Fully-worked Solutions

Practice 12

Formative Practice

1 $n = 18$

$\text{Median} = \dfrac{x_9 + x_{10}}{2}$

$= \dfrac{2 + 3}{2}$

$= 2.5$

Answer: **C**

2 (a) 6 (b) 8 (c) 2, 7

3 (a) ✓ (b) ✗

4 (a) $\text{Mean} = \dfrac{24 + 21 + 27 + 24 + 19}{5}$

$= \dfrac{115}{5}$

$= 23$

(b) $\text{Mean} = \dfrac{20 + 28 + 25 + 15 + 20 + 18}{6}$

$= \dfrac{126}{6}$

$= 21$

(c) $\text{Mean} = \dfrac{23 + 12 + 32 + 30 + 10 + 7 + 25 + 21}{8}$

$= \dfrac{160}{8}$

$= 20$

5 $\dfrac{4 + 6 + 24 + 8 + 15}{20} = \dfrac{57}{20}$

$= \text{RM}2.85$

6 (a) 9, 13, 17, 18, 20, 21, 25, 25

$n = 8$

$\text{Median} = \dfrac{x_4 + x_5}{2}$

$= \dfrac{18 + 20}{2}$

$= 19$

(b) 7, 10, 13, 14, 16, 19, 19, 20, 24

$n = 9$

$\text{Median} = x_5$

$= 16$

7 (a) $n = 23$

$\text{Median} = x_{12}$

$= 13 \text{ mm}$

(b) $n = 18$

$\text{Median} = \dfrac{x_9 + x_{10}}{2}$

$= \dfrac{22 + 23}{2}$

$= 22.5 \text{ g}$

8 (a) 7, 10, 12, 12, 14, 14, 14, 16, 18

(i) Mode = 14

(ii) Median = 14

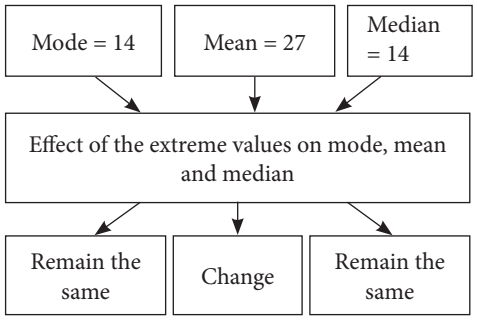
(iii) Mean

$= \dfrac{7 + 10 + 12 + 12 + 14 + 14 + 14 + 16 + 18}{9}$

$= \dfrac{117}{9}$

$= 13$

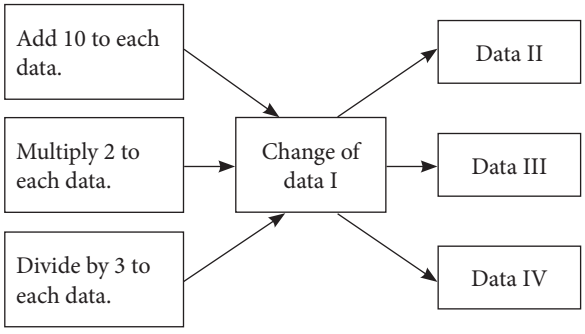
(b)



9 (a)

	Mode	Mean	Median
Data I	9	9.6	9
Data II	19	19.6	19
Data III	18	19.2	18
Data IV	3	3.2	3

(b)



(c) (i) Mode of data II = Mode of data I + 10

Mean of data II = Mean of data I + 10

Median of data II = Median of data I + 10

(ii) Mode of data III = Mode of data I × 2

Mean of data III = Mean of data I × 2

Median of data III = Median of data I × 2

(iii) Mode of data IV = Mode of data I ÷ 3
Mean of data IV = Mean of data I ÷ 3
Median of data IV = Median of data I ÷ 3

10

Age (year)	Tally	Frequency
1 – 2	𝍸	5
3 – 4	||	2
5 – 6	𝍸||	7
7 – 8	||||	4
9 – 10	||||	4
11 – 12	|||	3

11 (a) $2 + x + 8 + 5 + 10 + 6 = 35$
$x + 31 = 35$
$x = 4$

(b) Number of towns with temperatures from 8°C to 15°C
$= 8 + 5$
$= 13$

(c) Range of temperature of towns with the highest frequency = (16 – 19)°C

12 (a) 21 – 30

(b) 70 – 89

13 (a)

Monthly water bill (RM)	Frequency	Midpoint class	Frequency × Midpoint class
1 – 5	10	3	30
6 – 10	25	8	200
11 – 15	30	13	390
16 – 20	15	18	270
21 – 25	20	23	460
		Total	1 350

(b) Mean monthly water bill $= \text{RM}\frac{1\,350}{100}$
$= \text{RM}13.50$

14 (a) (i) Mode
(ii) Categorical data

(b) (i) Mode
(ii) Categorical data

(c) (i) Median
(ii) Numerical data with extreme value.

(d) (i) Mean
(ii) Numerical data without extreme value.

15 (a) $x + 30° + 90° + 110° = 360°$
$x + 230° = 360°$
$x = 130°$ [✗]

(b) WhatsApp has the largest angle of sector.
∴ Mode is WhatsApp. [✓]

16 (a) Mode = 4

(b) Mean $= \frac{8 + 4 + 8 + 16 + 12 + 4 + 4}{7}$
$= \frac{56}{7}$
$= 8$

(c) 4, 4, 4, 8, 8, 12, 16
Median $= x_4$
$= 8$

17 (a) Mode = 26 minutes

(b) Mean $= \frac{498}{20}$
$= 24.9$ minutes

(c) Median $= \frac{x_{10} + x_{11}}{2}$
$= \frac{23 + 26}{2}$
$= 24.5$ minutes

18 (a) (i) Mode = 21

(ii) Median $= \frac{19 + 20}{2}$
$= 19.5$

(b) Mean age
$= \frac{2(15) + 3(16) + 5(17) + 2(18) + 3(19) + 5(20) + 6(21) + 3(24) + 1(25)}{30}$
$= \frac{30 + 48 + 85 + 36 + 57 + 100 + 126 + 72 + 25}{30}$
$= \frac{579}{30}$
$= 19.3$

19 (a) Azri: 50, 68, 74, 82, 90
Median = 74
Danesh: 66, 70, 74, 88, 96
Median = 74
Kumar: 55, 72, 74, 95, 98
Median = 74
Yes, Azri, Danesh and Kumar achieved the same median mark.

(b) Azri: Mean mark
$= \frac{74 + 50 + 82 + 90 + 68}{5}$
$= \frac{364}{5}$
$= 72.8$
Danesh: Mean mark
$= \frac{70 + 88 + 74 + 96 + 66}{5}$
$= \frac{394}{5}$
$= 78.8$

Kumar: Mean mark

$$= \frac{95 + 74 + 55 + 98 + 72}{5}$$

$$= \frac{394}{5}$$

$$= 78.8$$

(c) The mean marks of Danesh and Kumar are equally high as compared to Azri. However, Danesh's marks are more consistent than Kumar. Hence, Danesh, Kumar and Azri qualify to receive the first, second and third prizes respectively.

Summative Practice

1 36.2, 36.3, 36.4, 36.4, 36.5, 36.6

Mode = 36.4°C

Median = 36.4°C

$$\text{Mean} = \frac{36.2 + 36.3 + 36.4 + 36.4 + 36.5 + 36.6}{6}$$

$$= \frac{218.4}{6}$$

$$= 36.4°C$$

Mode = Median = Mean

Answer: **A**

2 $n = 20$

$$\text{Median} = \frac{x_{10} + x_{11}}{2}$$

$$= \frac{39 + 42}{2}$$

$$= \frac{81}{2}$$

$$= 40.5$$

Answer: **C**

3 The modal annual income tax is RM500.

Answer: **A**

4 3, 3, 3, x, x, 9

$$\frac{3 + x}{2} = 5$$

$$3 + x = 10$$

$$x = 7$$

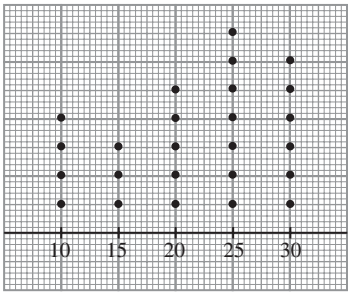
$$\text{Mean} = \frac{3 + 3 + 3 + 7 + 7 + 9 + 8 + 12}{8}$$

$$= \frac{52}{8}$$

$$= 6.5$$

Answer: **A**

5



Mass (kg)

Mean mass

$$= \frac{4(10) + 3(15) + 5(20) + 7(25) + 6(30)}{25}$$

$$= \frac{40 + 45 + 100 + 175 + 180}{25}$$

$$= \frac{540}{25}$$

$$= 21.6 \text{ kg}$$

Answer: **B**

6

Marks	0	1	2	3	4
Number of students	2	5	x	10	7

(a) Mode = 3

$\therefore x < 10$

(b) Mean = 2.5

$$\frac{2(0) + 5(1) + x(2) + 10(3) + 7(4)}{2 + 5 + x + 10 + 7} = 2.5$$

$$\frac{5 + 2x + 30 + 28}{x + 24} = 2.5$$

$$\frac{2x + 63}{x + 24} = 2.5$$

$$2x + 63 = 2.5(x + 24)$$

$$2x + 63 = 2.5x + 60$$

$$0.5x = 3$$

$$x = 6$$

(c)

Marks	0	1	2	3	4
Number of students	2	5	6	10	7

$n = 30$

$$\text{Median} = \frac{x_{15} + x_{16}}{2}$$

$$= \frac{3 + 3}{2}$$

$$= 3$$

7 (a) Total price of purses bought by 25 customers = RM1 530

$$\text{Mean} = \frac{\text{RM1 530}}{25}$$

(b) = RM61.20

Price (RM)	**Frequency**
1 – 20	1
21 – 40	6
41 – 60	5
61 – 80	8
81 – 100	2
101 – 120	3

(c) $\sum fx = 1(10.5) + 6(30.5) + 5(50.5) + 8(70.5) + 2(90.5) + 3(110.5)$
$= 10.5 + 183 + 252.5 + 564 + 181 + 331.5$
$= 1\,522.5$

$\text{Mean} = \frac{\text{RM1 522.5}}{25}$
$= \text{RM60.90}$

(d) Mean calculated from the actual data is accurate whereas mean calculated from the grouped data is an approximation.

8 (a) Mode = RM3 500
Total bonus paid = RM69 100

$\text{Mean} = \frac{\text{RM69 100}}{20}$
$= \text{RM3 455}$

$\text{Median} = \frac{x_{10} + x_{11}}{2}$
$= \frac{3\,400 + 3\,500}{2}$
$= \text{RM3 450}$

(b) Median, has an extreme value, RM9 600.

(c) Mode = RM3 500 + RM500
= RM4 000

Mean = RM3 455 + RM500
= RM3 955

Median = RM3 450 + RM500
= RM3 950