

# Mathematics

# 數學科

**Indices law**

指數定律



計數要小心，  
咪期望快一陣！

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## (A) Common Law of Indices 常用指數定律

### Common Law of Indices 常用指數定律

1. Multiplication 乘法	$a^m \times a^n = a^{m+n}$
2. Division 除法	$\frac{a^m}{a^n} = a^{m-n}$
3. Powers 冪	i. $(a^m)^n = a^{mn}$ , ii. $(ab)^m = a^m b^m$ , iii. $\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m} (b \neq 0)$
4. Zero index 零指數	$a^0 = 1 \quad (a \neq 0)$
5. Negative index 負指數	$a^{-m} = \frac{1}{a^m} \quad (a \neq 0)$
6. Root 根	i. $(\sqrt[n]{a})^n = a$ , ii. $\sqrt[n]{a^n} = a$ , iii. $\sqrt[n]{ab} = (\sqrt[n]{a})(\sqrt[n]{b})$ iv. $\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$ , v. $a^{\frac{1}{n}} = \sqrt[n]{a}$ vi. $a^{\frac{m}{n}} = (\sqrt[n]{a})^m = \sqrt[n]{a^m}$

黎 Sir 提提你  :

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

e.g. 1 Simplify the following questions: (Give the answers to the positive indices only)

例子一 簡化下列各題: (答案以正指數表示)

a.  $(-3a^2)^3$

b.  $[x^2 \times (-y)^3]^2$

c.  $\left(\frac{3m^3 \times m^2}{4n^2}\right)^2$

黎 Sir 提提你  :

a.  $(-3a^2)^3$

b.  $[x^2 \times (-y)^3]^2$

c.  $\left(\frac{3m^3 \times m^2}{4n^2}\right)^2$

1.

d.  $\left(\frac{a^2}{c}\right)^{-2} (a^{-2}c)^2$

e.  $(a^0 \div b^4)^{-2}$

f.  $\left(\frac{-3m^{-1}}{2n^2}\right)^3$

黎 Sir 提提你  :

d.  $\left(\frac{a^2}{c}\right)^{-2} (a^{-2}c)^2$

e.  $(a^0 \div b^4)^{-2}$

f.  $\left(\frac{-3m^{-1}}{2n^2}\right)^3$

1

g.  $\sqrt{x\sqrt{x\sqrt{x\sqrt{x\sqrt{x}}}}}$

h.  $\frac{\sqrt[3]{x\sqrt{x}^{-\frac{2}{3}}}}{\sqrt[3]{x\sqrt{x}^{-\frac{2}{3}}}}$

i.  $\frac{x\sqrt{x^{-2}}}{\sqrt[3]{x\sqrt{x^{-2}}}}$

黎 Sir 提提你  :

g.  $\sqrt{x\sqrt{x\sqrt{x\sqrt{x}}}}$



h.  $\frac{\sqrt[3]{x\sqrt{x}^{-\frac{2}{3}}}}{\sqrt[3]{x\sqrt{x}^{-\frac{2}{3}}}}$

i.  $\frac{x\sqrt{x^{-2}}}{\sqrt[3]{x\sqrt{x^{-2}}}}$



- 1.
- 2.

## (B) Solving Indices Equations 解指數方程

e.g. 1 例子一 Solve the following equations 解以下方程:

a.  $2^x = 1024$

b.  $3^{x-2} = 1$

c.  $7 \times 7^{x-1} = 343$

d.  $3^{x+2} = 27$

黎 Sir 提提你 :

a.  $2^x = 1024$

b.  $3^{x-2} = 1$

c.  $7 \times 7^{x-1} = 343$

c.  $3^{x+2} = 27$

1.

2.

e.  $9^{x+1} - 2(3^{2x+1}) - 243 = 0$

f.  $8^{3x+1} = 16^{x+2}$

黎 Sir 提提你 :

e.

f.

3.

4.

5.

g.  $2^{x+4} - 3(2^x) = 104$

h.  $3^{x+2} - 3^x - 24 = 0$

i.  $5^{2x+1} + 5^{2x-1} = 130$

黎 Sir 提提你 :

g.

h.

i.

**j.**  $3^{x+3} + 3^{x+1} - 270 = 0$

**k.**  $4^{x+3} \times 4^{2x+1} = 4^5$

**l.**  $4^{x+3} \div 4^{2x+1} = 4^5$

黎 Sir 提提你  :

**j.**  $3^{x+3} + 3^{x+1} - 270 = 0$

**k.**  $4^{x+3} \times 4^{2x+1} = 4^5$

**l.**  $4^{x+3} \div 4^{2x+1} = 4^5$

6.

7.

## (C) Scientific Notation 科學記數法

Scientific Notation(科學記數法):  $x = a \times 10^n$ , where  $1 \leq a < 10$ ,  $n$  is an integer(整數).

e.g. 1 例子一 Use Scientific Notation to represent(代表) the following numbers.

a. 2400

b. 0.0000421

黎 Sir 提提你 :

a.  $2400 =$

b.  $0.0000421 =$

1.

2.

e.g. 2 Calculate the following questions and use scientific notation to represent the ans.

a.  $0.0068 + 0.0057$

b.  $5.827 \times 10^{-4} + 6.233 \times 10^{-3}$

黎 Sir 提提你 :

a.  $0.0068 + 0.0057$

b.  $5.827 \times 10^{-4} + 6.233 \times 10^{-3}$

1.

c.  $6.827 \times 10^3 + 5.700 \times 10^2$

d.  $1.027 \times 10^3 + 10$

黎 Sir 提提你 :

c.  $6.827 \times 10^3 + 5.700 \times 10^2$

d.  $1.027 \times 10^3 + 10$



**(D) Inter-conversion between binary/hexadecimal numbers to decimal numbers 簡單十進數和二進數/十六進數的互換**

**i. Binary to Decimal 二轉十**

e.g. 1 例子一 Convert(轉換) the following binary numbers to decimal numbers.

a.  $11101_2$

b.  $111010_2$

黎 Sir 提提你  :

a.  $11101_2$

b.  $111010_2$

1.

**ii. Decimal to Binary 十轉二:**

e.g. 1 例子一 Convert(轉換) the following decimal numbers to binary numbers.

a. 19

b. 25

黎 Sir 提提你  :

a. 19

b. 25

d  
 $\therefore 19 =$

$\therefore 25 =$

1.

2.

c.  $2^{13} + 2^4 + 3$

黎 Sir 提提你  :

c.  $2^{13} + 2^4 + 3 =$

1.

2.

### iii. Hexadecimal to Decimal 十六轉十

e.g. 1 例子一 Convert(轉換) the following hexadecimal numbers to decimal numbers.

a.  $1531_{16}$

b.  $FA8_{16}$

黎 Sir 提提你  :

a.  $1531_{16}$

b.  $FA8_{16}$

- 1.
- 2.

### iv. Decimal to Hexadecimal 十轉十六

e.g. 1 例子一 Convert(轉換) the following decimal numbers to hexadecimal numbers.

a. 1128

b. 512

黎 Sir 提提你  :

a.  $1128 =$

b.  $512 =$

- 1.
- 2.

**v. Hexadecimal to Binary 十六轉二**

e.g. 1 例子一 Convert(轉換) the following hexadecimal numbers to binary numbers.

a.  $F8_{16}$

b.  $1531_{16}$

黎 Sir 提提你  :

a.  $F8_{16}$

b.  $1531_{16}$

1.

Hexadecimal 十六進制

Binary 二進制

e.g.  $A_{16} = 10$

2.

**vi. Binary to Hexadecimal 二轉十六**

e.g. 1 例子一 Convert(轉換) the following binary numbers to hexadecimal numbers.

a.  $10000011_2$

b.  $1000011_2$

黎 Sir 提提你  :

a.  $10000011_2 =$

b.  $1000011_2 =$

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