Measures of Dispersion

離差的量度

Exercises(練習)

1. Find the inter-quartile range for each of the following data sets.
求下列各組數據的四分位數間距。

(a) 2, 4, 5, 6, 6, 7, 8, 10, 13

(b) −4, −2, 0, 6, 8, 9, 14, 15

2. The following data show the weights of 8 men. Find the range of their weights.
53 kg, 60 kg, 58 kg, 68 kg, 50 kg, 71 kg, 50 kg, 69 kg.
以下是 8 名男子的體重：
53 kg, 60 kg, 58 kg, 68 kg, 50 kg, 71 kg, 50 kg, 69 kg
求他們體重的分佈域。

3. The following table shows the scores of a basketball team in the 80 matches last season. Find the range of the scores of the basketball team.

Score	Frequency
61–70	3
71–80	11
81–90	23
91–100	26
101–110	14
111–120	3

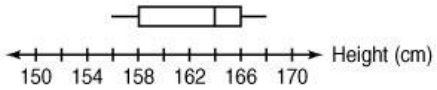
下表所示為某籃球隊在上一個球季中的 80 場比賽的得分。

得分	頻數
61–70	3
71–80	11
81–90	23
91–100	26
101–110	14
111–120	3

求球隊上個球季得分的分佈域。

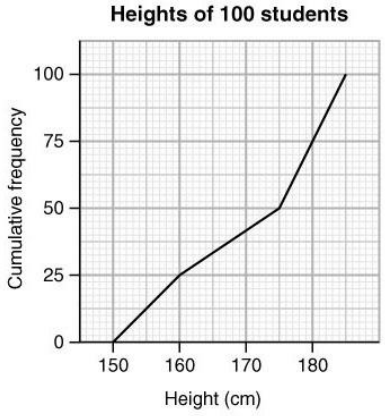
4. By comparing the inter-quartile range for the following sets of data, which set has a greater dispersion?
Data set *A*: 8, 11, 12, 14, 14
Data set *B*: 23, 24, 26, 27, 28, 29
根據下列各組數據的四分位數間距，判斷哪組數據的離差較大。
數據組 *A*: 8, 11, 12, 14, 14
數據組 *B*: 23, 24, 26, 27, 28, 29

5. The following figure is the box-and-whisker diagram of the heights of 100 students in a school.
下圖所示為某校裏 100 名學生的身高的框線圖。



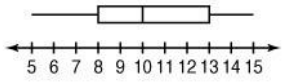
From the box-and-whisker diagram,
(a) find the median height of the students,
(b) find the range and the inter-quartile range of the heights of the students,
(c) describle the distribution of the heights of the students.
根據以上的框線圖，
(a) 求學生身高的中位數；
(b) 求學生身高的分佈域和四分位數間距；
(c) 試描述學生身高的分佈情況。

6. The following figure shows the cumulative frequency polygon of the heights of 100 students.



(a) Find the median, the lower quartile of the heights of the students.
(b) Find the inter-quartile range of the heights of the students.
圖中所示為 100 名學生的身高的累積頻數多邊形。
(a) 求身高的中位數，下四分位數和上四分位數。
(b) 求身高的四分位數間距。

7. Draw a box-and-whisker diagram for the following set of data: 5, 7, 9, 10, 10, 12, 13, 15
繪畫一個框線圖來表示以下的數據組：5, 7, 9, 10, 10, 12, 13, 15



8. The following show the weights of two groups of students.
Group *A*: 69kg, 72 kg, 65 kg, 63 kg, 59 kg, 56 kg, 52 kg, 52 kg
Group *B*: 68 kg, 71 kg, 58 kg,42 kg, 48 kg, 52 kg,53 kg, 51 kg

(a) Find the mean weights of group *A* and group *B*.

(b) Find the standard deviations of group *A* and group B.
(Give your answers correct to 3 significant figures.)

(c) Hence, determine the weights of which group has a greater dispersion.

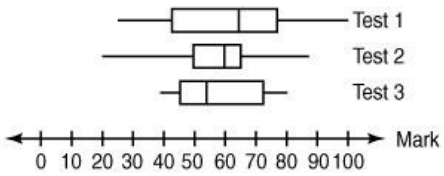
以下所示為兩組學生的體重。
A 組:69kg, 72 kg, 65 kg, 63 kg, 59 kg, 56 kg, 52 kg, 52 kg
B 組:68 kg, 71 kg, 58 kg,42 kg, 48 kg, 52 kg,53 kg, 51 kg

(a) 分別求 *A* 組和 *B* 組的平均體重。

(b) 求 *A* 組和 *B* 組體重的標準差。（答案須準確至三位有效數字。）

(c) 根據 (b) 中所得的結果，哪組的體重的離差較大？

9. The following box-and-whisker diagrams show the distributions of marks in 3 Mathematics tests.
下圖所示為某班在三次數學科測驗中的分數的框線圖。



(a) Which test has the marks with the smallest inter-quartile range?

(b) Which test has the marks with the largest range?

(c) If Mary gets 60 marks in all three tests, in which test does she perform the worst? Briefly explain your answer.

(a) 哪次測驗的分數的四分位數間距最小？

(b) 哪次測驗的分數的分佈域最大？

(c) 若詠詩在三次數學測驗均取得 60 分，這表示她在哪次測驗的表現最差？試略作解釋。

10. Find the standard deviation of the numbers 1, 2, 6, 9, 15 and give your answer correct to 3 significant figures.
求下列一組數據的標準差：1, 2, 6, 9, 15
（答案須準確至三位有效數字。）

11. The following table shows the results of Tom in the first 4 Mathematics tests.

	Marks
Test 1	76
Test 2	83
Test 3	86
Test 4	72
Test 5	?

(a) Find the range and inter-quartile range of Tom's marks in the first 4 tests.

(b) Since Tom is found cheating in Test 5, he gets zero mark in the test.

(i) Will the range of Tom's marks increase r decrease?

(ii) Find the inter-quartile range of Tom's marks in the 5 tests. Does it increase, decrease or remain unchanged when compared with (a)?

下表所示為健新在首 4 次數學測驗的分數。

	分數
測驗 1	76
測驗 2	83
測驗 3	86
測驗 4	72
測驗 5	?

(a) 求健新在首 4 次數學測驗的分數的分佈域和四分位數間距。

(b) 後來健新在第 5 次數學測驗作弊。因此，他在第 5 次數學測驗的分數是零分。

(i) 健新的測驗分數的分佈域會因此而增加還是減少？

(ii) 求健新新的分數的四分位數間距。比較在 (a) 所得的數值，新的四分位數間距增加、減少，還是維持不變？

12. The following table shows the ages of a group of people.

Age	10-13	14-17	18-21	22-25	26-29	30-33
Frequency	4	2	3	7	5	9

(a) Find the mean age of these people.

(b) Find the standard deviation of the ages of these people.

(Give you answers correct to 3 significant figures if necessary.)

下表所示為一組人士的年齡。

年齡	10-13	14-17	18-21	22-25	26-29	30-33
頻數	4	2	3	7	5	9

(a) 求該組人士的平均年齡。

(b) 求該組人士年齡的標準差。（答案須準確至三位有效數字。）

13. The following table shows the weights of several notebook computers.

Weight (kg)	Frequency
2.1–2.2	3
2.3–2.4	2
2.5–2.6	1
2.7–2.8	4

(a) Find the mean weight of these notebook computers.

(b) Find the standard deviation of the weights of these notebook computers.
(Give your answer correct to 3 significant figures.)

下表所示為 10 部手提電腦的重量。

重量 (kg)	頻數
2.1–2.2	3
2.3–2.4	2
2.5–2.6	1
2.7–2.8	4

(a) 求手提電腦的平均重量。

(b) 求手提電腦重量的標準差。（答案須準確至三位有效數字。）

14. The following table shows the temperatures of Hong Kong and Shanghai on a certain day.

City	Hong Kong	Shanghai
12:00 midnight	18°C	7°C
4:00 am	19°C	8°C
8:00 am	20°C	10°C
12:00 noon	22°C	12°C
4:00 pm	22°C	13°C
8:00 pm	21°C	11°C

(a) Which city is warmer on that day?

(b) Which measure of dispersion would you use for the temperatures of the two cities? Briefly explain your answer.

(c) Using the measure of dispersion you choose in (b), determine which city has a greater variation in temperature on that day.

下表所示為在某天裏，香港和上海每 4 小時的溫度變化。

城市	香港	上海
12:00 am	18°C	7°C
4:00 am	19°C	8°C
8:00 am	20°C	10°C
12:00 pm	22°C	12°C

4:00 pm	22°C	13°C
8:00 pm	21°C	11°C

(a) 哪個城市在當天較溫暖？

(b) 你會使用哪種量度，來求出兩個城市在當天溫度的離差？試略作解釋。

(c) 使用你在 (b) 所選擇的離差的量度，判斷哪個城市在當天的溫度變化較大。

15. The following back-to-back stem-and-leaf diagram shows the heights of 15 basketball players of team *A* and team *B* respectively.

Team *A* Leaf (1 cm)	Stem (10 cm)	Team *B* Leaf (1 cm)
7 5 3	17	8
9 6 4 2 1 1	18	3 3 5 9
8 5 3	19	0 1 4 7 9
5 3	20	3 4 6
1	21	2 5

(a) To compare the dispersions of heights of team *A* and team *B*, which measure of dispersion would you use? Briefly explain your answer.

(b) Using the measure of dispersion you choose in (a), which team has a more dispersed height distribution?

以下所示為 15 名籃球隊 *A* 和 15 名籃球隊 *B* 隊員的身高的背靠背幹葉圖。

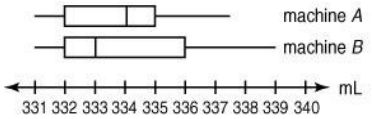
籃球隊 *A* 葉 (1 cm)	幹 (10 cm)	籃球隊 *B* 葉(1 cm)
7 5 3	17	8
9 6 4 2 1 1	18	3 3 5 9
8 5 3	19	0 1 4 7 9
5 3	20	3 4 6
1	21	2 5

(a) 你會使用哪種量度，來比較籃球隊 *A* 和籃球隊 *B* 隊員身高的離差？試略作解釋。

(b) 使用你在 (a) 所選擇的離差的量度，判斷哪隊隊員的身高的離差較大。

16. The following box-and-whisker diagrams show the volumes of 500 cans of coke produced by machines *A* and *B*.

下圖所示為機器 *A* 和機器 *B* 生產的 500 罐汽水的容量的框線圖。



(a) Which machine produced cans of coke with smaller dispersion?

(b) If the standard volume of a can of coke is 335 mL, which machine is more likely to produced cans of coke with standard volume?

(a) 哪部機器生產的汽水的離差較小？

(b) 若一罐汽水的標準容量是 335 mL，哪一部機器能生產較多標準容量的汽水？

17. There are 10 trees in a park. Their mean height is 3.5 m and the standard deviation is 1 m.

(a) If the height of each tree is increased by 0.2 m, find the new mean and the new standard deviation of the trees.

(b) If the height of each tree is increased by 5%, find the new mean and the new standard deviation of the trees.

(c) If 2 trees of height 3.5 m are chopped off, will the standard deviation of the heights of the trees increase, decrease or remain unchanged? Briefly explain your answer.

某公園內有 10 棵樹木，它們的平均高度是 3.5 m，而高度的標準差是 1 m。

(a) 若每棵樹木的高度增加 0.2 m，求新的平均高度和標準差。

(b) 若每棵樹木的高度增加 5%，求新的平均高度和標準差。

(c) 若該公園砍伐了 2 棵高度為 3.5 m 的樹木，則樹木高度的標準差將會增加、減少，還是維持不變呢？試略作解釋。

18. The table below shows the lengths of 40 pieces of wire.

Length (cm)	Frequency
15–19	4
20–24	10
25–29	9
30–34	10
35–39	7

(a) Construct a cumulative frequency table for the above data.

(b) Draw the cumulative frequency polygon from the table in (a). Hence, find the range and the inter-quartile range of the lengths of the wires.

下表所示為 40 條電線的長度。

長度 (cm)	頻數
15–19	4

20–24	10
25–29	9
30–34	10
35–39	7

(a) 根據上述數據，建立一個累積頻數表。

(b) 繪畫一個累積頻數多邊形來表示上述數據，並求電線長度的分佈域和四分位數間距。

19. There are 40 students in a class. Their mean mark in a Mathematics test is x marks and the standard deviation is y marks.

(a) If the mark of each student is doubled, find the new mean mark and the new standard deviation of their marks.

(b) If 2 marks are added to each student after their mark is doubled, find the new mean mark and the new standard deviation of their marks.

(c) A new student joins the class and gets $(2x + 2)$ marks in the test. Using the result of (b), determine whether the standard deviation of the marks will increase, decrease or remain unchanged. Briefly explain your answer.

某班有 40 名學生，他們數學測驗的平均分數是 x 分，而分數的標準差是 y 分。

(a) 若每名學生的分數增加 1 倍，求新的平均分數和標準差。

(b) 若每名學生的分數在增加 1 倍後，再添加 2 分，求新的平均分數和標準差。

(c) 若該班加入一名新的學生，而他的數學測驗分數是 $(2x + 2)$ 分。根據 (b) 的結果，該班數學測驗分數的標準差將會增加、減少，還是維持不變？試略作解釋。

20. The following table shows the staff's salaries of companies *A* and *B*.

Salary ($)	Frequency	
	Company *A*	Company *B*
5001–10 000	12	7
10 001–15 000	43	38
15 001–20 000	10	24
20 001–25 000	7	5
25 001–30 000	5	3
30 001–35000	3	3

(a) Find the mean salaries in companies *A* and *B*.

(b) Find the standard deviations of the salaries of companies *A* and *B*.

(c) Which company has a greater dispersion in salary?

(Give your answers correct to 3 significant figures if necessary.)

下表所示為公司 *A* 和 *B* 的員工的薪金分佈。

薪金 ($)	頻數	
	公司 *A*	公司 *B*

5001–10 000	12	7
10 001–15 000	43	38
15 001–20 000	10	24
20 001–25 000	7	5
25 001–30 000	5	3
30 001–35000	3	3

(a) 分別求公司 *A* 和 *B* 的員工的平均薪金。

(b) 求公司 *A* 和 *B* 的員工薪金的標準差。

(c) 哪間公司員工的薪金的離差較大？

（如有需要，取答案準確至三位有效數字。）

Pre-requisite Questions

預備測驗

1. Find the arithmetic means of the following sets of data..

求下列各組數據的算術平均數。

(a) 4, 7, 12, 16, 19

(b) 25, 18, 29, 31, 35, 42

2. The following table shows the distribution of the volume of juice in 50 bottles.

Volume (mL)	240 – 242	243 – 245	246 – 248	249 – 251	252 - 254
Frequency	3	12	21	9	5

Find the mean volume of a bottle of juice.

下表所示為 50 瓶果汁的容量分佈。

容量 (mL)	240 – 242	243 – 245	246 – 248	249 – 251	252 - 254
頻數	3	12	21	9	5

求該 50 瓶果汁的的平均容量。

3 The mean height of 6 people are 1.52 m. If a man of height 1.73 m is added to the group, find the new mean height of the group.

已知 6 個人的平均身高為 1.52 m。當加入另一身高為 1.73 m 的人後，求這羣人的平均身高。

4. The mean mark of 10 students in an examination is 78.3. If the mark of one of the student is changed from 75 to 68, find the new mean mark of these students.

10 名學生的考試分數的平均分是 78.3。若其中一名學生的考試分數由 75 扣減至 68，求這 10 名學生新的平均分數。

***5*.** The following shows the age of 30 members of a youth centre.

下表所示為一所青年中心內 30 名會員的年齡。

Age	14	15	16	17	18
Frequency	7	10	7	5	1

Find the median age of the members of the youth centre.

求青年中心該 30 名會員的年齡中位數。

6. Find the median of the following sets of data.

求下列各組數據的中位數。

(a) 9, 12, 8, 15, 22

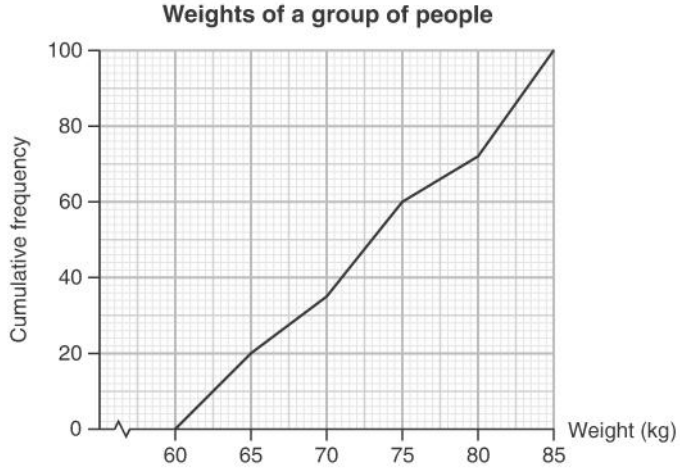
(b) 28, 17, 39, 41, 50, 26, 19, 44, 31, 35

7. Find the median of $x+1, x+2, x-4, x+6, x+8, x+3$

求 $x+1, x+2, x-4, x+6, x+8, x+3$ 的中位數。

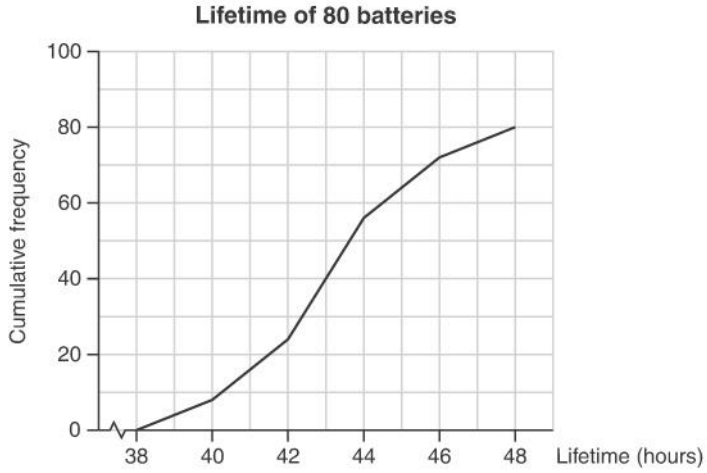
8. The cumulative frequency polygon shows the weights of a group of people. Find the median weight of these people.

圖中所示為一組人的體重的累積頻數多邊形。求這組人體重的中位數。



9. The cumulative frequency polygon shows the lifetimes of 80 batteries. Find the median lifetime of these batteries.

圖中所示為 80 顆枚池的壽命的累積頻數多邊形。求這些電池壽命的中位數。



10. The following table shows the weights of 60 packs of rice.

下表所示為 60 包米的重量。

Weight (kg)	4.5 – 4.8	4.9 – 5.2	5.3 – 5.6	5.7 – 6.0
Frequency	15	24	18	3

Find the modal class of the weight of the packs of rice.

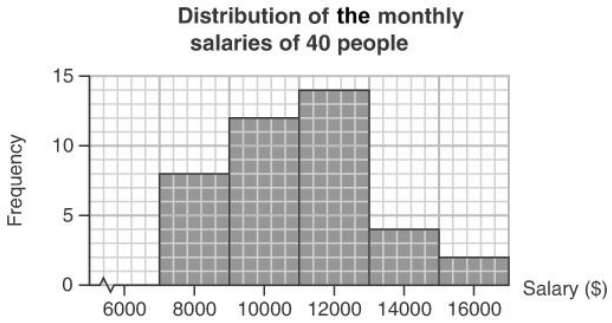
求該 60 包米的重量的眾數組。

11. Find the modes of the following sets of data.
求下列各組數據的眾數。

(a) 3, 6, 6, –2, –3, –3, 3, 9, 6

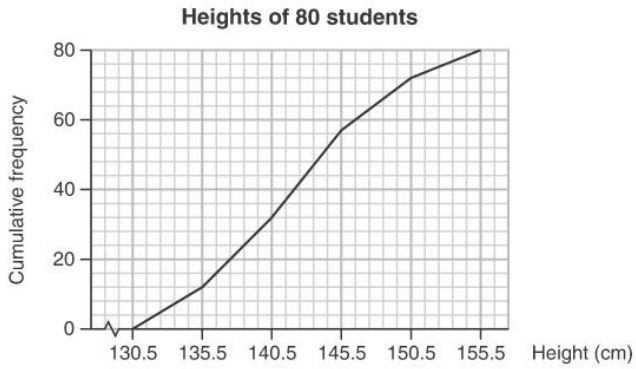
(b) 2.3, 4.5, 4.5, 2.3, 3.2, 5.4, 2.3, 3.2, 4.5

***12*.** The following histogram shows the distribution of the monthly salaries of 40 people.
以下組織圖顯示 40 名人士的月薪分佈。



Find the modal class of the salaries of these people.
求這些人士的月薪的眾數組。

13 The following cumulative frequency polygon shows the heights of 80 students.
圖中所示為 80 名學生的身高的累積頻數多邊形。



Find the lower quartile and the upper quartile of the heights of the students.
求該 80 名學生的身高的下四分位數和上四分位數。

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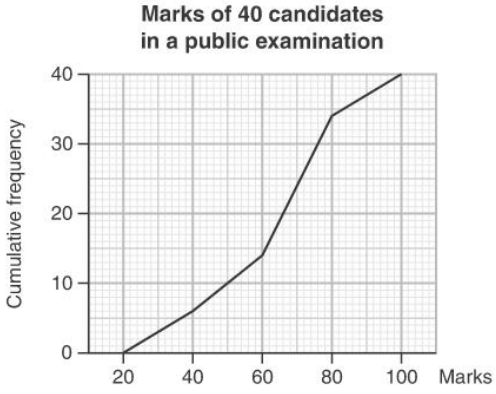
14. The following cumulative frequency polygon shows the marks of 40 candidates in a public examination.



Find the lower quartile, median and upper quartile of the marks of the candidates.
圖中所示為 40 個考生在公開考試中所考獲分數的累積

頻數多邊形。

求該組考生的分數的下四分位數、中位數和上四分位數。

Level 1 Questions

程度 1 題目

1. The following table shows the lifetimes of 30 bulbs.

Lifetime (hour)	10 – 12	13 – 15	16 – 18	19 –21
Frequency	5	8	11	6

Find the range of the lifetime of the bulbs.

下表所示為 30 個燈泡的壽命。

壽命 (小時)	10 – 12	13 – 15	16 – 18	19 –21
頻數	5	8	11	6

求該 30 個燈泡的壽命的分佈域。

2. Find the range for each of the following data sets.

求下列各組數據的分佈域。

(a) –2, 3, –5, 7, 9, 6

(b) 6, 4, 8, 11, –4, 12

3. The selling prices of 10 pairs of shoes are listed as follows:

$350, $629, $299, $799, $399, $649, $759, $899, $499, $449

Find the range of the selling prices of the shoes.

以下為 10 雙皮鞋的售價：

$350, $629, $299, $799, $399, $649, $759, $899, $499, $449

求皮鞋的售價的分佈域。

4 The following stem-and-leaf diagram shows the marks of 15 students in a mathematics examination.

Stems (10 marks)	Leaf (1 mark)
3	1 2 5 6
4	2 5 6 6 7
5	0 0 1 6
6	1 1

According to the stem-and-leaf diagram, find

(a) the range of the marks of the students;,

(b) the median mark of the students.

以下是 15 名學生在數學科考試的分數的幹葉圖。

幹	葉

(10 分)	(1 分)
3	1 2 5 6
4	2 5 6 6 7
5	0 0 1 6
6	1 1

根據以上的幹葉圖，求學生分數的

(a) 分佈域;

(b) 中位數。

5. Find the range and inter-quartile range for the data set $x-3, x-4, x, x+8, x+1, x$.
求數據組 $x-3, x-4, x, x+8, x+1, x$ 的分佈域和四分位數間距。

6. The following stem-and-leaf diagram shows the ages of a group of people.

Stems (tenth digit)	Leaf (unit digit)
2	0 0 3 3 4 5
3	1 4 4 6 8 9
4	2 5 5 6
5	0

Find

(a) the median age of the people;

(b) the inter-quartile range of age of the people.

以下是一組人士的年齡的的幹葉圖。

幹 (十位)	葉 (個位)
2	0 0 3 3 4 5
3	1 4 4 6 8 9
4	2 5 5 6
5	0

求該組人士年齡的

(a) 中位數;

(b) 四分位數間距。

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

(a) 102, 99, 110, 107, 113, 96

(b) 88, 76, 79, 85, 93, 96, 97, 85

求下列各組數據的四分位數間距。

(a) 102, 99, 110, 107, 113, 96

(b) 88, 76, 79, 85, 93, 96, 97, 85

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

(a) 2, 1, 3, 7, 5, 4, 6

(b) −3, 2, −5, 7, 1, −2

求下列各組數據的四分位數間距。

(a) 2, 1, 3, 7, 5, 4, 6

(b) −3, 2, −5, 7, 1, −2

9. In a singing competition, the scores awarded to John and Terry by 7 referees are given below:

John: 8.5, 8, 7.5, 9, 7, 8, 7.5

Terry: 6, 7, 9, 6.5, 7.5, 8, 6

(a) Find the range and inter-quartile range of the scores of John and Terry respectively.

(b) Whose scores have a greater dispersion?

在一個歌唱比賽中，7 位評判給與偉業和英豪的分數為：

偉業: 8.5, 8, 7.5, 9, 7, 8, 7.5

英豪: 6, 7, 9, 6.5, 7.5, 8, 6

(a) 求偉業和英豪的得分的分佈域與四分位數間距。

(b) 哪一位的得分的離差較大？

10. The following stem-and-leaf diagram shows the heights of a group of students.

Stems (10 cm)	Leaf (1 cm)
13	1 2 4
14	0 4 4 5 6 6 9
15	0 2 2 3 7 7
16	1 1 2

Find

(a) the median height of the students;

(b) the inter-quartile range of the heights of the students.

以下是一組學生的身高的的幹葉圖。

幹 (10 cm)	葉 (1 cm)
13	1 2 4
14	0 4 4 5 6 6 9

15	0 2 2 3 7 7
16	1 1 2

求該組學生的身高的

(a) 中位數;

(b) 四分位數間距。

11. The marks of a test of two groups of students are shown below.

Group *A*: 12, 24, 38, 50, 52, 67, 79, 94

Group *B*: 47, 48, 49, 49, 53, 55, 57, 58

(a) Find the inter-quartile range of the marks of each group.

(b) By the result of (a), which group has a smaller dispersed marks distribution?

以下所示為兩組學生在一次測驗中的分數。

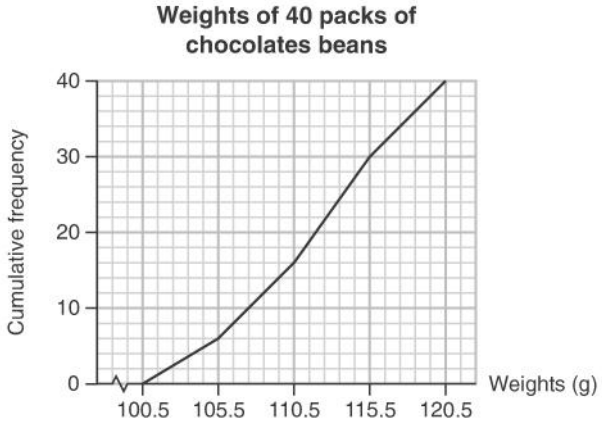
A 組: 12, 24, 38, 50, 52, 67, 79, 94

B 組: 47, 48, 49, 49, 53, 55, 57, 58

(a) 求各組的測驗分數的四分位數間距。

(b) 根據(a)中所得的結果，哪一組的測驗分數的離差較小？

12. The figure shows the cumulative frequency polygon of the weights of 40 packs of chocolates beans.



(a) Find the lower quartile and upper quartile of the weights of the packs of chocolate beans.

(b) Find the range and inter-quartile range of the weights of packs of chocolate beans.

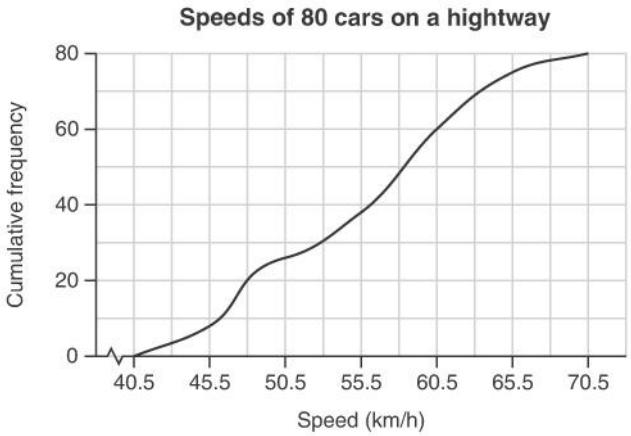
圖中所示為 40 包巧克力豆的重量的累積頻數多邊形。.

(a) 求該 40 包巧克力豆的重量的下四分位數和上四分位數。

(b) 求該 40 包巧克力豆的重量的分佈域和四分位數間距。

13. The figure shows the cumulative frequency curve of the speeds of 80 cars on a highway. Find the inter-quartile range of the speeds of the cars.

圖中所示為 80 輛汽車在高速公路上的車速的累積頻數曲線。

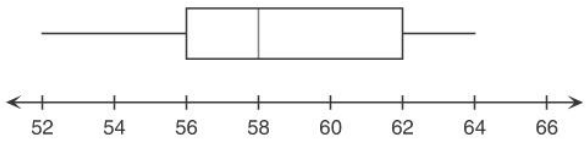


Find the inter-quartile range of the speeds of the cars.

求車速的四分位數間距。

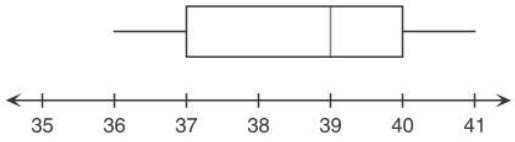
14. Find the range, median and inter-quartile range of the distribution represented by the box-and-whisker diagram below.

求以下框線圖所表示的數據分佈的分佈域、中位數和四分位數間距。

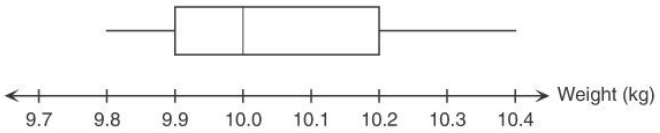


15. Find the range, median and inter-quartile range of the distribution represented by the box-and-whisker diagram below.

求以下框線圖所表示的數據分佈的分佈域、中位數和四分位數間距。



16 The following box-and-whiskers diagram shows the weight of 100 packs of rice.
以下框線圖所示為 100 包白米的重量。



(a) Find the inter-quartile range of the weights of the packs of rice.

(b) What is the percentage of the packs of rice having a weight not exceeding 10.2 kg?

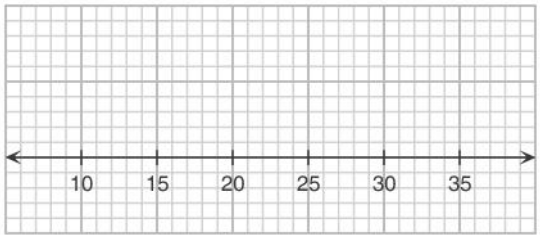
(c) Describe the distribution of the weights of the packs of rice.

(a) 求該 100 包白米的重量的四分位數間距。

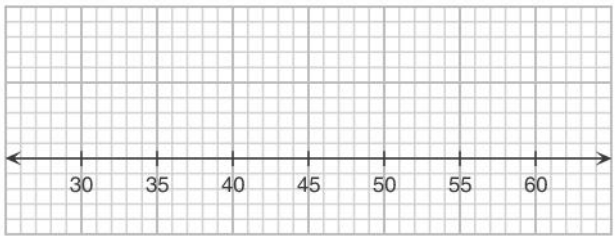
(b) 重量不超過 10.2 kg 的白米佔百分之幾？

(c) 試描述白米重量分佈的情況。

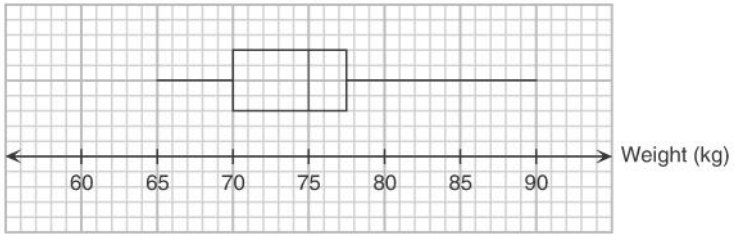
17. Draw a box-and-whisker diagram on the given number line with the following information.
Minimum = 10, lower quartile =16, median = 20, upper quartile = 28, maximum = 30.
根據下列數據的資料，在數線上繪畫相應的框線圖：
最小值= 10，下四分位數=16，中位數= 20，上四分位數= 28，最大值= 30。



18 Draw a box-and-whisker diagram on the given number line with the following information.
Minimum = 32, lower quartile = 43, median = 48, upper quartile = 53, maximum = 57.
根據下列數據的資料，在數線上繪畫相應的框線圖：
最小值= 32，下四分位數= 43，中位數= 48，上四分位數= 53，最大值= 57。



19. The following box-and-whisker diagram shows the weights of 100 boys in a school.
以下框線圖所示為某校 100 名男生的體重。



(a) Find the median weight of the boys.

(b) Find the inter-quartile range of the weights of the boys.

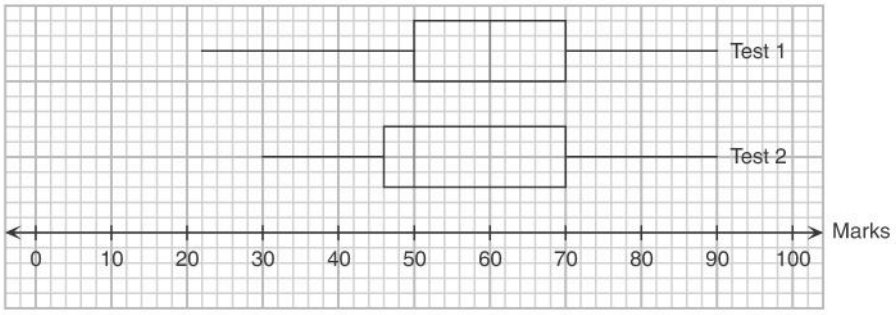
(c) Describe the distribution of the weights of the boys.

(a) 求男生體重的中位數。

(b) 求男生體重的四分位數間距。

(c) 試描述男生體重分佈的情況。

***20*.** The following box-and-whisker diagrams show the marks of two Chinese tests in a class of students.
以下框線圖所示為一班學生在兩次中文測驗所得的分數。



(a) In which test the inter-quartile range of marks is larger?

(b) In which test the smaller range of marks is smaller?

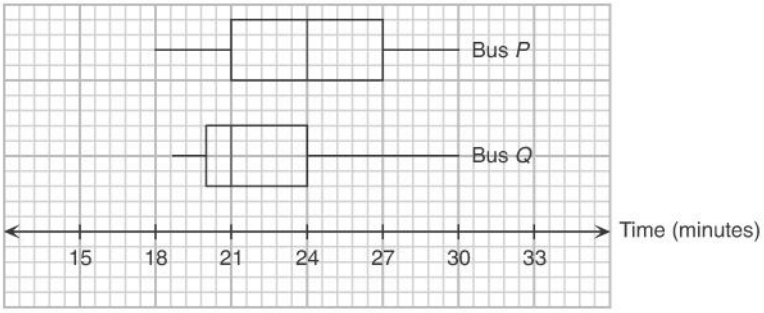
(c) In which test the median mark is higher?

(a) 哪一次測驗分數的四分位數間距較大？

(b) 哪一次測驗分數的分佈域較小？

(c) 哪一次測驗分數的中位數較高？

21 The following box-and-whisker diagrams show the traveling time to city *A* by two buses.
以下框線圖所示為兩輛巴士駛到 *A* 城所需的時間。



(a) Which bus has a smaller inter-quartile range of travelling times?

(b) Which bus has a larger range of travelling time?

(c) If Eric wants to go to City *A* urgently, which bus should he take?

(a) 哪一輛巴士行駛時間的四分位數間距較小？

(b) 哪一輛巴士行駛時間的分佈域較大？

(c) 若志楠要趕往 *A* 城，他應乘坐哪一輛巴士？

22. Find the mean and standard deviation of the data set: 8, 13, 17, 9, 12, 25

(Give your answer correct to 3 significant figures if necessary.)

求數據組 8, 13, 17, 9, 12, 25 的算術平均數和標準差。

(如有需要，答案準確至三位有效數字。)

23. Find the mean and standard deviation of the data set: 3, 6, 9, 7, 11

(Give your answer correct to 3 significant figures if necessary.)

求數據組 3, 6, 9, 7, 11 的算術平均數和標準差。

(如有需要，答案準確至三位有效數字。)

24. Find the inter-quartile range and standard deviation of the data set: 12, 15, 19, 11, 13.

求數據組 12, 15, 19, 11, 13 的四分位數間距和標準差。

25. The distribution of the lifetimes of 100 batteries are shown below.

Lifetime (hour)	40 – 42	43 – 45	46 – 48	49 – 51	52 – 54	55 – 57
Frequency	8	15	23	32	16	6

(a) Find the mean lifetime of the batteries.

(b) Find the standard deviation of the lifetimes of the batteries.

下表所示為 100 枚電池的壽命的分佈。

壽命 (小時)	40 – 42	43 – 45	46 – 48	49 – 51	52 – 54	55 – 57
頻數	8	15	23	32	16	6

(a) 求電池的平均壽命。

(b) 求電池壽命的標準差。

26. The distribution of marks of 50 students in a test are shown below.

Marks	0 – 9	10 – 19	20 – 29	30 – 39	40 – 49	50 – 59
Frequency	2	5	14	17	9	3

(a) Find the mean mark of the test.

(b) Find the standard deviation of the marks of the test.

下表所示為 50 名學生在一次測驗所得的分數分佈。

分數	0 – 9	10 – 19	20 – 29	30 – 39	40 – 49	50 – 59
頻數	2	5	14	17	9	3

(a) 求該次測驗的平均分數。

(b) 求該次測驗分數的標準差。

***27*.** If the inter-quartile range and standard deviation of the data $y_1, y_2, ..., y_n$ are 8 and 2.1 respectively, find the inter-quartile range and standard deviation of the data.

若數據組 $y_1, y_2, ..., y_n$ 的四分位數間距和標準差分別是 8 和 2.1，求下列各組數據的四分位數間距和標準差。

(a) $y_1 - 1.5, y_2 - 1.5, ..., y_n - 1.5$,

(b) $2y_1, 2y_2, ..., 2y_n$,

(c) $3y_1 - 2, 3y_2 - 2, ..., 3y_n - 2$.

28. If the range, inter-quartile range and standard deviation of the data $x_1, x_2, ..., x_n$ are 10, 7 and 1.3 respectively, find the range, inter-quartile range and standard deviation of the following sets of data.

若數據組 $x_1, x_2, ..., x_n$ 的分佈域、四分位數間距和標準差分別是 10、7 和 1.3 ，求下列各組數據的分佈域、四分位數間距和標準差。

(a) $x_1 + 2, x_2 + 2, ..., x_n + 2$,

(b) $3x_1, 3x_2, ..., 3x_n$,

(c) $2x_1 + 1, 2x_2 + 1, ..., 2x_n + 1$.

29. It is given that the mean and standard deviation of marks of a test are 35 and 3.1 respectively. If 5 marks are added to each student in the test, find the new mean and standard deviation of the marks.

已知某次測驗的分數的平均分和標準差分別是 35 和 3.1。若參與該次測驗的每名學生都獲加 5 分，求該次測驗的平均分和標準差。

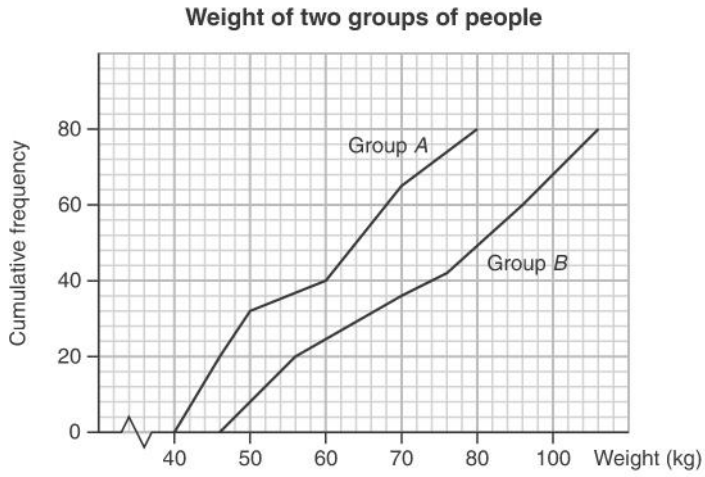
30. It is given that the inter-quartile range of the marked prices of shoes in a shop is $350. If all the shoes are sold at a discount 10%, find the inter-quartile range of the selling prices of the shoes.

. 已知某鞋店的皮鞋標價的四分位數間距是$350。若現在鞋店提供九折優惠，求皮鞋售價的四分位數間距。

Level 2 Questions

程度 2 題目

1. The following cumulative frequency polygons show the weights of two groups of people.
圖中所示為兩組人的體重累積頻數多邊形。



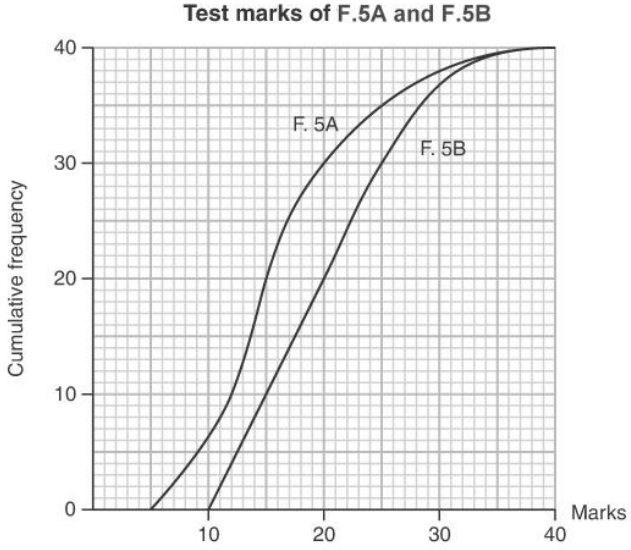
(a) Find the median, lower quartile, upper quartile and the inter-quartile range of the weight of each group.

(b) By comparing the inter-quartile range of the two groups, which group has a weight distribution with a smaller dispersion?

(a) 求每組人體重的中位數、下四分位數、上四分位數和四分位數間距。

(b) 比較兩組人體重的四分位數間距，哪一組的體重的離差較小？

2. The following cumulative frequency curves show the marks of classes F.5*A* and F.5*B* in a test.
圖中所示的累積頻數曲線表示 F.5A 班和 F.5B 班在某次測驗中的分數。



(a) Find the median, lower quartile, upper quartile and the inter-quartile range of the marks of each class.

(b) By comparing the inter-quartile ranges of the two classes, which class has a distribution of marks with a greater dispersion?

(a) 求每班分數的中位數、下四分位數、上四分位數和四分位數間距。

(b) 比較兩班分數的四分位數間距，哪一班的分數的離差較大？

***3*.** The following shows the weights of babies in a hospital.

2.1 kg, 2.1 kg, 2.3 kg, 2.5kg, 2.5 kg, 2.6 kg, 2.8 kg, 2.8 kg, 3 kg, 3.2 kg

(a) Find the median, range and the inter-quartile range of the weights.

(b) Due to a mistake in data entry, the datum 3 kg has to be corrected to 2.8 kg, how are the median, the inter-quartile range affected? Briefly explain your answer.

以下為醫院內一組初生嬰兒的體重。

2.1 kg, 2.1 kg, 2.3 kg, 2.5kg, 2.5 kg, 2.6 kg, 2.8 kg, 2.8 kg, 3 kg, 3.2 kg

(a) 求嬰兒體重的中位數、分佈域和四分位數間距。.

(b) 因為錯誤輸入數據，其中 3 kg 應為 2.8 kg，此修改對該組嬰兒的體重的中位數和四分位數間距會有甚麼影響？試略作解釋。

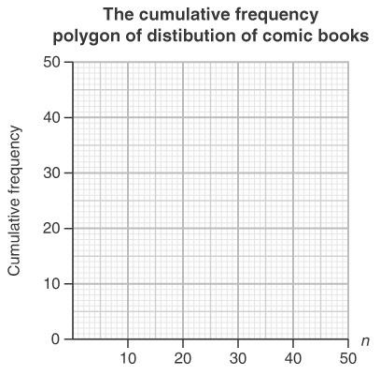
4. The following table shows the number of comics books (n) owned by 40 students.

n	Frequency
$0 \le n \le 10$	10
$10 < n \le 20$	16
$20 < n \le 30$	10
$30 < n \le 40$	2
$40 < n \le 50$	2

(a) Complete the following cumulative frequency table.

n is less than or equal to	Cumulative frequency
10	
20	
30	
40	
50	

(b) Plot the cumulative frequency polygon on the given graph. Hence, find the median and inter-quartile range of the numbers of comic books owned by the 40 students.



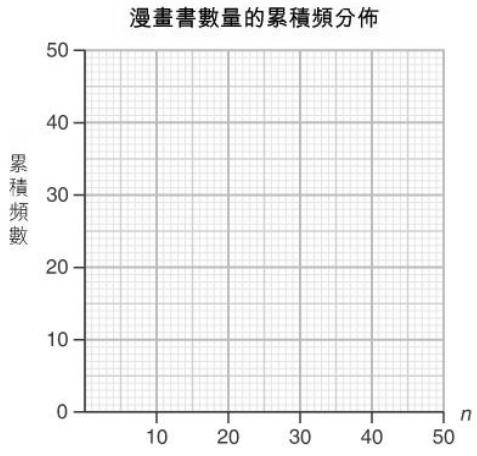
. 下表所示為 40 名學生擁有的漫畫書數量(n)。

n	頻數
$0 \le n \le 10$	10
$10 < n \le 20$	16
$20 < n \le 30$	10
$30 < n \le 40$	2
$40 < n \le 50$	2

(a) 完成以下的累積頻數表。

n 少於或相等於	累積頻數
10	
20	
30	
40	
50	

(b) 在下圖中繪畫相應的累積頻數多邊形。由此，求該 40 名學生擁有的漫畫書數量的中位數和四分位數間距。



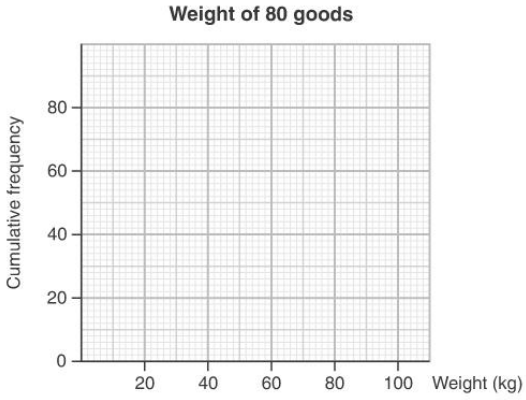
5. The following table shows the distribution of the weights (x) of 80 goods.

x /kg	Frequency
$0 < x \leq 20$	16
$20 < x \leq 40$	18
$40 < x \leq 60$	26
$60 < x \leq 80$	15
$80 < x \leq 100$	5

(a) Complete the following cumulative frequency table.

x is less than or equal to	Cumulative frequency
20	
40	
60	
80	
100	

(b) Plot the cumulative frequency polygon on the given graph. Hence, find the median and inter-quartile range of the weights of the goods.



下表所示為 80 件貨物的重量(x)分佈。

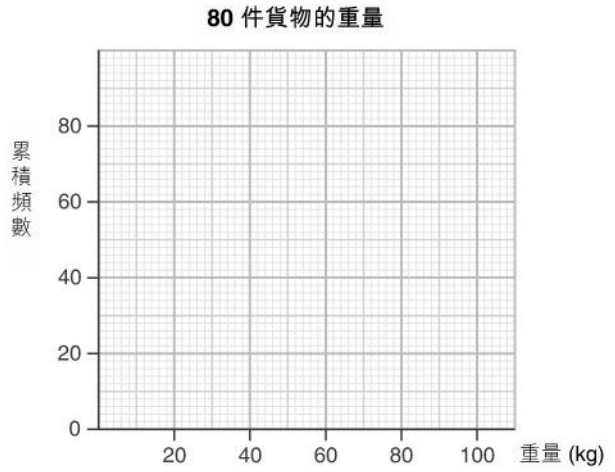
x /kg	頻數
$0 < x \leq 20$	16
$20 < x \leq 40$	18
$40 < x \leq 60$	26
$60 < x \leq 80$	15
$80 < x \leq 100$	5

(a) 完成以下的累積頻數表。

x 少於或相等於	累積頻數
20	

40	
60	
80	
100	

(b) 在下圖中繪畫相應的累積頻數多邊形。由此，求該批貨物的重量的中位數和四分位數間距。



6. The following shows the marks of the candidates in an examination.

65, 65, 72, 73, 73, 73, 79, 79, 79, 79, 83, 83, 83, 86, 91

(a) Find the median, range and the inter-quartile range of the marks.

(b) Later, errors re found in the calculation of marks. The marks 65 and 86 have to be changed to 70 and 95 respectively. How are the median, the inter-quartile range affected? Briefly explain your answer.

以下為一組學生在某次考試中獲得的分數。

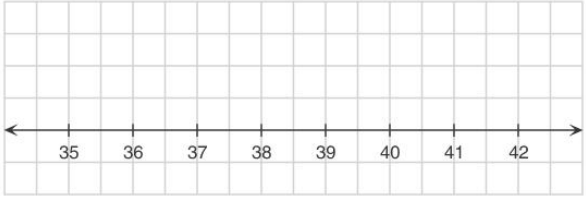
65, 65, 72, 73, 73, 73, 79, 79, 79, 79, 83, 83, 83, 86, 91

(a) 求測驗分數的中位數、分佈域和四分位數間距。

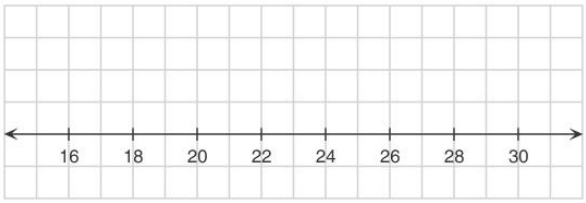
(b) 因為分數計算錯誤，其中 65 和 86 須分別更改為 70 和 95。此更改對測驗分數的中位數和四分位數間距會有甚麼影響？試略作解釋。

7. For the data set 36, 38, 38, 41, 42, 35, 37, 42, 42, 38, draw the corresponding box-and-whisker diagram on the given number line.

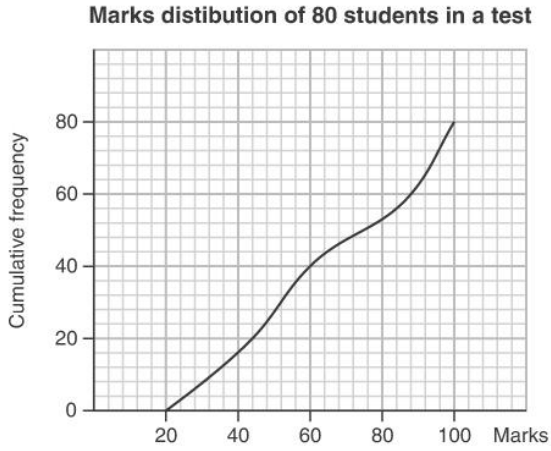
在以下數線上，繪畫數據組 36, 38, 38, 41, 42, 35, 37, 42, 42, 38 的框線圖。



8. For the data set 18, 20, 24, 16, 27, 30, 26, 29, draw the corresponding box-and-whisker diagram on the given number line.
在以下數線上，繪畫數據組 18, 20, 24, 16, 27, 30, 26, 29 的框線圖。

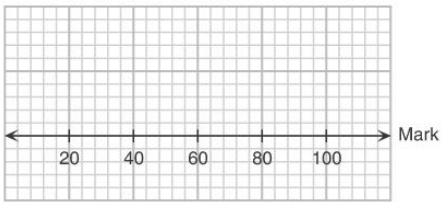


9. The figure shows the cumulative frequency curve of the marks of 80 students in a test.

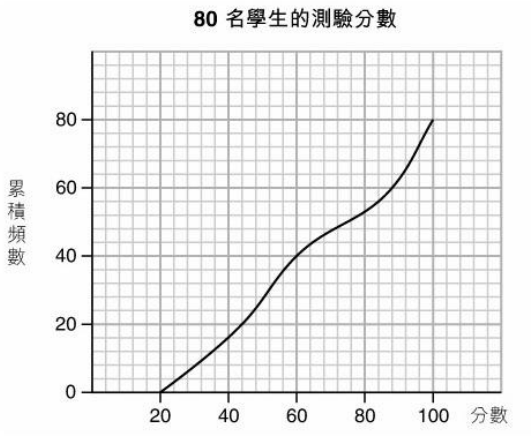


(a) Find the lower quartile, median and the upper quartile of the marks of the test.

(b) Present the information in (a) by a box-and-whisker diagram on the number line below.

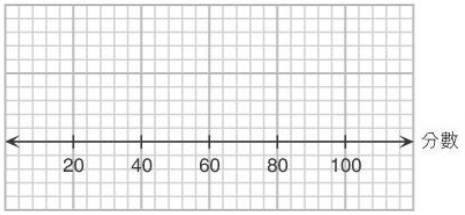


圖中所示為 80 名學生在一次測驗中的分數的累積頻數曲線。



(a) 求是次測驗分數的下四分位數、中位數和上四分位數。

(b) 試在以下數線上繪畫一個框線圖表示(a)的結果。



10. Find the standard deviations of the following sets of numbers. Give your answers correct to 3 significant figures when necessary.

求下列各組數據的標準差。如有需要，答案準確至三位有效數字。

(a) $x - 2, x - 3, x + 1, x, x + 4$

(b) $a, a + 2d, a + 4d, a + 6d \quad (d > 0)$

11. The maximum, minimum marks and the quartiles of marks of a class of Mathematics, English and Chinese examinations are summarized in the following table.

Subject	Minimum	Q_1	Q_2	Q_3	Maximum
Chinese	38	51	53	60	70
English	25	51	57	70	72
Mathematics	20	45	65	80	91

(a) **(i)** In which subject, the marks has the largest range?

(ii) In which subject, the marks has the smallest inter-quartile range?

(iii) In which subject, the median mark is the highest?

(b) If Peter gets 63 marks in all the three subjects, in which subject does he perform the best? Explain your answer briefly.

下表所示為某班學生的數學科、英文科和中文科考試中的最高分數、最低分數和四分位數。

科目	最高分數	Q_1	Q_2	Q_3	最低分數

中文	38	51	53	60	70
英文	25	51	57	70	72
數學	20	45	65	80	91

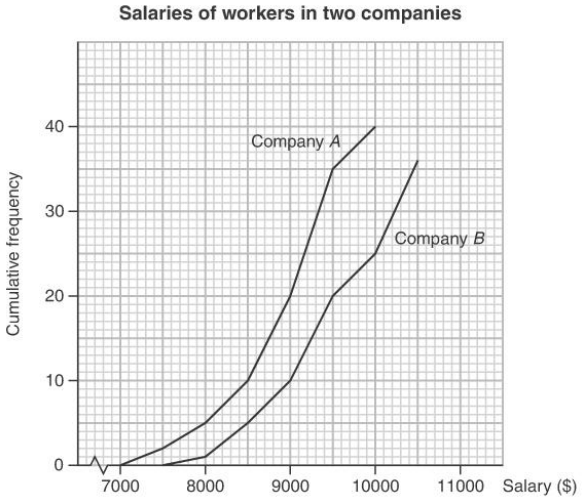
(a) **(i)** 哪個科目分數的分佈域最大？

(ii) 哪個科目分數的四分位數間距最小？

(iii) 哪個科目分數的中位數最高？

(b) 若國強在各科目的考試均取得 63 分，問他在哪個科目的表現最佳？試略作解釋。

12. The distributions of the salaries of the workers in Company *A* and Company *B* are shown by the following cumulative frequency polygons.



(a) Find the lower quartile, the median and the upper quartile of the salaries of workers in each company.

(b) Which company has a more dispersed salary distribution? Explain your answer.

以下的累積頻數多邊形顯示公司 *A* 和公司 *B* 的員工的薪金分佈。

(a) 求每間公司員工的薪金的下四分位數、中位數和上四分位數。

(b) 哪間公司的薪金分佈的離差較大？試解釋你的答案。

13. The weights of 80 packs of sugar are recorded in the table below

Weight (g)	198	199	200	201	202	203
Frequency	8	15	22	16	10	9

(a) Find the mean weight of the packs of sugar.

(b) Find the standard deviation of the weights of the packs of sugar.
(Give your answer correct to 3 significant figures if necessary.)

. 下表所示為 80 包糖的重量。

重量 (g)	198	199	200	201	202	203
頻數	8	15	22	16	10	9

(a) 求糖的平均重量。

(b) 求糖的重量的標準差。

(如有需要，答案準確至三位有效數字。)

14. Find the standard deviations of the following sets of numbers. Give your answer correct to 3 significant figures when necessary.

求下列各組數據的標準差。如有需要，答案準確至三位有效數字。

(a) $x + 5, x - 8, x + 2, x + 4, x + 2$

(b) $p, p - q, p + 3q, p + 10q \quad (q > 0)$

15. The volumes of 200 containers are recorded in the table below.

Volume (m^3)	347	348	349	350	351
Frequency	33	45	58	41	23

(a) Find the mean volume of the containers.

(b) Find the standard deviation of the volumes of the containers.

(Give your answer correct to 3 significant figures if necessary.)

下表所示為 200 個容器的容量。

容量 (m^3)	347	348	349	350	351
頻數	33	45	58	41	23

(a) 求容器的平均容量。

(b) 求容器容量的標準差。

(如有需要，答案準確至三位有效數字。)

16. The table below shows the marks of of students of two classes in a test.

Marks	41-50	51-60	61-70	71-80	81-90	91-100
Class A	0	3	10	17	6	4
Class B	2	4	9	16	6	3

(a) Find the standard deviations of the marks of the two classes.

(Give your answer correct to 3 significant figures)

(b) Which class has a more dispersed marks distribution?

下表所示為兩班學生在一次測驗中的分數。

分數	41-50	51-60	61-70	71-80	81-90	91-100
A 班	0	3	10	17	6	4
B 班	2	4	9	16	6	3

(a) 求兩班測驗分數的標準差。

(答案準確至三位有效數字。)

(b) 哪一班的分數的離差較大？

17. The following table shows the results of two Mathematics tests given to a group of students.

Marks	51 – 60	61 – 70	71 – 80	81 – 90	91 – 100
Frequency	8	12	8	9	3

Result of Mathematics test 1

Marks	51 – 60	61 – 70	71 – 80	81 – 90	91 – 100
Frequency	6	12	10	9	3

Result of Mathematics test 2

(a) Find the mean mark in both tests.

(b) Find the standard deviations of the marks in both tests.
(Give your answers correct to 4 significant figures if necessary.)

(c) Which test result has a more dispersed marks distribution?

下表所示為一組學生在兩次數學科測驗中所獲得的成績。

分數	51 – 60	61 – 70	71 – 80	81 – 90	91 – 100
頻數	8	12	8	9	3

第一次數學科測驗

分數	51 – 60	61 – 70	71 – 80	81 – 90	91 – 100
頻數	6	12	10	9	3

第二次數學科測驗

(a) 求兩次測驗的平均分數。

(b) 求兩次測驗分數的標準差。
(如有需要，答案準確至四位有效數字。)

(c) 哪一次測驗成績的離差較大？

(

18. The following back-to-back stem-and-leaf diagram shows the marks of the best-six subjects of the last year's F.6 students of School *A* and School *B* in HKCEE.

School *B*	Stem	School *A*
Leaves (1 mark)	(10 marks)	Leaves (1 mark)
9 9 8 8 8 7 7 7 6 6	1	6 8
4 3 3 2 2 1 1 1 0 0 0	2	0 0 1 2 2 3 3 4
9 8 7 7 7 6 6 5	2	5 5 5 5 6 6 6 7 7 7 8 8 8 9 9
0	3	0 0 0

(a) To compare the dispersions of the marks of the students of school *A* and school *B*, which measure of dispersion should be used? Explain your answer briefly.

(b) Using the measure of dispersion you choose in (a), determine which school has a more dispersed

marks distribution.

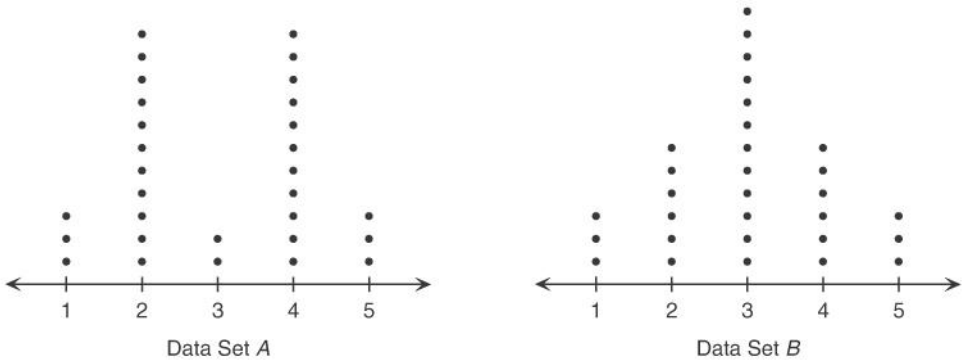
以下的背靠背幹葉圖顯示兩所學校的中六學生在去年會考中最佳六科的總分。

B 學校 葉(1 分)	幹 (10 分)	*A* 學校 葉(1 分)
9 9 8 8 8 7 7 7 6 6	1	6 8
4 3 3 2 2 1 1 1 0 0 0	2	0 0 1 2 2 3 3 4
9 8 7 7 7 6 6 5	2	5 5 5 5 6 6 6 7 7 7 8 8 8 9 9
0	3	0 0 0

(a) 你會採用哪種離差的量度來比較 *A* 學校與 *B* 學校分數的分散程度？試簡略解釋。

(b) 計算你在(a)中所選擇的離差，並判斷哪一所學校的分數的離差較大。

19. The following dot plots show the distributions of two sets of data ,*A* and *B*. Each set of data consists of 30 numbers.

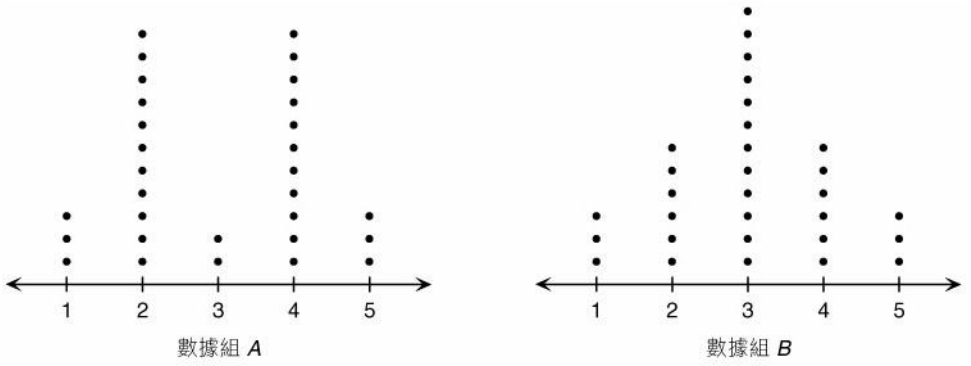


(a) According to the diagrams, which data set is more dispersed?

(b) Find the ranges and inter-quartile ranges of the two sets of data.

(c) Which measure of dispersion would you use to compare the dispersions of the two data sets? Compare the dispersions of both data sets by the measures of dispersions that you choose.

圖中的點陣圖所示為兩組各包含 30 個數值的數據組 *A* 和 *B*。



(a) 根據以上的點陣圖，哪一組數據比較分散？

(b) 求各組數據分佈域和四分位數間距。

(c) 你會採用哪種離差的量度來比較兩組數據的分散程度？計算你所選擇的離差，並判斷兩組數據的離差。

20. The following back-to-back stem-and-leaf diagram shows the marks distribution of 21 boys and 19 girls in a test.

Boys	Stem	Girls
Leaves (1 mark)	(10 marks)	Leaves (1 mark)
8 7	0	7
7 5 3 0	1	0 1 5 9
7 6 5 2 0	2	2 2 5 6 6 7 7
8 8 5 4 4 3	3	3 3 5 6
8 5 2 0	4	0 2 8

(a) To compare the dispersions of the marks of boys and girls, which measure of dispersion would you use? Explain briefly.

(b) Using the measure of dispersion in (a), determine which groups, the boys or the girls, has a more dispersed marks distribution.

下圖所示為一次測驗中 21 名男生和 19 名女生分數分佈的背靠背幹葉圖。

男生	幹	女生
葉(1 分)	(10 分)	葉(1 分)
8 7	0	7
7 5 3 0	1	0 1 5 9
7 6 5 2 0	2	2 2 5 6 6 7 7
8 8 5 4 4 3	3	3 3 5 6
8 5 2 0	4	0 2 8

(a) 你會採用哪種離差的量度來比較男生和女生的分數的分散程度？試簡略解釋。

(b) 計算你在(a)中所選擇的離差， 判斷男生或女生的分數的離差較大。

Level 2+ Questions

程度 2+題目

1 The following table shows the marks of a class of 40 students in a test.

Mark (x)	Frequency
$0 \leq x < 10$	2
$10 \leq x < 20$	11
$20 \leq x < 30$	14
$30 \leq x < 40$	11
$40 \leq x < 50$	2

(a) Find the mean and the standard deviation of the marks of students.
(Give your answer correct to 3 significant figures if necessary.)

(b) The teacher is unsatisfactory about the test results. He wants to raise the marks of students by one of the methods below:

Method 1: Add 5 marks to each student.

Method 2: Increase the mark of each student by 20%.

(i) Is there any difference between the new means of the two methods?

(ii) Is there any difference between the new standard deviations of the two methods?

(iii) If the teacher wants to apply a method not affecting the dispersion of the marks, which method should he choose?

(c) If the teacher wants to increase the mean mark to 30 marks without changing the standard deviation, how should the teacher adjust the mark?

下表所示為一班共 40 名學生在一次測驗中的分數。

分數 (x)	頻數
$0 \leq x < 10$	2
$10 \leq x < 20$	11
$20 \leq x < 30$	14
$30 \leq x < 40$	11
$40 \leq x < 50$	2

(a) 求該 40 名學生的分數的平均數和標準差。
(答案需準確至三位有效數字。)

(b) 老師對是次測驗結果並不滿意。他考慮用以下方法來增加學生的分數。

方法 1：每名學生的分數增加 5 分。

方法 2：每名學生的分數增加 20%。

(i) 兩種方法所得的新平均分有甚麼不同？

(ii) 兩種方法所得的新標準差有沒有差異？

(iii) 若老師希望使用不會影響分數離差的方法，他該使用哪一種方法？

(c) 若老師希望把是次測驗的平均分數增加至 30 分，且不影響分數離差，他該如何調整測驗的分數？

2. The body mass indices (BMI) for two groups of children are given in the table.

BMI	14	15	16	17	18	19
Group *A*	4	9	18	7	6	1
Group *B*	5	7	14	8	6	3

(a) Calculate the arithmetic means, ranges, inter-quartile ranges and standard deviations of the BMI for these two groups of students.
(Give your answers correct to 3 significant figures if necessary.)

(b) Which group has a more dispersed BMI distribution?

(c) If a child of BMI 19 from group *A* joins group *B*, how will it affect the standard deviations of the BMI for these two groups.

下表所示為兩組兒童的身體質量指數(BMI)。

BMI	14	15	16	17	18	19
A 組	4	9	18	7	6	1
B 組	5	7	14	8	6	3

(a) 求這兩組兒童 BMI 的算術平均數、分佈域、四分位數間距和標準差。
(如有需要，答案準確至三位有效數字。)

(b) 哪一組兒童的 BMI 的離差較大？

(c) 若一名 BMI 為 19 的兒童離開 *A* 組並加入 *B* 組，這轉變對兩組的 BMI 的標準差會有甚麼影響？

3. There are 50 employees in a company. The mean salary of them is $10 000 and the standard deviation is $2 000.

(a) If the salary of each employee is increased by $500, find the new mean and the new standard deviation of the salaries.

(b) If the salary of each employee is increased by 2%, find the new mean and the new standard deviation of the salaries.

(c) The company lays off 10 employees by one of the following arrangement:
Arrangement 1: The salaries of the employees, who are laid off ,are all $10 000,
Arrangement 2: The average salary of the employee, who are laid off, is $10 000

(i) State whether the two arrangements have the same effects on the standard deviation of the salaries of the employees in the company.

(ii) Find the standard deviation of the salaries of the employees in the company if the company adopts arrangement 1. (Give your answer in 4 significant figures.)

某公司僱用了 50 名員工，他們的平均月薪是$10 000，而月薪的標準差是$2 000。

(a) 若每名員工的月薪增加$500，求新的平均月薪和標準差。

(b) 若每名員工的月薪增加 2%，求新的平均月薪和標準差。I

(c) 該公司採用下列的其中一個方案解僱 10 名員工：

方案 1: 被解僱的員工的月薪均為$10 000。

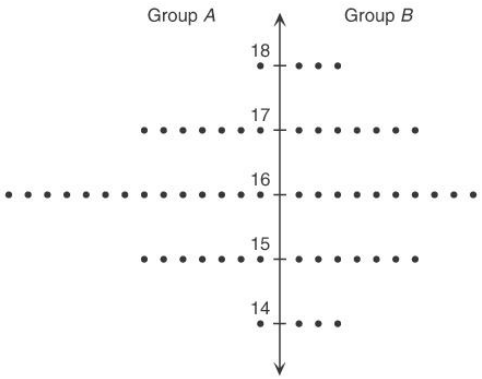
方案 2: 被解僱的員工的平均月薪為$10 000。

(i) 方案 1 和方案 2 會對該公司的員工的薪金的標準差的影響相同嗎？

(ii) 採用方案 1 後，求員工的薪金的平均值和標準差

(答案需準確至四位有效數字。)

4. The age distributions of two groups, each of 30 students, are shown by the dot-plots.



(a) By inspection on the dot-plots, which group has a greater dispersion of ages of students? Explain your answer briefly.

(b) If one member of age 16 leaves group *A* and joins group *B*, will the standard deviation of ages

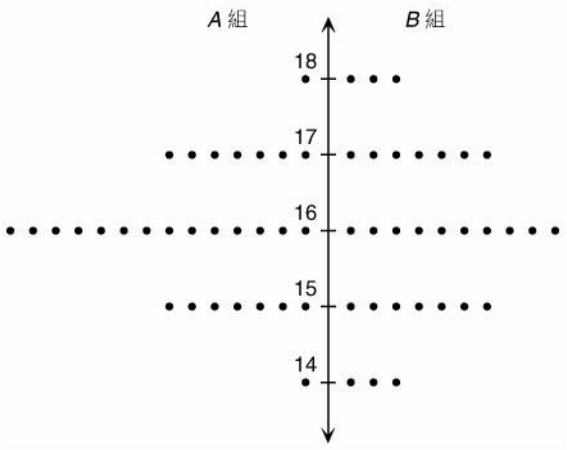
(i) in group *A*?

(ii) in group *B*?

become greater, smaller or unchanged? Explain your answer briefly.

(c) If the students of age 14 and 18 leaves group *A*, will the standard deviation become greater, smaller or unchanged? Explain your answer briefly.

以下的點陣圖所示為兩組學生的年齡分佈。(每組各有 30 人)



(a) 透過觀察以上的圖表，哪組數據的離差較大？試略作解釋。

(b) 若一名 16 歲的學生離開 *A* 組並加入 *B* 組，下列各組的標準差會增加、減少，還是維持不變？

(i) *A* 組

(ii) *B* 組

試簡略解釋。

(c) 若一名 14 歲的學生和一名 18 歲的學生離開 *A* 組，*A* 組的標準差會增加、減少，還是維持不變？試簡略解釋。

Multiple Choice Questions

多項選擇題

1. Find the range of the set of numbers:
求以下數據組的分佈域：

2, –4, 6, –5, –8, 4, 2, 5

A. 11
B. 12
C. 13
D. 14

2. Which of the following is not a measure of dispersion?
A. Arithmetic Mean
B. Standard Deviation
C. Range
D. Inter-quartile range
下列哪一項不是離差的量度？
A. 算術平均數
B. 標準差
C. 分佈域
D. 四分位數間距

3. The table shows the heights of 50 people.
下表所示為 50 人士的身高。

Height (cm)	Frequency
150 – 152	6
153 – 155	13
156 – 158	15
159 – 161	9
162 – 164	7

Find the range of heights of the people.
求這組人士身高的分佈域。
A. 6 cm
B. 14 cm
C. 15 cm
D. 18 cm

4. Which of the following can be used to measure the dispersion of a set of data?
I. Range
II. Median
III. Standard deviation
A. I only
B. II only
C. I and II only
D. I and III only
下列何者可以用來量度一組數據的離差？
I. 分佈域
II. 中位數
III. 標準差
A. 只有 I
B. 只有 II
C. 只有 I 及 II
D. 只有 I 及 III

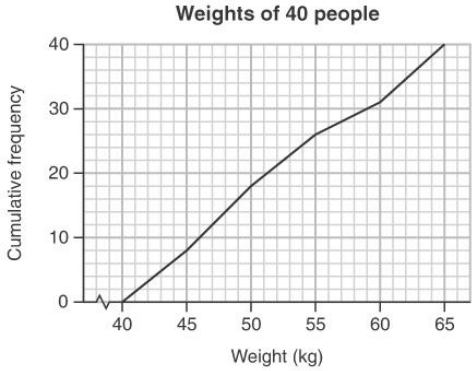
***5*.** Find the range and inter-quartile of the data set
求以下數據組的分佈域和四分位數間距：
–3, 2, 0, –5, 3, –2, 4, 8.

	Range	Inter-quartile range
A.	13	6
B.	13	7
C.	11	7
D.	11	6

6. Find the inter-quartile range of the group of numbers:
求以下數據組的四分位數間距。
8, 5, 1, 6, 7, 4, 2,0

A. 8
B. 7
C. 6
D. 5

7. The figure below shows the cumulative frequency polygon of the weights of 40 people.
下圖所示為 40 人的體重的累積頻數多邊形。



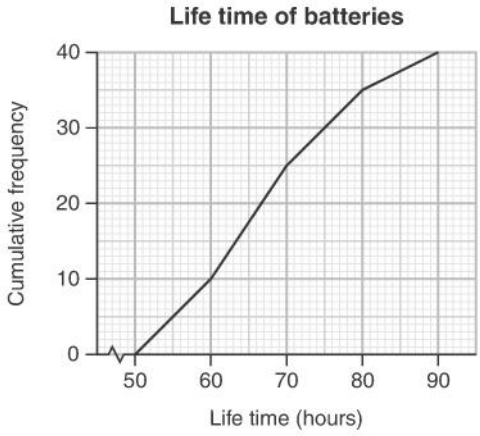
Find the inter-quartile range of the weights of the people.
求這組人士的體重的四分位數間距。

A. 13
B. 18
C. 21
D. 25

8. Find the inter-quartile range of the group of numbers:
求以下數據組的四分位數間距。
$x^2+5, x^2, x^2-2, x^2+7, x^2-4$

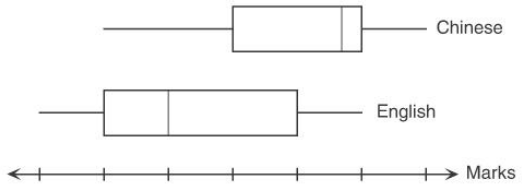
A. 3
B. 9
C. 10
D. 12

9. The figure shows the cumulative frequency polygon of the lifetimes of 80 batteries. Find the inter-quartile range of the lifetimes of the batteries.
下圖所示為 80 枚電池壽命的累積頻數多邊形。求電池壽命的四分位數間距



A. 40
B. 35
C. 15
D. 5

10. The box-and whisker diagram shows the marks distribution of students in Chinese and English examination.



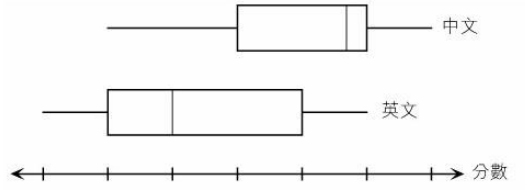
From the diagram above, which of the following are correct?

I. The ranges of marks of the students in both examinations are the same.
II. The inter-quartile range of marks of the students in Chinese examination is less than that of English examination.
III. The median mark of the students in Chinese examination is higher than that in English exaination

A. I and II only
B. II and III only
C. I and III only

D. I, II and III

以下為中文科及英文科考試的分數分佈的框線圖。



根據以上框線圖，下列何者是正確的？

I. 兩科考試分數的分佈域相同。

II. 中文科考試分數的四分位數間距較英文科的小。

III. 中文科考試分數的中位數較英文科的高。

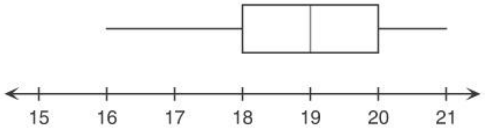
A. 只有 I 及 II

B. 只有 II 及 III

C. 只有 I 及 III

D. I, II 及 III

11. The box-and-whisker diagram shows the ages of the members of a youth centre.



From the diagram above, which of the following is not correct?

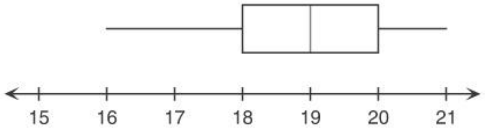
A. Range = 5

B. Inter-quartile range = 2

C. 50% of members' ages are under 18

D. 25% of members' ages are between 20 and 21.

以下為一間青年中心會員的年齡的框線圖。



根據以上框線圖，下列哪一項是不正確的？

A. 分佈域= 5

B. 四分位數間距= 2

C. 50% 的會員的年齡小於 18 歲

D. 25% 的會員的年齡介乎於 20 歲至 21 歲

12. Which of the following cannot be read from a box-and-whisker diagram?

A. Range

B. Inter-quartile range

C. Median

D. Standard deviation

下列哪一項資料不能從框線圖中讀取？

A. 分佈域

B. 四分位數間距

C. 中位數

D. 標準差

13. Find the standard deviation of the following distribution. (Give your answer correct to 3 significant figures.)

求以下數據分佈的標準差。

(答案須準確至三位有效數字。)

Number	3	4	6	8
Frequency	5	4	6	5

A. 1.90

B. 1.92

C. 2.12

D. 2.20

14. For two numbers a and b where $a > b$, the standard deviation of a and b is

對於兩個實數 a 和 b，且 $a > b$，則 a 和 b 的標準差是

A. $\frac{a^2+b^2}{2}$.

B. $\frac{a+b}{2}$.

C. $\frac{a-b}{2}$.

15. Find the standard deviation of the data set:
求以下數據組的標準差：
8, 4, 5, 6, 12

A. 2.83 (cor. to 3 sig. fig.)
B. 7.00 (cor. to 3 sig. fig.)
C. 7.95 (cor. to 3 sig. fig.)
D. 5.13 (cor. to 3 sig. fig.)

16 If $d > 0$, the standard deviation of $a - 3d$, $a - d, a + d$ and $a + 3d$ is
若 $d > 0$，$a - 3d$ 、$a - d, a + d$ 和 $a + 3d$ 的標準差是

A. d.
B. $2d$.
C. $\sqrt{2}d$.
D. $\sqrt{5}d$.

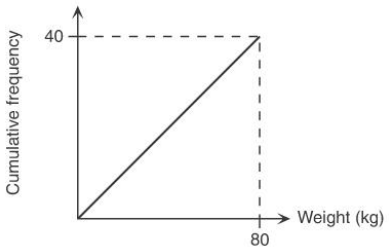
17. Find the standard deviation of the following distribution. (Give your answer correct to 3 significant figures.)
求以下數據分佈的標準差。
(答案須準確至三位有效數字。)

Class interval	20–22	23–25	26–28	29–31
Frequency	3	5	4	4

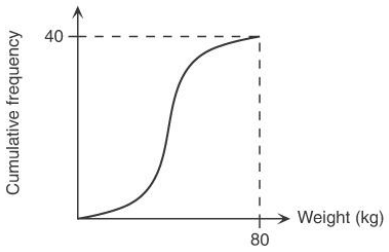
A. 3.35
B. 3.18
C. 3.14
D. 3.05

18. The figure shows the cumulative frequency curves of the weight distributions of three classes. Arrange the three distributions in descending order of their standard deviations.
下圖所示為三班學生體重的累積頻數曲線。試把三班學生體重分佈的標準差由大至小排列。

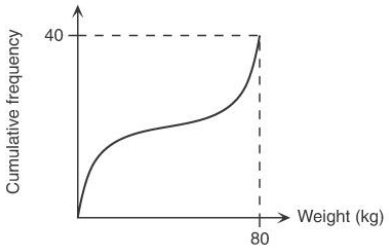
I.



II.

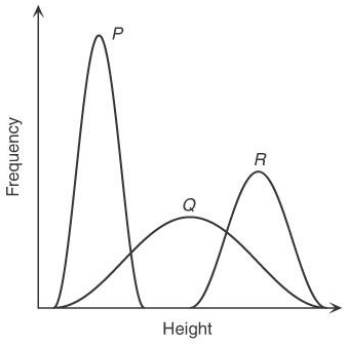


III.



A. I, II, III
B. I, III, II
C. II, I, III
D. III, I, II

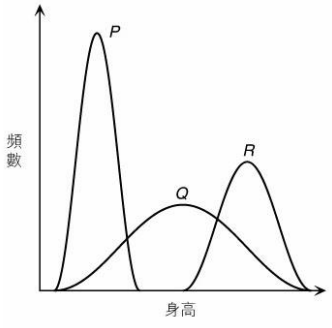
19. The figure shows the frequency distributions of heights of students in school *P*, *Q* and *R*.



Arrange the standard deviations of the heights of students in these schools in descending

order.

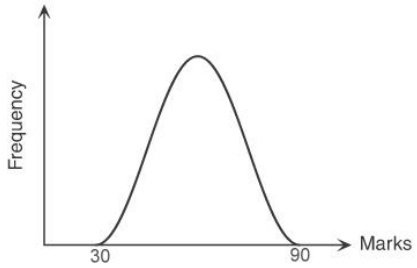
下圖所示為學校 *P*、*Q* 和 *R* 的學生身高的頻數分佈。



把這些學校的學生身高按標準差由大至小排列。

A. *P*, *R*, *Q*
B. *P*, *Q*, *R*
C. *Q*, *R P*
D. *R*, *Q*, *P*

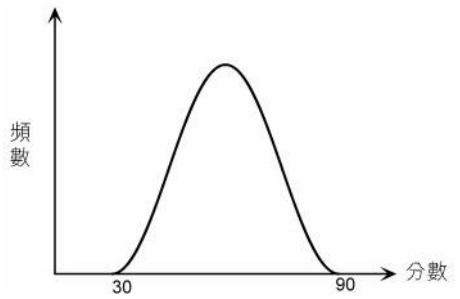
20. The figure shows the marks distribution of mathematics examination of a group of students.



If three more students of zero mark is added to the group, what are the changes of the mean and the standard deviation of the marks?

	Mean	Standard Deviation
A.	Increased	Decreased
B.	Increased	Increased
C.	Decreased	Decreased
D.	Decreased	Increased

下圖顯示一組學生在數學科考試中的分數分佈。



若在該分數佈內加入三個考獲零分的學生，該組學生分數的平均數和標準差會有何變化？

	算術平均數	標準差
A.	增加	減少
B.	增加	增加
C.	減少	減少
D.	減少	增加

21. For a set of data with negative values only, if a datum '0' is added, which of the following must be true?

I. The range will increase.
II. The inter-quartile range will increase
III. The standard deviation will increase

A. I only
B. II only
C. III only
D. I, II and III

已知一組數據只有負數。若加入一個數值'0'，下列何者必定正確？

I. 分佈域會增加
II. 四分位數間距會增加
III. 標準差會增加

A. 只有 I
B. 只有 II
C. 只有 III
D. I、II 及 III

22. The mean, standard deviation and inter-quartile range of n numbers are m, s and q respectively. If each number is decreased by 3, what will be their new means, standard deviations and inter-quartile range?

	Mean	Standard Deviation	Inter-quartile Range
A.	m	s	q
B.	m	$s-3$	$q-3$
C.	$m-3$	s	q
D.	$m-3$	s	$q-3$

n 個數值的平均數、標準差和四分位數間距分別是m、s 和 q。若把每一個數據減去3，新的平均數、標準差和四分位數間距是多少？

	平均數	標準差	四分位數間距
A.	m	s	q
B.	m	$s-3$	$q-3$
C.	$m-3$	s	q
D.	$m-3$	s	$q-3$

23. Given two groups of numbers,

Group A: $a+1$, $a+2$, $a+3$

Group B: $b+1$, $b+2$, $b+3$

m_1 and m_2 are the means of the group A and B respectively, s_1 and s_2 are the standard deviations of group A and B respectively. If $a > b$, which of the following is true ?

現有兩組數據，

A組: $a+1$, $a+2$, $a+3$

B組: $b+1$, $b+2$, $b+3$

m_1 和m_2 分別是A 組和B 組的平均數，而s_1 和s_2 則分別是A 組和B 組的標準差。若 $a > b$，則下列哪一項是正確的？

A. $m_1 < m_2$ and $s_1 > s_2$

B. $m_1 < m_2$ and $s_1 = s_2$

C. $m_1 > m_2$ and $s_1 > s_2$

D. $m_1 > m_2$ and $s_1 = s_2$

24. The box-and-whisker diagram shows the distribution of ages of employees in a company.

Which of the following must be true for the distribution?

I. The distribution of employees of ages between 23 and 24 is less dispersed than that of ages between 24 and 26.

II. The mean age of the employee in that company is 24.

III. The inter-quartile range of ages of the employees is 3.

A. I and II only

B. II and III only

C. I and III only

D. I, II and III.

以下的框線圖所示為某公司員工的年齡分佈。

根據以上的分佈，下列何者必定正確？

I. 員工年齡在 23 歲至 24 歲的分佈的離差較 24 歲至 26 歲的分佈的為小

II. 員工的平均年齡為 24 歲。

III. 員工年齡的四分位數間距是 3。

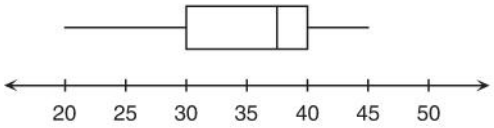
A. 只有 I 及 II

B. 只有 II 及 III

C. 只有 I 及 III

D. I、II 及 III

25. The box-and-whisker diagram shows the distribution of a data set. Find the range and inter-quartile range of the data set.
以下的框線圖顯示某組數據的分佈。求該組數據的分佈域及四分位數間距。



	Range 分佈域	Inter-quartile range 四分位數間距
A.	25	10
B.	37.5	25
C.	45	37.5
D.	30	40