= \frac{109}{9}$ 1A 12.1

(6)

2. New mean

$= \dfrac{8\times 7-9-5}{6}$

$= 7$ 1A

Let $x_1, x_2, ..., x_6$ be the numbers.

$\sqrt{\dfrac{(x_1-7)^2+...+(x_6-7)^2+(9-7)^2+(5-7)^2}{8}} = 2.5$ 1M

$(x_1-7)^2+...+(x_6-7)^2+(9-7)^2+(5-7)^2 = 50$

$(x_1-7)^2+...+(x_6-7)^2 = 42$ 1A

New standard deviation

$= \sqrt{\dfrac{(x_1-7)^2+...+(x_6-7)^2}{6}}$ 1M

$= \sqrt{\dfrac{42}{6}}$

$= \sqrt{7}$

≈ 2.65 1A

(5)

3. (a)(i) $c-18 = 37$

$c = 55$ 1A

(ii) $b-a = 12$

$33 \le a \le 42$

$45 \le b \le 54$ 1A+1A

(b) When the student with 18 marks is removed,

A possible data set:

30, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44,

45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55 1A Can be absorbed

Greatest possible mean

$= \dfrac{975}{22}$ 1M+1A r.t. 44.3

(6)

4. (a) New mean = \$10500 1A

New standard deviation = \$2000 1A

(b) New mean = $10000(1.02) = \$10200$ 1A

New standard deviation = $2000(1.02) = \$2040$ 1A

(c) (i) In arrangement 1, the standard deviation increases. 1A

In arrangement 2, the standard deviation may increase or decrease or no change. 1A

(c) (ii) Let $x_1, x_2, ..., x_{50}$ be the salaries, $\bar{x}$ be the mean.

$$\sqrt{\frac{(x_1-\bar{x})^2+...+(x_{50}-\bar{x})^2}{50}} = 2000$$ 1M

$$(x_1-\bar{x})^2+...+(x_{50}-\bar{x})^2 = 2\times10^8$$

After adopting arrangement 1,

$$(x_1-\bar{x})^2+...+(x_{40}-\bar{x})^2 = 2\times10^8$$ 1M

New standard deviation

$$= \sqrt{\frac{2\times10^8}{40}}$$ 1M

$$\approx \$2236$$ 1A

(10)