

我們也可把比中的每個數除以它們的最大公因數。

$$\text{例：} 12 : 15 = \frac{12}{3} : \frac{15}{3} = 4 : 5$$

- 若 $3a = 2b$ ，則 $a : b = 2 : 3$ ，而不是 $3 : 2$ 。
- 若已知 $a : b$ 及 $b : c$ ，先找出兩個比中的公項，即 b 的最小公倍數，便可找出聯比 $a : b : c$ 。
例：若 $a : b = 1 : 2$ 及 $b : c = 3 : 4$ ，則
 $a : b : c = 3 : 6 : 8$ 。(2 及 3 的最小公倍數為 6)
- 若 $a : b = 2 : 3$ 及 $c : b = 6 : 1$ ，求 $a : b : c$ 時需留意 b 的位置。
 $a : b = 2 : 3$
 $b : c = 1 : 6$ (需寫成 $1 : 6$ 才作比較。)
所以 $a : b : c = 2 : 3 : 18$ 。
- 地圖上的比例尺一般以 $1 : n$ 的形式來表示。
例： $1 : 50\,000$ 表示 1 cm 代表 50 000 cm，即 500 m。



Warm Up Practice

- State whether each of the following statements is true (T) or false (F).
 - If a lorry travels at 24 m/s and a car travels at 75 km/h, then the car travels faster. (a) _____
 - If $a : b = 3 : 4$, then $a = 3$ and $b = 4$. (b) _____
 - If $5a = 3b$, then $a : b = 3 : 5$. (c) _____
 - $2 \text{ km} : 500 \text{ m} = 1 : 250$ (d) _____
 - If $a : b = \frac{2}{3} : \frac{2}{5}$, then $a : b = 5 : 3$. (e) _____
 - John is 14 years old and Mary is 11 years old now. The ratio of their ages will be $5 : 4$ next year. (f) _____



思考站

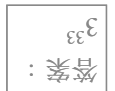
美芬取出 3 張數字卡。

她對偉強說：「你能否用卡上 3 個數字及任何數學運算方法，取得一個最大的數值來？」

偉強想了一會兒：「最大的該是 33^3 ，對嗎？」

美芬說：「不對，再想一想吧！」

各位同學，你能幫助偉強嗎？



學習錦囊

1. 注意指數不能和底的負數相乘。

例： $(-2)^{-3} \neq 2^3$

2. 處理分數的負指數時，可直接將分子分母對調，而指數則轉為正數。

例： $\left(\frac{3}{4}\right)^{-2} = \left(\frac{4}{3}\right)^2$

3. 當底為負數，而次方為偶數時，結果是正數。

例： $(-2)^{-4} = 16$

4. 由於 0^0 是沒有定義的，因此 $a^0 = 1$ ，必須註明 $a \neq 0$ 。

- (NF)** 5. 十六進制記數法中，10 – 15 分別由英文字母 A – F 表示。

即 A = 10，B = 11，C = 12，D = 13，E = 14，F = 15。

- 不能將兩負數相乘而作 $(-)(-) = (+)$ 處理。



Open-ended Question



- The weight of a melon is 1520 g.
 - Suggest 2 possible scale intervals of the measurement.
 - Find the percentage error in each measurement. (Give the answers correct to 3 significant figures if necessary)
- (NF)** Use the digits 'A, C, E, 1' to form 2 hexadecimal numbers which lie between 4.2×10^4 and 4.6×10^4 .



休憩室



瞎子與聾子的故事

2 公里外的某處有打雷和閃電的現象，由於光的速率為 3×10^8 m/s，而聲音的速率為 340 m/s，所以聾子先看見閃光，而瞎子其後才聽到雷聲。

$$\text{時間相差} = \frac{2000}{3.4 \times 10^2} - \frac{2000}{3 \times 10^8} \approx 5.88 \text{ 秒}$$



Important Term



approximate value (近似值)

error (誤差)

lower limit (下限)

maximum absolute error (最大絕對誤差)

percentage error (百分誤差)

power (冪)

relative error (相對誤差)

scientific notation (科學記數法)

significant figure (有效數字)

upper limit (上限)



Test Your Understanding



Fundamental Stage

A. Multiple Choice Question

1. Which of the following is not a common factor of $4ab^2$ and $6ac$?
A. 2
B. a
C. $2a$
D. ac
2. Which of the following equations is not an identity?
A. $2x + 6 = 2(x + 3)$
B. $x - (y - z) = x - y + z$
C. $(x + 1)^2 = x^2 + 2x + 1$
D. $(2x - 3)^2 = 4x^2 - 9$
3. If $(2x + 3)(x - 5) \equiv Ax^2 + Bx + C$, find C .
A. -15
B. -5
C. -7
D. 2
4. Which of the following is a factor of $(4a^2 - 2a)$?
A. $a^2 - 2$
B. $2a + 1$
C. $2a - 1$
D. $4a$
5. Factorize $p(2a - b) - b + 2a$.
A. $(p + 1)(2a - b)$
B. $(p - 1)(2a + b)$
C. $(p - 1)(2a - b)$
D. $(p + 1)(2a + b)$
6. Which of the following expressions has $x - 4$ as a factor?
A. $x^2 - 4$
B. $x^2 + 4x$
C. $x^2 - 4x$
D. $2x - 4$
7. $(2x - 3)^2 =$
A. $4x^2 - 12x + 9$
B. $4x^2 + 12x + 9$
C. $2x^2 - 12x + 9$
D. $2x^2 - 6x + 9$
8. If $(x - 3)^2 = 10$, then $x^2 + 3x =$
A. $3x - 1$.
B. $6x + 1$.
C. $9x + 10$.
D. $9x + 1$.
9. Factorize $6ac - 4bc - 3a + 2b$.
A. $(2c - 1)(3a + 2b)$
B. $(2c - 1)(3a - 2b)$
C. $(2c + 1)(3a - 2b)$
D. $(2c + 1)(3a + 2b)$
10. Factorize $p(a - b) - q(b - a)$.
A. $(p + q)(a + b)$
B. $(p - q)(a - b)$
C. $(p + q)(a - b)$
D. $(p - q)(a + b)$

Advanced Stage

A. Multiple Choice Question

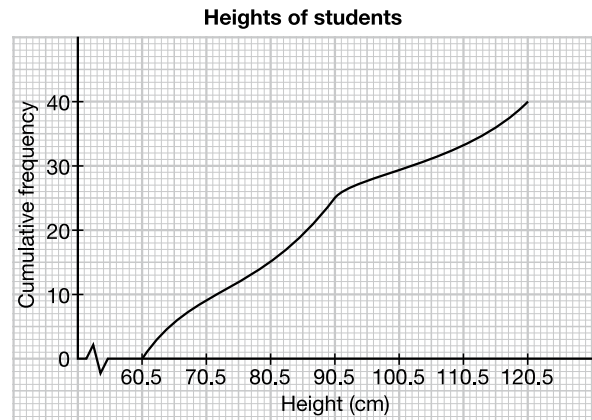
The following cumulative frequency table shows the daily salaries of a group of workers.

Salaries less than (\$)	Cumulative frequency
0.5	0
100.5	8
200.5	20
300.5	32
400.5	45
500.5	50

Study the above table and answer questions 1 – 3.

- What is the class interval of the second group?
 - \$100 – \$200
 - \$101 – \$200
 - \$201 – \$300
 - Cannot be determined
- How many workers can earn more than \$300.5 a day?
 - 18
 - 20
 - 32
 - 50
- Which group has the greatest number of workers?
 - \$1 – \$100
 - \$101 – \$200
 - \$201 – \$300
 - \$301 – \$400

The following cumulative frequency curve shows the heights of a class of students.



Answer questions 4 – 6 according to the above figure.

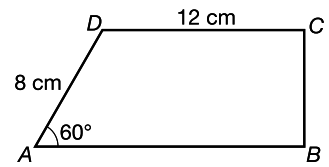
- What is the total number of students in the class?
 - 35
 - 38
 - 39
 - 40
- How many students are taller than 80.5 cm?
 - 15
 - 18
 - 25
 - 30
- What is the highest possible height in the class?
 - 120 cm
 - 120.4 cm
 - 120.5 cm
 - 121 cm

21. If $4^{1-3x} = 4^{-3x} + 192$, find the value of x . (5 marks)

22. In the figure, $AD = 8$ cm, $CD = 12$ cm and $\angle BAD = 60^\circ$.

(a) Find the lengths of AB and BC .

(b) Find the area of the trapezium.



(7 marks)

Section C: Long Question (33 marks)

23. The total cost $\$C$ of printing a reference book is given by

$$C = a + bN,$$

where N is the number of books printed.

When 2000 books are printed, the total cost is $\$83\,000$.

When 3000 books are printed, the total cost is $\$123\,000$.

(a) Find the values of a and b .

(b) Find the cost of printing a book when $N = 4000$.

(c) If 5000 books are printed and the books are sold at $\$48$ each, find the profit percentage.

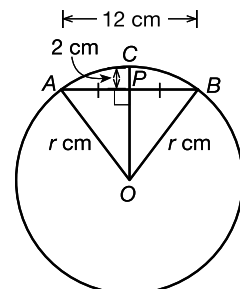
(11 marks)

24. In the figure, O is the centre of the circle with radius r cm and $AP = PB$.

(a) Express OP in terms of r .

(b) Hence find the value of r .

(c) Find $\angle AOB$.



(11 marks)

25. It is given that $\sin \theta + \cos \theta = 1.4$.

(a) Show that $(\sin \theta + \cos \theta)^2 = 1 + 2 \sin \theta \cos \theta$.

(b) Find the value of $\sin \theta \cos \theta$.

(c) Expand $(\sin \theta - \cos \theta)^2$ and hence find the value of $\sin \theta - \cos \theta$.

(d) Using the result of (c), find the values of $\sin \theta$ and θ .

(11 marks)

End

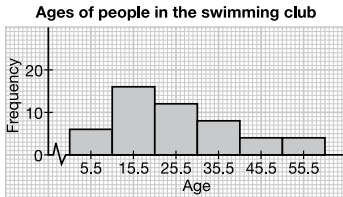
成績指標

1. 同學完成每課練習後，請計算自己所得的分數。
2. 得分計算方法：每題練習答對可得 1 分，答錯得 0 分。
如該題分為數個部分，則每部分答對可得 1 分。
例 1：第 1 章的基礎題，所包含的短題目中的第 18 題有 (a) — (d) 4 部分，故第 2 題的總分為 4 分。
例 2：第 1 章的基礎題，所包含的短題目中的第 21 題並沒有分為數部分，故第 21 題的總分為 1 分。
3. 同學們可參考下列積分表，評估個人的成績。

章節	日期		你的表現如何？請加上「✓」號。		
	開始	完成	表現良好	繼續努力	有待改善
Chapter 1					
Chapter 2					
Chapter 3					
Chapter 4					
Chapter 5					
Chapter 6					
Chapter 7					
Chapter 8					
Chapter 9					
Chapter 10					
Chapter 11					
Chapter 12					
Chapter 13					

11. (a)

Age	Frequency
1 – 10	6
11 – 20	16
21 – 30	12
31 – 40	8
41 – 50	4
51 – 60	4



- (b) Number of people in group 21 – 40
 $= 12 + 8 = 20$
 Percentage of people in group 21 – 40
 $= \frac{20}{50} \times 100\% = \underline{40\%}$
- (c) Number of people older than 40.5
 $= 50 - 42 = \underline{8}$

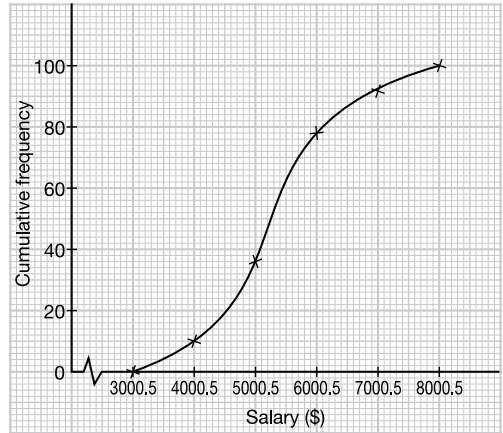
12. (a) 60 students took the test.
 (b) Median mark = 54 (at c. f. = 30)
 (c) 54 students got marks less than 90, so there are 6 brilliant students.

13. (a) Total number of workers
 $= 10 + 24 + y + 42 + 16 - y + 8 = \underline{100}$
- (b) $10 + 24 + y = 36$ • 首兩組工人工資低於 \$5000.5。
 $y = \underline{2}$
- (c) Number of worker earn more than \$6000.5
 $= 16 - 2 + 8 = \underline{22}$

(d)

Monthly Salaries less than (\$)	Cumulative frequency
3000.5	0
4000.5	10
5000.5	36
6000.5	78
7000.5	92
8000.5	100

Monthly salaries of workers in the factory

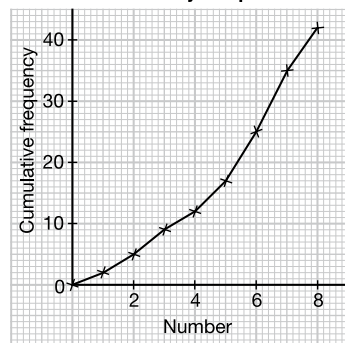


14. (a) Total number of students
 $= 2 + 3 + 4 + 3 + 5 + 8 + 10 + 7 = \underline{42}$
- (b) 8 students just passed 6 subjects.

(c)

No. of subjects passed (less than or equal to)	Cumulative frequency
0	0
1	2
2	5
3	9
4	12
5	17
6	25
7	35
8	42

Number of subjects passed



- (d) 17 students should take the special course. (Failing 3 or more subjects is equal to passing 5 or fewer subjects.)