Learn at Home with Diverse Online Resources

In view of the impact brought by the new coronavirus, schools in Hong Kong have delayed school resumption after the Lunar New Year Holiday. Let's make good use of this online resources to facilitate us to learn at home.

Name: _____(   )   Class: F.5E

F5 Mathematics Chapter 21 Measures of Dispersion (Part 1)

12 February, 2020

Before finish the following excises, let's have a Math chat by scanning the QR code

21.1	Range and Inter-quartile Range	https://qrgo.page.link/jNHdg
21.2	Box-and-Whisker Diagram	https://qrgo.page.link/ex1Zr
21.3	Standard Deviation	https://qrgo.page.link/iptJW
21.4	Applications of Standard Deviation	https://qrgo.page.link/GKcR8
21.5	Effects on Dispersion with Changes in Data	https://qrgo.page.link/b5wxh

Exercises 1 on Measures of Dispersion

(Ch.21.1 Range and Inter-quartile Range)

1. Find the range of each of the following sets of data.

    (a) –4, 4, –7, 9, –2, 3
    (b) 58, 82, 78, 61, 33, 49, 47

    (c) –0.8, –1.0, 1.3, 0.2, –0.9, –2.9, –1.7, –2.1

2. The table shows the expenses of 20 people on a day.

Expense ($)	30 – 39	40 – 49	50 – 59	60 – 69
Frequency	3	9	6	2

    Find the range of the expenses of the people on that day.

3. Find the inter-quartile range of each of the following sets of data.

    (a) 5, 7, 10, 13, 15, 16
    (b) 2, 7, 9, 12, 13, 18, 23

    (c) 20, 23, 27, 28, 36, 38, 42, 51
    (d) 15, 20, 23, 28, 32, 36, 41, 46, 48

4. Find the inter-quartile range of each of the following sets of data.

(a) 19, 18, 25, 16, 21, 14

(b) 35, 42, 48, 47, 35, 32, 45

(c) 25.3, 22, 26.2, 22.7, 21.5, 14.7, 18.9, 14.1

(d) $x - 3, x + 1, x + 2, x - 1, x - 5, x, x - 1, x + 4, x - 2$

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5. The waiting time (in min) of 9 patients in a clinic are shown below.

$$17, 22, 24, 18, 22, 28, 23, 29, 24$$

(a) Find the range of the waiting time of the patients.

(b) Find the inter-quartile range of the waiting time of the patients.

6. The daily attendance of two tutorial classes in a week are shown below.

       Class A: 49, 41, 39, 46, 36, 42, 42

       Class B: 39, 38, 45, 36, 42, 35, 36

(a) Find the range of the daily attendance of each class in the week.

    Class A:

    Class B:

(b) By comparing the ranges found in **(a)**, which class has a smaller dispersion in the daily attendance? Explain your answer.

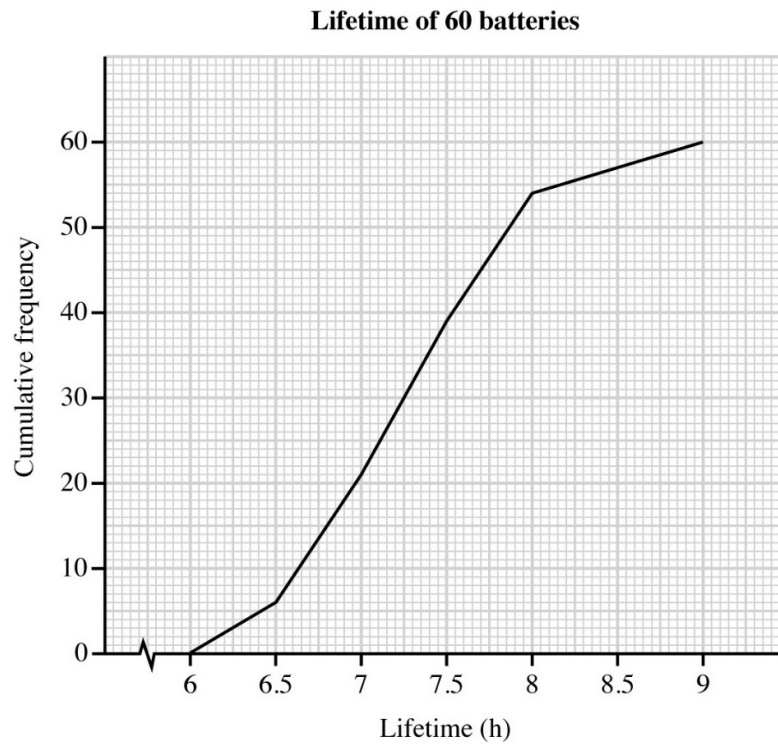**7.** Consider the following two sets of data.

       Set A: 75, 55, 46, 79, 84, 58, 63, 72

       Set B: 87, 75, 58, 77, 53, 84, x, 58

(a) Find the values of x if the two sets of data have the same range.

(b) For each of the values of x found in **(a)**, find the inter-quartile range of set B.

8. The figure shows the cumulative frequency polygon of the lifetime of 60 batteries.

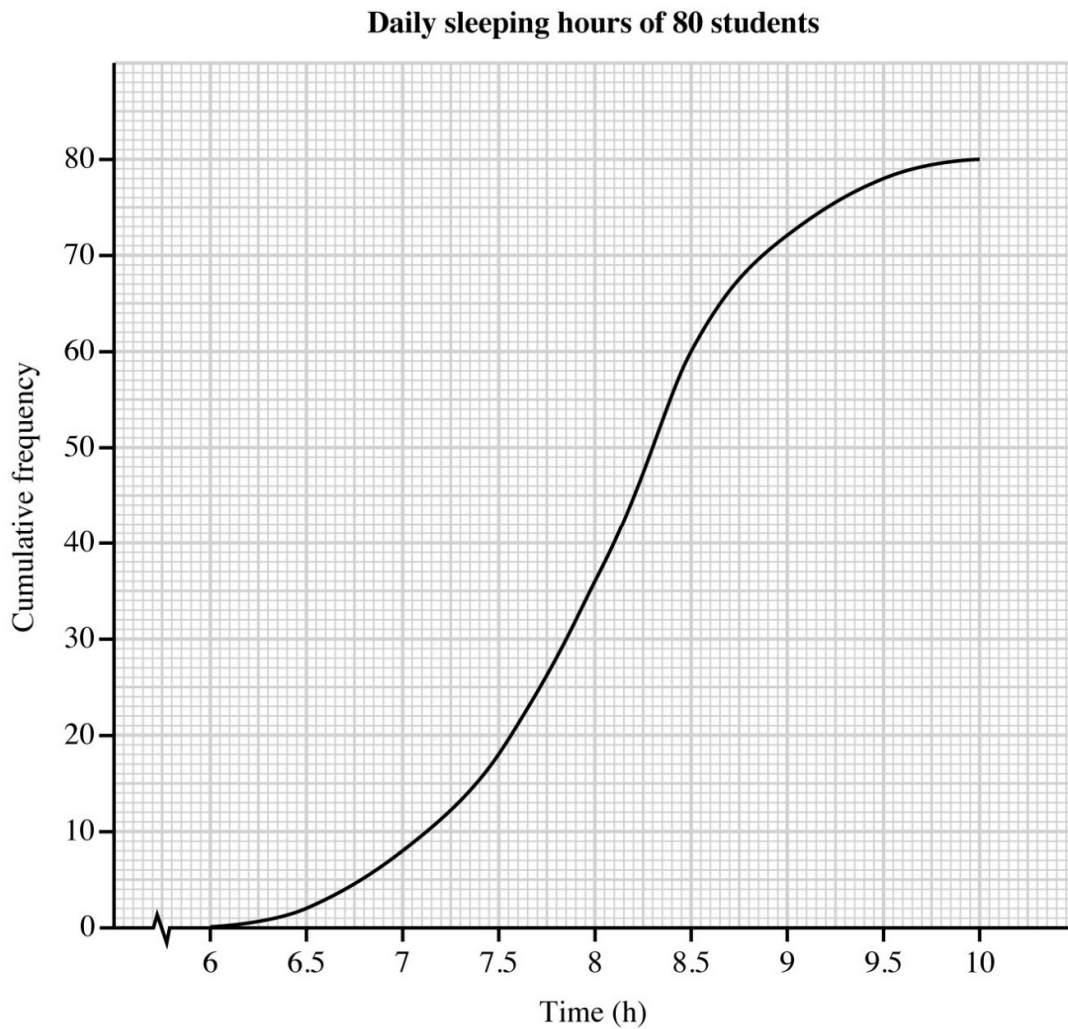**Lifetime of 60 batteries**

(a) Find the median, the first quartile and the third quartile of the lifetime of the batteries.

Median = $\qquad$ Q_1 = $\qquad$ Q_3 = $\qquad$

(b) Find the inter-quartile range of the lifetime of the batteries.

9. The figure shows the cumulative frequency curve of the daily sleeping hours of 80 students.

Daily sleeping hours of 80 students
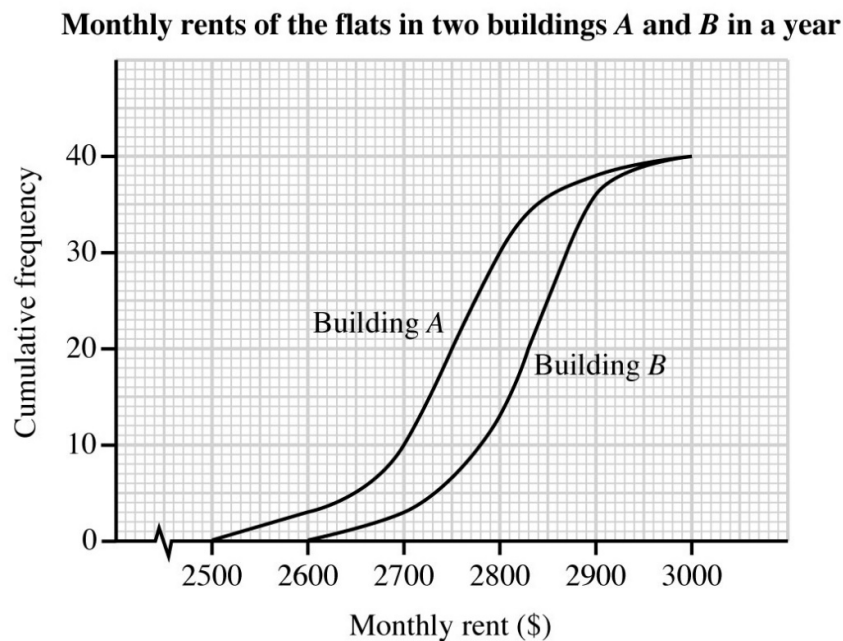

(a) Find the median, the first quartile and the third quartile of the daily sleeping hours of the students.

Median = Q_1 = Q_3 =

(b) Find the inter-quartile range of the daily sleeping hours of the students.

10. The figure shows the cumulative frequency curves of the monthly rents of the flats in buildings A and B in a year.

Monthly rents of the flats in two buildings A and B in a year

(a) Find the median, the first quartile and the third quartile of monthly rents of the flats of each building.

<u>**Building A**</u>	<u>**Building B**</u>
Median =	Median =
Q_1 =	Q_1 =
Q_3 =	Q_3 =

(b) (i) Find the inter-quartile range of the monthly rents of the flats of each building.

(ii) By comparing the inter-quartile ranges found in **(b)(i)**, which building has a smaller dispersion in the monthly rents of the flats?

11. The stem-and-leaf diagram shows the maximum daily temperatures (in °C) in June.

Stem (1°C)	Leaf (0.1°C)
28	4 8 9
29	1 1 1 4 6 7 8 9
30	2 3 4 x 7
31	0 1 5 6 7 8 y
32	3 5
33	0 4 5 8 8

It is known that the median and the inter-quartile range of the maximum daily temperatures in June are 30.6°C and 2.3°C respectively. Find the values of x and y.

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12. The stem-and-leaf diagram shows the scores of 30 students of class 5A in an examination.

Stem (10 marks)	Leaf (1 marks)
4	0 4 7
5	1 2 3 3 6 9
6	0 1 1 2 5 7 8 9
7	1 2 2 3 4 6 7 9
8	0 3 8
9	4 5

(a) Find the range of the scores of the students of class 5A.

(b) Find the inter-quartile range of the scores of the students of class 5A.

(c) A student is selected randomly from class 5A. Find the probability that the student selected scores

(i) 70 or above,

(ii) 60 or below.

13. The stem-and-leaf diagram shows the hourly wages of the employees of two companies A and B.

<u>Company A</u>   <u>Company B</u>

Leaf ($1)	Stem ($10)	Leaf ($1)
5	2	9
2	3	4 x
9 7 3 2	4	0 7 y
2	5	5
2	6	0

It is known that the mean hourly wages of the employees of both companies are the same and the inter-quartile range of the hourly wages of the employees of company B is $15.

(a) Find the values of x and y.

(b) Find the inter-quartile range of the hourly wages of the employees from company A.

(c) By comparing the inter-quartile ranges found in (a), which company has a larger dispersion in

the hourly wages of the employees?

Exercises 2 on Measures of Dispersion
(Ch.21.2 Box-and-whisker Diagrams)

1. The box-and-whisker diagram shows the weights of newborn babies in a hospital on a day.

    Find the median, the range and the inter-quartile range of their weights.

    Weight (kg)
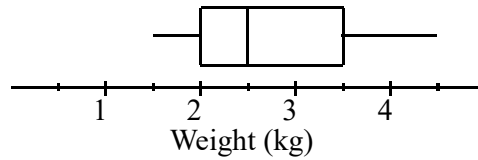
    Median =

    Range =

    Inter-quartile range =

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2. The stem-and-leaf diagram shows the time spent daily by John on reading books in 14 days.

Stem (10 min)	Leaf (1 min)
2	5 5 8 9
3	0 1 1 3 4 5 7
4	1 1 2

    (a) Find the minimum, the maximum, the median, the first quartile and the third quartile of the time spent daily by John on reading books.

    Minimum = $Q_1 =$

    Maximum = $Q_3 =$

    Median =

    (b) Draw a box-and-whisker diagram to describe the time spent daily by John on reading books.

    24   26   28   30   32   34   36   38   40   42

3. The figure shows the cumulative frequency curve of the monthly salaries of 80 people.
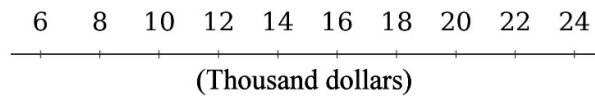
Monthly salaries of 80 people

(a) Find the minimum, the maximum, the median, the first quartile and the third quartile of the monthly salaries of the people.
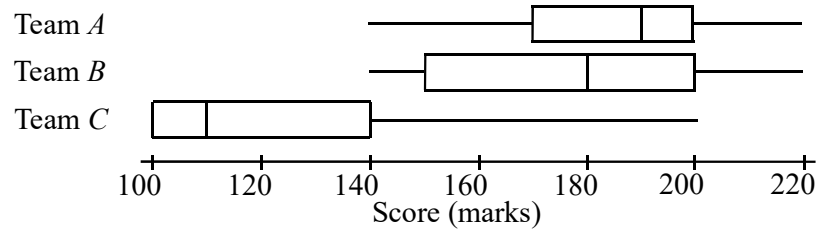
Minimum = $Q_1 =$

Maximum = $Q_3 =$

Median =

(b) Draw a box-and-whisker diagram to describe the monthly salaries of the people.

6   8   10   12   14   16   18   20   22   24

(Thousand dollars)

4. The box-and-whisker diagrams show the scores obtained by 3 bowling teams in a competition.

(a) Which team has the largest range of scores?

(b) Which team has the smallest inter-quartile range of scores?

(c) Which team has the highest median score?

**(d)** Which team performs the best? Explain your answer briefly.

5. The figure shows the cumulative frequency curves of the scores of students in classes A and B in an examination.

Scores of students in two classes A and B in an examination
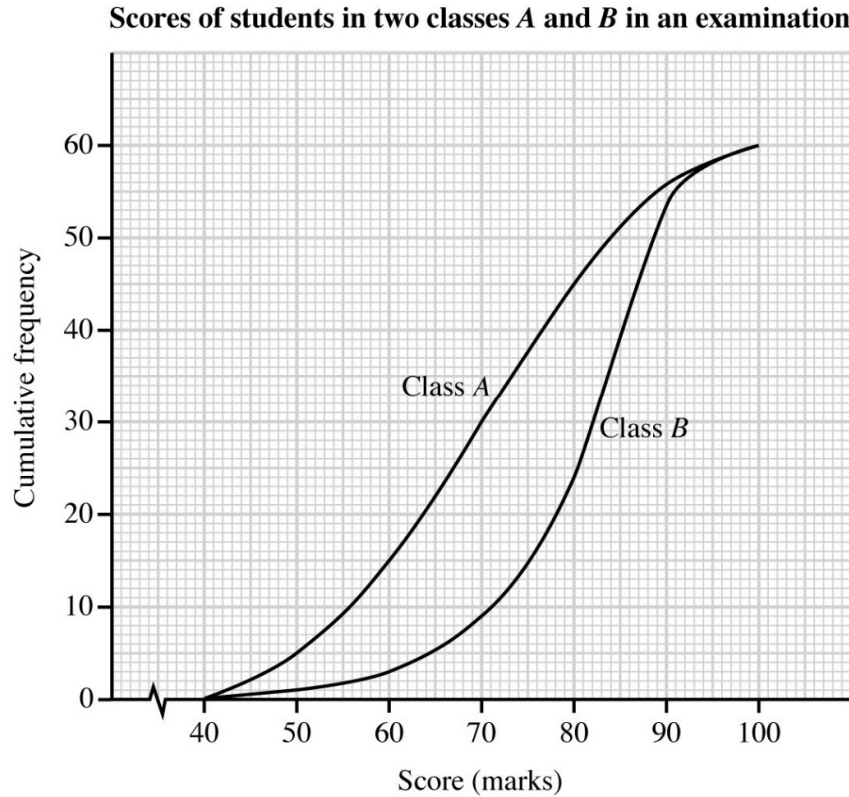
(a) Draw box-and-whisker diagrams in the same figure to describe the scores of the students of Classes A and B respectively.

Class A

Class B

40 45 50 55 60 65 70 75 80 85 90 95 100
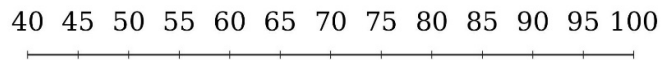
(b) Which class has a larger dispersion in scores in the examination? Explain your answer briefly.

(c) Which class does better in the examination? Explain your answer briefly.

Exercises 3 on Measures of Dispersion
(Ch.21.3 Standard Deviation)

In this exercise, give the answers correct to 3 significant figures if necessary.

1. The mean of six numbers 4, 8, 7, k, 12, 9 is 9.

    (a) Find the value of k.

    (b) Find the standard deviation of the six numbers.

2. The table shows the numbers of sick leaves taken by the 30 employees of a company in a year.

Number of sick leaves taken	0	1	2	3	4	5
Frequency	5	8	4	9	3	1

    Find the mean and the standard deviation of the numbers of sick leaves taken.

3. The table shows the numbers of movies watched by 40 people in a month.

Number of movies watched	0	1	2	3	4	5
Frequency	3	6	10	13	x	3

    Find the mean and the standard deviation of the numbers of movies watched by the people in that month.

4. The table shows the areas of 50 flats.

| Area (m²)	Class mark (m²)	Frequency
40 – 44		13
45 – 49		14
50 – 54		11
55 – 59		6
60 – 64		4
65 – 69		2

(a) Complete the above table.

(b) Find the mean and the standard deviation of the areas of the flats.

5. The table shows the daily profits of a restaurant in April.

Daily profit (thousand dollars)	Class mark (thousand dollars)	Frequency
4.5 – 4.9		5
5.0 – 5.4		10
5.5 – 5.9		
6.0 – 6.4		4
6.5 – 6.9		5

(a) Complete the above table.

(b) Find the mean and the standard deviation of the daily profits of the restaurant in April.

6. The histogram shows the scores of a group of students in an examination.

Scores of a group of students in an examination
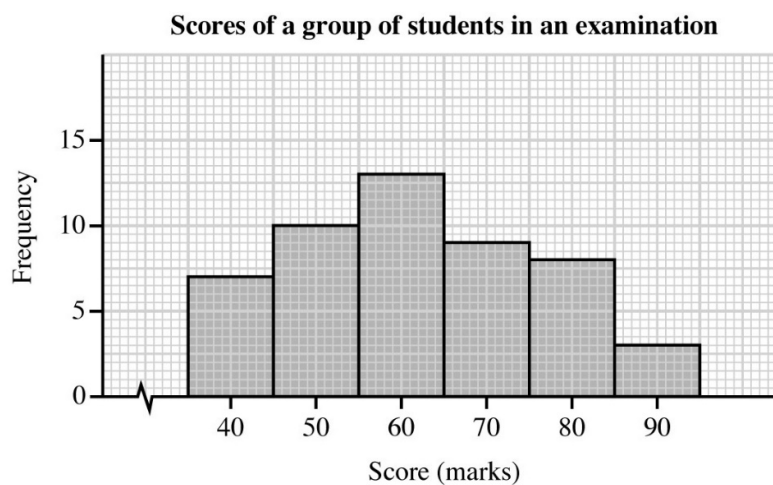
(a) Find the total number of students in the group.

(b) Find the mean and the standard deviation of the scores of the students of the group.

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7. The table shows the amounts of petrol consumed by two cars A and B in five days.

	Day 1	Day 2	Day 3	Day 4	Day 5
Car A	7.4 L	6.4 L	7.3 L	7.9 L	7.2 L
Car B	7.8 L	8.1 L	7.1 L	6.2 L	6.8 L

(a) Find the mean and the standard deviation of the amounts of petrol consumed by each car.

(b) Using the results of **(a)**, which car has a larger dispersion in the amounts of petrol consumed.

8. The table shows the numbers of students wearing glasses in 30 classes in school A.

Number of students	0 – 4	5 – 9	10 – 14	15 – 19	20 – 24
Frequency	2	12	10	x	1

(a) Find the value of x.

(b) Find the mean and the standard deviation of the numbers of students wearing glasses in 30 classes.

(c) The standard deviation of the numbers of students wearing glasses in 30 classes in school B is 3. Which school has a larger dispersion in the numbers of students wearing glasses?

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