Jawapan

Praktis 8

Praktis Formatif
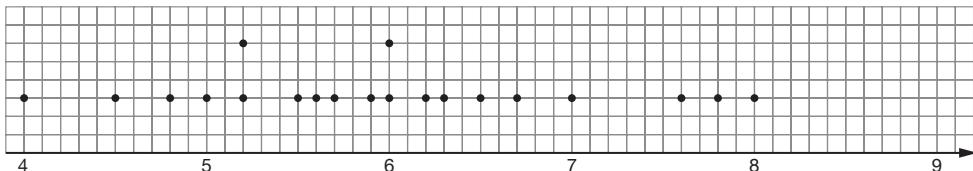
8.1 Serakan
Dispersion

1 $y = 20$, $x = 28$
2 $41°C - 38.5°C = 2.5°C$
3 7.4 cm $- 2.2$ cm $= 5.2$ cm

4 (a)

Markah Kelas *X*/*Marks of Class X*		Markah Kelas *Y*/*Marks of Class Y*
8 6	5	3 8 8
9 9 8 6 6	6	2 5 5 7 9 9
9 8 8 8 7 6 3	7	0 0 3 3 6 8 9 9
5 5 4 3 2 2 2 0 0	8	0 1 1 2 3 5 7
9 0	9	8

   (b) Kelas *X*/*Class X*
   (c) Kelas *Y*/*Class Y*,
       Beza/*Difference* = 98 – 53 = 45

5 (a)
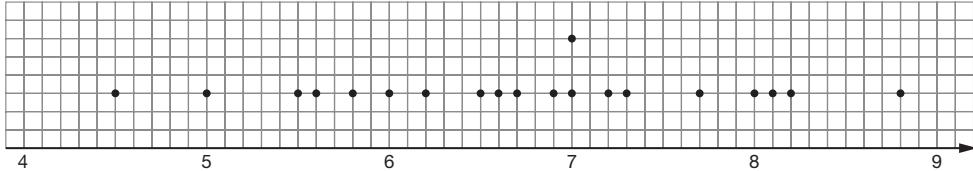
Perbelanjaan Kumpulan A (RM)
Expenditure of group A

Perbelanjaan Kumpulan B (RM)
Expenditure of group B

   (b) Kumpulan *A* mempunyai beza perbelanjaan yang
       lebih besar kerana perbelanjaan maksimum ialah
       RM8.80 dan perbelanjaan minimum ialah RM4.50.
       Jadi, beza perbelanjaan ialah RM4.30. Beza
       perbelanjaan Kumpulan *B* hanya RM4.
       The dispersion in spending of Group A is larger
       because it has larger difference in value. The
       maximum spending and the minimum spending of
       Group A is RM8.80 *and* RM4.50 *respectively. So the*
       difference is RM4.30. *But the difference in spending*
       of Group B is only RM4.

8.2 Sukatan Serakan
Measures of Dispersion

1 (a) Julat antara kuartil/*Interquartile range*
       $$= \frac{2.5 + 2.9}{2} - \frac{1.5 + 1.8}{2}$$
       $$= 1.05$$

   (b) Julat antara kuartil/*Interquartile range* = 8 – 3
       $= 5$

   (c) Julat antara kuartil/*Interquartile range* = 19 – 13
       $= 6$

   (d) Julat antara kuartil/Interquartile range
       $$= \frac{8 + 9}{2} - \frac{6 + 6}{2}$$
       $$= 2.5$$

2

Bilangan buah-buahan *Number of fruits, x*	3	4	5	6	7	
Kekerapan longgokan *Cummulative frequency*	25	37	46	49	50	
Bilangan murid, *Number of pupils*	25	12	9	3	1	$\sum f = 50$
fx	75	48	45	18	7	$\sum fx = 193$
x^2	9	16	25	36	49	
fx^2	225	192	225	108	49	$\sum fx^2 = 799$

(a) $\dfrac{\sum fx}{\sum f} = \dfrac{193}{50}$
$= 3.86$

(b) $\dfrac{\sum fx^2}{\sum f} - \left(\dfrac{\sum fx}{\sum f}\right)^2 = \dfrac{799}{50} - 3.86^2$
$= 1.0804$

(c) $\sqrt{1.0804} = 1.039$

3 (a) $28 - 5 = 23$

(b) $27 - 22 = 5$

(c) Julat antara kuartil adalah lebih sesuai untuk mengukur data di atas kerana wujudnya pencilan, 5. *Interquartile range is more suitable to measure the above data because of the existence of an outlier, 5.*

4 (a) (i) Sisihan piawai adalah lebih sesuai untuk dijadikan sukatan serakan. Walaupun julat bagi lompatan Fauzi dan Xiang adalah sama, iaitu 0.4 meter, tetapi konsisten lompatan mereka hanya dapat diukur melalui sisihan piawai. *Standard deviation is a more suitable measure of dispersion. Although range between the results of Fauzi and Xiang are the same, which is 0.4 metre, but their consistency can only be measured through standard deviation.*
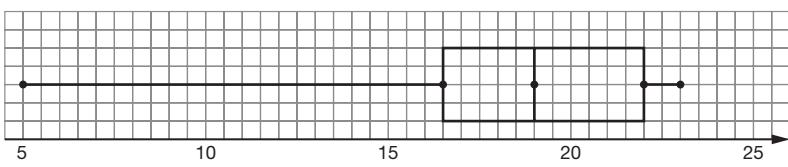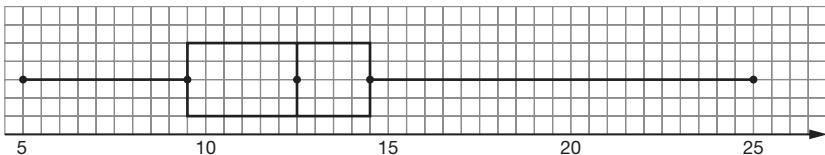
(ii)

Fauzi	x	x^2
	1	1
	0.6	0.36
	0.8	0.64
	0.9	0.81
	0.8	0.64
	0.7	0.49
TOTAL	4.8	3.94

Min/*Mean* $= \dfrac{4.8}{6} = 0.8$

Varians/*Variance* $= \dfrac{3.94}{6} - 0.8^2 = 0.01667$

Sisihan piawai/*Standard deviation* $= \sqrt{0.01667}$
$= 0.1291$

Sisihan piawai bagi lompatan Fauzi/*Standard deviation for Fauzi's jump* = 0.1291

Xiang	x	x^2
	0.7	0.49
	0.6	0.36
	0.6	0.36
	0.8	0.64
	1	1
	0.6	0.36
TOTAL	4.3	3.21

Min/*Mean* $= \dfrac{4.3}{6} = 0.7167$

Varians/*Variance* $= \dfrac{3.21}{6} - 0.7167^2$
$= 0.02134$

Sisihan piawai/*Standard deviation* $= \sqrt{0.02134}$
$= 0.1461$

Sisihan piawai bagi lompatan Xiang/*Standard deviation for Xiang's jump* = 0.1461

(b) Sisihan piawai bagi lompatan Fauzi adalah lebih rendah kerana lompatannya adalah lebih konsisten. Fauzi harus dipilih untuk mewakili sekolah. *Standard deviation of Fauzi is lower because his results is more consistent. So Fauzi should be chosen to represent the school.*

5 (a)

(b)

6 (a) (i) 10

    (ii) 50

    (iii) 40

    (iv) 25

    (v) 35

    (vi) 10

    (vii) 31

(b) (i) 0.24

    (ii) 0.49

    (iii) 0.25

    (iv) 0.32

    (v) 0.44

    (vi) 0.12

    (vii) 0.35

7

Sukatan serakan *Measure of dispersion*	Ditambah dengan 2 *Added by 2*	Ditolak dengan 2 *Subtracted by 2*	Didarab dengan 2 *Multiplied by 2*	Dibahagi dengan 2 *Divided by 2*
Julat/*Range* = 6	6	6	$6 \times 2 = 12$	$6 \div 2 = 3$
Julat antara kuartil = 3 *Interquartile range*	3	3	$3 \times 2 = 6$	$3 \div 2 = 1.5$
Varians/*Variance* = 4	4	4	$4 \times 2^2 = 16$	$4 \div 2^2 = 1$
Sisihan piawai = 2 *Standard deviation*	2	2	$2 \times 2 = 4$	$2 \div 2 = 1$

8 (a)

	x	x^2
	1	1
	2	4
	3	9
	4	16
	5	25
	6	36
	7	49
TOTAL	28	140

Min/*Mean* $= \dfrac{28}{7}$

    $= 4$

Diberi min baharu selepas penambahan x kepada setiap data ialah 14. Oleh itu $x = 10$.
Given the new mean after adding x to each of the data is 14. *Thus, x = 10.*

(b) $\dfrac{140}{7} - 4^2 = 4$

(c) a ialah sebarang nilai/*a can be any value,*
$4 \times (3)^2 = 36$
Oleh itu/*Therefore,* $b = 3$

9 (a)

	x	x^2
	6	36
	6	36
	7	49
	8	64
	9	81
	9	81
	9	81
	11	121
	18	324
TOTAL	**83**	**873**

Min/*Mean* $= \dfrac{83}{9}$

    $= 9.222$

Varians/*Variance* $= \dfrac{873}{9} - 9.222^2$

    $= 11.95$

(b) $873 - 324 = 549$

Min/*Mean* $= \dfrac{65}{8}$

    $= 8.125$

Varians/*Variance* $= \dfrac{549}{8} - 8.125^2$

    $= 2.609$

Sisihan piawai/*Standard deviation* $= \sqrt{2.609}$

    $= 1.615$

10 Julat/*Range* $= (38 \div 2) - (17 \div 2)$

    $= 10.5$

Varians/*Variance* $= 7^2$

    $= 49$

Varians baru/*New variance* $= \dfrac{49}{2^2} = 12.25$

11 Julat antara kuartil/*Interquartile range* $= 10 \times 3$
$$= 30$$
Sisihan piawai lama/*Previous standard deviation*
$= 1.5811$
Sisihan piawai baharu/*New standard deviation*
$= 1.5811 \times 3$
$= 4.743$

12 Kelas/*Class A*

A	x	f	fx	fx^2
	3	6	18	54
	4	6	24	96
	5	10	50	250
	6	7	42	252
	7	1	7	49
TOTAL		**30**	**141**	**701**

Min/*Mean*, $\bar{x} = \dfrac{141}{30}$
$$= 4.7$$
Varians/*Variance*, $\sigma^2 = \dfrac{701}{30} - 4.7^2$
$$= 1.277$$
Sisihan piawai/*Standard deviation* $= \sqrt{1.277}$
$$= 1.130$$

Kelas/*Class B*

B	x	f	fx	fx^2
	3	8	24	72
	4	7	28	112
	5	9	45	225
	6	5	30	180
	7	1	7	49
TOTAL		**30**	**134**	**638**

Min/*Mean*, $\bar{x} = \dfrac{134}{30}$
$$= 4.467$$
Varians/*Variance*, $\sigma^2 = \dfrac{638}{30} - 4.467^2$
$$= 1.313$$
Sisihan piawai/*Standard deviation* $= \sqrt{1.313}$
$$= 1.146$$
Murid dari kelas *A* adalah lebih cekap kerana sisihan piawai bagi masa yang diambil adalah lebih kecil.
Pupils from class A are more efficient because the standard deviation for the time taken is smaller.

13

Joe	x	x^2
	80	6 400
	78	6 084
	90	8 100
	82	6 724
	79	6 241
TOTAL	**409**	**33 549**

Min/*Mean*, $\bar{x} = \dfrac{409}{5}$
$$= 81.8$$
Varians/*Variance*, $\sigma^2 = \dfrac{33\,549}{5} - 81.8^2$
$$= 18.56$$
Sisihan piawai/*Standard deviation*, $\sigma = \sqrt{18.56}$
$$= 4.308$$

Selvam	x	x^2
	80	6 400
	73	5 329
	68	4 624
	75	5 625
	99	9 801
TOTAL	**395**	**31 779**

Min/*Mean*, $\bar{x} = \dfrac{395}{5}$
$$= 79$$
Varians/*Variance*, $\sigma^2 = \dfrac{31\,779}{5} - 79^2$
$$= 114.8$$
Sisihan piawai/*Standard deviation*, $\sigma = \sqrt{114.8}$
$$= 10.71$$
Joe mempunyai pencapaian yang lebih konsisten kerana sisihan piawai baginya lebih kecil.
Joe performed more consistently because the standard deviation is smaller.

14 Kumpulan/*Group* X
$$\dfrac{4\,100}{\sum f} = 164$$
$$\sum f = 25$$
$$\dfrac{\sum x^2}{25} - 164^2 = 2.2$$
$$\sum x^2 = 672\,455$$

Kumpulan /*Group* Y
$$\dfrac{5\,530}{\sum f} = 158$$
$$\sum f = 35$$
$$\dfrac{\sum y^2}{35} - 158^2 = 2.8$$
$$\sum y^2 = 873\,838$$

Min bergabung/*Combined mean* $= \dfrac{4\,100 + 5\,530}{35 + 25}$
$$= 160.5$$
Sisihan piawai bergabung/*Combined standard deviation*
$$= \sqrt{\dfrac{672\,455 + 873\,838}{60} - 160.5^2}$$
$$= \sqrt{11.3}$$
$$= 3.362$$

15 1, 2, *b*, 8, *a*, 24
Julat antara kuartil/*Interquartile range* $= 9$
$$a - 2 = 9$$
$$a = 11$$

$$\text{Min/Mean} = \frac{25}{3}$$

$$\frac{1 + 2 + b + 8 + 11 + 24}{6} = \frac{25}{3}$$

$$1 + 2 + b + 8 + 11 + 24 = 50$$

$$b = 4$$

(a) $a = 11$, $b = 4$

(b)

	x	x^2
	1	1
	2	4
	4	16
	8	64
	11	121
	24	576
TOTAL	**50**	**782**

$$\text{Min/Mean, } \bar{x} = \frac{50}{6}$$
$$= 8.333$$

$$\text{Sisihan piawai/Standard deviation, } \sigma = \sqrt{\frac{782}{6} - 8.333^2}$$
$$= \sqrt{60.89}$$
$$= 7.803$$

16

	x	x^2
	-2	4
	-1	1
	0	0
	4	16
	6	36
	9	81
TOTAL	**16**	**138**

$$\text{Min/Mean, } \bar{x} = \frac{16}{6}$$
$$= 2.667$$

$$\text{Sisihan piawai/Standard deviation, } \sigma = \sqrt{\frac{138}{6} - 2.6667^2}$$
$$= \sqrt{15.89}$$
$$= 3.986$$

Praktis Sumatif

Kertas 1

1 B **2** D **3** A **4** D **5** A
6 C **7** D

Kertas 2

Bahagian/*Section* A

1 (a) Varians/*Variance* = 2

$$\frac{132}{y} - \left(\frac{36}{y}\right)^2 = 2$$

$$\frac{132}{y} - \frac{1\,296}{y^2} = 2$$

$$132y - 2y^2 - 1\,296 = 0$$

$$2y^2 - 132y + 1\,296 = 0$$

$$(y - 54)(2y - 24) = 0$$

$y = 54$ (Ditolak/*rejected*) atau/*or* $y = 12$ (Diterima/*accepted*)

Oleh itu/*Therefore*, $y = 12$.

(b) 30 ialah pencilan. Apabila nilai yang jauh daripada min ditambahkan, sisihan piawai baharu menjadi semakin besar.
30 *is an outlier. When the value that has a greater difference from mean is added, the new standard deviation will be larger.*

2 (a) Julat antara kuartil/*Interquartile range* = x

Varians/*Variance* = $\dfrac{y}{9}$

(b) Julat antara kuartil/*Interquartile range* = $\dfrac{9x}{2}$

Varians/*Variance* = $\dfrac{9y}{4}$

Bahagian/*Section* B

3

Data set / *Set of data*	Julat / *Range*	Julat antara kuartil / *Interquartile range*	x	y
x, 3, 4, 5, 8, 9, y, 10	8	5.5	$10 - x = 8$ $x = 2$	$\dfrac{9 + y}{2} - \dfrac{3 + 4}{2} = 5.5$ $y = 9$
y, x, 10, 13, 15, 20, 21, 22, 24	$24 - 7 = 17$	$\dfrac{21 + 22}{2} - \dfrac{8 + 10}{2} = 12.5$	8	7
x, 4, 5, 6, 6, 7, 7, y, 8, 8	5	3	$8 - x = 5$ $x = 3$	$y - 5 = 3$ $y = 8$
25, 25, 27, 28, 28, 31, 33, x, y	13	7.5	$\dfrac{33 + x}{2} - \dfrac{25 + 27}{2} = 7.5$ $x = 34$	$y - 25 = 13$ $y = 38$

4 (a)

	x	f	fx	fx^2
	300	1	300	90 000
	400	5	2 000	800 000
	500	16	8 000	4 000 000
	600	6	3 600	2 160 000
	700	2	1 400	980000
TOTAL	2 500	30	15 300	8 030 000

Min/*Mean*, $\bar{x} = \dfrac{15\,300}{30}$

$= 510$

Sisihan piawai/*Standard deviation*, σ

$= \sqrt{\dfrac{8\,030\,000}{30} - 510^2}$

$= \sqrt{7\,566.667}$

$= 86.99$

(b) Julat antara kuartil/*Interquartile range*

(c) $\dfrac{\sum x}{31} = 500$

$\sum x = 15\,500$

RM15 500 – RM15 300 = RM200

5 (a) **Tina**

Min/*Mean*, $\bar{x} = \dfrac{567}{6}$

$= 94.5$

Varians/*Variance*, $\sigma^2 = \dfrac{53\,713}{6} - 94.5^2$

$= 21.92$

Joey

Min/*Mean*, $\bar{x} = \dfrac{283.5}{6}$

$= 47.25$

Varians/*Variance*, $\sigma^2 = \dfrac{13\,428.58}{6} - 47.25^2$

$= 5.479$

(b) Berdasarkan varians yang dihitung, didapati bahawa varians markah Tina adalah 4 kali daripada varians markah Joey. Jadi, markah Joey adalah separuh daripada markah Tina.
Based on the variance, the variance of Tina's marks is 4 times the variance of Joey's marks. Thus, Joey's marks is half of that of Tina's marks.

Bahagian/*Section* C

6

Panjang/*Length*(cm)	1	2	3	4	5	6
Bilangan serangga *Number of insects*	4	20	10	9	5	2
Kekerapan Longgokan *Cumulative frequency*	4	24	34	43	48	50

(a) Julat/*Range* = 6 cm – 1 cm

$= 5$ cm

$Q1 = \dfrac{50}{4}$

= nilai ke–12.5/12.5*th value*

= 2 cm

$Q3 = \dfrac{3}{4} \times 50$

= nilai ke–37.5/37.5*th value*

= 4 cm

Julat antara kuartil/*Interquartile range*

= 4 cm – 2 cm

= 2 cm

	x	f	fx	fx^2
	1	4	4	4
	2	20	40	80
	3	10	30	90
	4	9	36	144
	5	5	25	125
	6	2	12	72
TOTAL	21	50	147	515

Min/*Mean*, $\bar{x} = \dfrac{147}{50}$

$= 2.94$

Varians/*Variance*, $\sigma^2 = \dfrac{515}{50} - 2.94^2$

$= 1.6564$ cm^2

Sisihan piawai/*Standard deviation*, $\sigma = \sqrt{1.6564}$

$= 1.287$ cm

(b) Julat/*Range* = 50 mm

Julat antara kuartil/*Interquartile range* = 20 mm

Varians/*Variance* = 165.6 mm^2

Sisihan piawai/*Standard deviation* = 12.87 mm

(c) Semua kekal sama seperti dalam 6(a).
All remain the same as in 6(a).

(d) Julat antara kuartil/*Interquartile range*