

新 中 學 教 科 書

代 數

習 題 詳 解

編 纂 者

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新中學代數學教科書習題詳解

第一編

代數學之基礎

第一章 代數學之記號及效用

第一習題 A. (3-4頁)

1. (a) 以 $x+3$ 表之. (d) 以 $\frac{3}{x}$ 表之.
(b) 以 $x-3$ 表之. (e) 以 $3x+1$ 表之.
(c) 以 $3-x$ 表之. (f) 以 $\frac{x}{3}$ 表之.
2. (a) 以 n 代最大者,則以 $n-1$ 代居中者,以 $n-2$ 代最小者;
(b) 以 n 代最小者,則以 $n+1$ 代居中者,以 $n+2$ 代最大者;
(c) 以 n 代居中者,則以 $n+1$ 代最大者,以 $n-1$ 代最小者.
3. 偶數可以 $2n$ 表之,奇數可以 $2n-1$ 表之. 但 n 表整數.
4. 3 之倍數,可以 $3n$ 表之. m 之倍數,可以 mn 表之.
5. 設以 t 表十位基數, u 表一位基數,則此數可以 $10t+u$ 表之.
6. 設以 h 表百位基數, t 表十位基數, u 表一位基數,

則此數可以 $100h + 10t + u$ 表之。

7. (a) 5.1 分。

(d) $60n$ 分。

(b) cn 分。

(e) $\left(\frac{c}{a} \times n\right)$ 分或 $\frac{cn}{a}$ 分。

(c) $3cn$ 分。

(f) $\left(\frac{c}{a} \times 12n\right)$ 分或 $\frac{12cn}{a}$ 分。

8. 1 里有 180 丈, 2 里有 $180 \times 2 = 360$ 丈。m 里有 $180m$ 丈。n 里有 $180n$ 丈。

9. 1 圓為 100 分。1 分為 $\frac{1}{100}$ 圓。d 圓為 $100d$ 分。c 分為 $\frac{c}{100}$ 圓。

10. 1 時為 60 分。1 分為 $\frac{1}{60}$ 時。h 時為 $60h$ 分。m 分為 $\frac{m}{60}$ 時。

第一習題 B. (4-5 頁)

1. (a) $a = lw$.

(e) $c = 2 \times 3.1416r$.

(b) $a = bh$.

(f) $a = 3.1416r^2$.

(c) $a = \frac{bh}{2}$.

(g) $s = 4 \times 3.1416r^2$.

(d) $a = \frac{(b_1 + b_2)h}{2}$.

(h) $v = \frac{4}{3} \times 3.1416r^3$.

2. (a) $(a + b)^2 = a^2 + b^2 + 2ab$.

(b) $(a - b)^2 = a^2 + b^2 - 2ab$.

(c) $(a + b)(a - b) = a^2 - b^2$.

(d) $(a + b)^3 = a^3 + b^3 + 3ab(a + b)$.

(e) $(a - b)^3 = a^3 - b^3 - 3ab(a - b)$.

第二章 代數式

第二習題 (6-7頁)

1. (a) $2t+5=2 \times 10+5=20+5=25$ (答).

(b) $2t^2+3t=2 \times 10^2+3 \times 10=200+30=230$ (答).

(c) $7t^2+t+2=7 \times 10^2+10+2=700+10+2=712$ (答).

(d) $9t^2+4t+2=9 \times 10^2+4 \times 10+2=900+40+2$
 $=942$ (答).

(e) $7t^2+8t+6=7 \times 10^2+8 \times 10+6=700+80+6$
 $=786$ (答).

(f) $14t^3+51t^2+52t+30=14 \times 10^3+51 \times 10^2+52 \times 10$
 $+30=14000+5100+520+30$
 $=19650$ (答).

2. (a) $a^2+2ab+b^2=10^2+2 \times 10 \times 2+2^2=100+40+4$
 $=144$ (答).

(b) $a^2-2ab+b^2=10^2-2 \times 10 \times 2+2^2=100-40+4$
 $=64$ (答).

(c) $(a+b)(a^2-ab+b^2)=(10+2)(10^2-10 \times 2+2^2)$
 $=12 \times (100-20+4)=12 \times 84$
 $=1008$ (答).

(d) $(a-b)(a^2+ab+b^2)=(10-2)(10^2+10 \times 2+2^2)$
 $=8 \times (100+20+4)$
 $=8 \times 124=992$ (答).

(e) $a^3+3a^2b+3ab^2+b^3=10^3+3 \times 10^2 \times 2+3 \times 10 \times 2^2$
 $+2^3=1000+600+120+8=1728$ (答).

(f) $a^3-3a^2b+3ab^2-b^3=10^3-3 \times 10^2 \times 2+3 \times 10 \times 2^2$
 $-2^3=1000-600+120-8=512$ (答).

3.

	$2 \times 3.1416r$	$3.1416r^2$	$4 \times 3.1416r^2$	$\frac{4}{3} \times 3.1416r^3$
$r=1$	6.2832	3.1416	12.5664	4.1888
$r=2$	12.5664	12.5664	50.2656	33.5104
$r=3$	18.8496	28.2744	113.0976	113.0976
$r=4$	25.1328	50.2656	201.0624	268.0832
$r=5$	31.4160	78.5400	314.1600	523.6000

4. (a) $\frac{1}{2} \sqrt{2(b^2 + c^2) - a^2} = \frac{1}{2} \sqrt{2(12^2 + 15^2) - 9^2}$
 $= \frac{1}{2} \sqrt{2(144 + 225) - 81}$
 $= \frac{1}{2} \sqrt{738 - 81} = \frac{1}{2} \sqrt{657} \text{ (答).}$

(b) $\frac{1}{2} \sqrt{2(c^2 + a^2) - b^2} = \frac{1}{2} \sqrt{2(15^2 + 9^2) - 12^2}$
 $= \frac{1}{2} \sqrt{2(225 + 81) - 144}$
 $= \frac{1}{2} \sqrt{612 - 144} = \frac{1}{2} \sqrt{468} \text{ (答).}$

(c) $\frac{1}{2} \sqrt{2(a^2 + b^2) - c^2} = \frac{1}{2} \sqrt{2(9^2 + 12^2) - 15^2}$
 $= \frac{1}{2} \sqrt{2(81 + 144) - 225}$
 $= \frac{1}{2} \sqrt{450 - 225} = \frac{1}{2} \sqrt{225}$
 $= \frac{1}{2} \times 15 = 7\frac{1}{2} \text{ (答).}$

$$(d) \frac{1}{b+c} \sqrt{bcs(s-a)} = \frac{1}{12+15} \sqrt{12 \times 15 \times 18(18-9)}$$

$$s = \frac{a+b+c}{2} = \frac{1}{27} \sqrt{12 \times 15 \times 18 \times 9}$$

$$= \frac{9+12+15}{2} = \frac{1}{27} \sqrt{29160} (\text{答})$$

$$= 18.$$

$$(e) \frac{1}{c+a} \sqrt{cas(s-b)} = \frac{1}{15+9} \sqrt{15 \times 9 \times 18(18-12)}$$

$$= \frac{1}{24} \sqrt{15 \times 9 \times 18 \times 6}$$

$$= \frac{1}{24} \sqrt{14580} (\text{答}).$$

$$(f) \frac{1}{a+b} \sqrt{abs(s-c)} = \frac{1}{9+12} \sqrt{9 \times 12 \times 18(18-15)}$$

$$= \frac{1}{21} \sqrt{9 \times 12 \times 18 \times 3}$$

$$= \frac{1}{21} \sqrt{5832} (\text{答}).$$

$$(g) \sqrt{s(s-a)(s-b)(s-c)} = \sqrt{1(18-9)18-12(18-15)}$$

$$= \sqrt{18 \times 9 \times 6 \times 3}$$

$$= \sqrt{15 \times 3 \times 3 \times 18}$$

$$= 18 \times 3 = 54 (\text{答}).$$

第三章 代數學之數

第三習題 A. (8-9頁)

1. (a) 進-5里之意爲退五里。

- (b) 進 0 里之意爲不進不退。
2. (a) 賺零圓之意爲不賺不賠。
(b) 賺負十圓之意爲賠十圓。
3. (a) 民國+10年之意爲民國紀元後十年。
(b) 民國-10年之意爲民國紀元前十年。
4. 赤道南之緯度爲負。
5. 格林威區以西之經度爲負。
6.
$$\left. \begin{array}{l} 3-8=-5 \\ 7-7=0 \\ \frac{2}{3}-\frac{4}{5}=-\frac{2}{15} \end{array} \right\} \text{(答), } \left. \begin{array}{l} \frac{2}{3}-4=-3\frac{1}{3} \\ 2-\frac{4}{5}=1\frac{1}{5} \end{array} \right\} \text{(答).}$$

第三習題 B. (10頁)

1. $+9, +5, +4, +1, -1, -4, -5, -9$.
2. 此正數不小於此負數。
3. 此負數不大於此正數。
4. 此負數不大於他負數。

第三習題 C. (10-11頁)

1.
$$\left. \begin{array}{l} f(11)=11^2=121 \\ f(12)=12^2=144 \\ f(13)=13^2=169 \\ f(14)=14^2=196 \\ f(15)=15^2=225 \\ f(16)=16^2=256 \\ f(17)=17^2=289 \\ f(18)=18^2=324 \\ f(19)=19^2=361 \end{array} \right\} \text{(答).}$$

2. $F(2)=2^3=8$

$F(3)=3^3=27$

$F(4)=4^3=64$

$F(5)=5^3=125$

$F(6)=6^3=216$

$F(7)=7^3=343$

$F(8)=8^3=512$

$F(9)=9^3=729$

(答)·

3. $A(1,2)=3 \times 1 + 6 \times 2 = 3 + 12 = 15$ (答)·

4. $A(1,2)=6 \times 1 + 3 \times 2 = 6 + 6 = 12$ (答)·

5. $B(1,2)=3 \times 1 + 6 \times 2 - 15 = 3 + 12 - 15 = 0$ (答)·

6. $B(1,2)=6 \times 1 + 3 \times 2 - 12 = 6 + 6 - 12 = 0$ (答)·

7. $C(6,4)=6^2-4 \times 4$ 或 $4 \times 6^2+9 \times 4^2-288$ 或 $6 \times 4-60$
 $=36-16$ 或 $144+144-288$ 或 $24-60$
 $=20$ 或 0 或 -36 (答),

$C(6,9)=6^2-4 \times 9$ 或 $4 \times 6^2+9 \times 9^2-288$ 或 $6 \times 9-60$
 $=36-36$ 或 $144+729-288$ 或 $54-60$
 $=0$ 或 585 或 -6 (答),

$C(10,6)=10^2-4 \times 6$ 或 $4 \times 10^2+9 \times 6^2-288$ 或 $10 \times 6-60$
 $=100-24$ 或 $400+324-288$ 或 $60-60$
 $=76$ 或 436 或 0 (答)·

8. $C(0,5)=0^2+5^2-25=0+25+25=0$ (答),

$C(1,4,9)=1^2+4 \cdot 9^2-25=1+24 \cdot 01-25=0 \cdot 01$ (答),

$C(2,4,6)=2^2+4 \cdot 6^2-25=4+21 \cdot 16-25=0 \cdot 16$ (答),

$C(3,4)=3^2+4^2-25=9+16-25=0$ (答),

$$C(4,3) = 4^2 + 3^2 - 25 = 16 + 9 - 25 = 0(\text{答}),$$

$$C(4.1, 2.9) = 4.1^2 + 2.9^2 - 25 = 16.81 + 8.41 - 25 = 0.22(\text{答}).$$

9. $Q(0) = 0^2 + 0 = 0 + 0 = 0(\text{答}),$

$$Q(3) - 12 = (3^2 + 3) - 12 = (9 + 3) - 12 = 12 - 12 = 0(\text{答}),$$

$$Q(3) - 14 = (3^2 + 3) - 14 = (9 + 3) - 14 = 12 - 14 = -2(\text{答}).$$

10.
$$\left. \begin{aligned} S(3) &= (3+2)(3-3) = 5 \times 0 = 0 \\ S(4) &= (4+2)(4-3) = 6 \times 1 = 6 \\ S(5) &= (5+2)(5-3) = 7 \times 2 = 14 \end{aligned} \right\} (\text{答}).$$

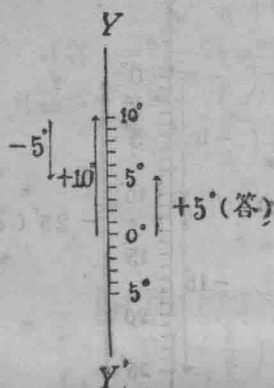
第四章 代數學數之演算規則

第四習題 A. (12-13頁)

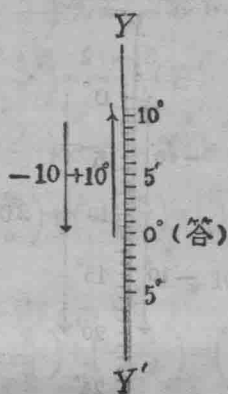
1. (a) 由此降 5 度, 則爲 $(+10) + (-5) = +5$ 度,
 由此降 10 度, 則爲 $(+10) + (-10) = 0$ 度,
 由此降 15 度, 則爲 $(+10) + (-15) = -5$ 度.
 (b) 由此昇 5 度, 則爲 $(+10) + (+5) = +15$ 度,
 由此昇 10 度, 則爲 $(+10) + (+10) = +20$ 度,
 由此昇 15 度, 則爲 $(+10) + (+15) = +25$ 度.
2. (a) 由此降 5 度, 則爲 $(-10) + (-5) = -15$ 度,
 由此降 10 度, 則爲 $(-10) + (-10) = -20$ 度,
 由此降 15 度, 則爲 $(-10) + (-15) = -25$ 度.
 (b) 由此昇 5 度, 則爲 $(-10) + (+5) = -5$ 度,
 由此昇 10 度, 則爲 $(-10) + (+10) = 0$ 度,
 由此昇 15 度, 則爲 $(-10) + (+15) = +5$ 度.

3.

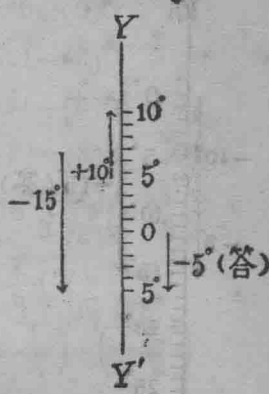
1.(a)₁



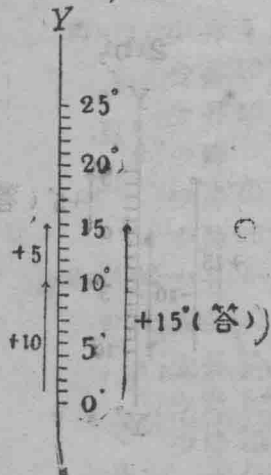
1.(a)₂



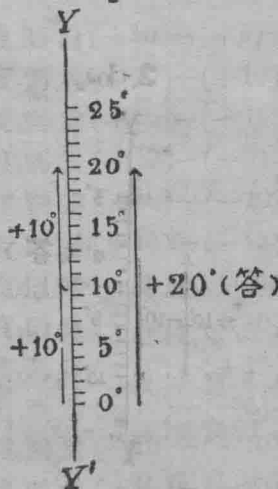
1.(a)₃



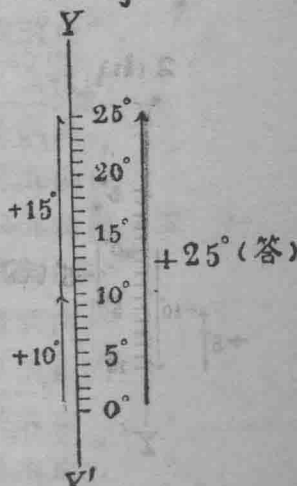
1.(b)₁

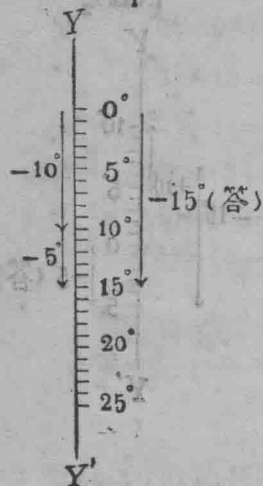
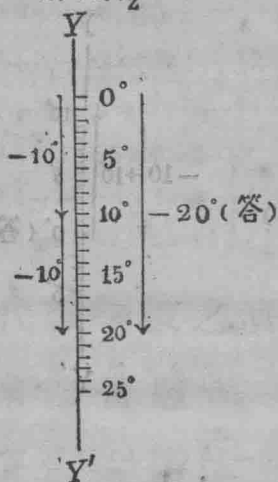
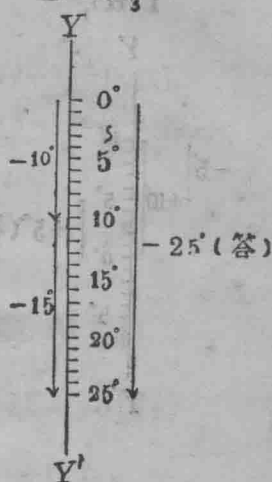
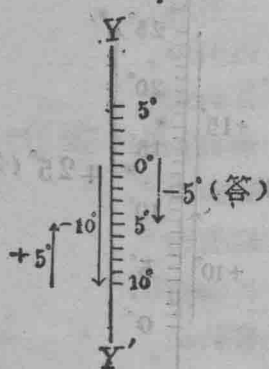
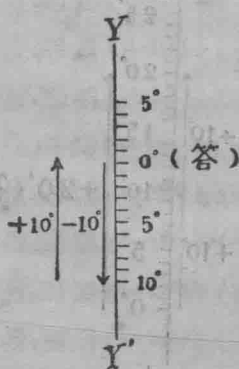
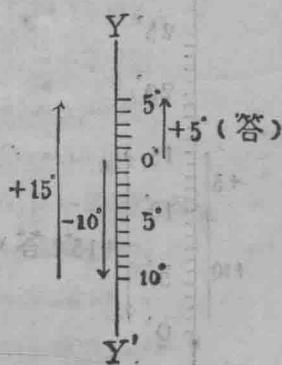


1.(b)₂



1.(b)₃



2.(a)₁2.(a)₂2.(a)₃2.(b)₁2.(b)₂2.(b)₃

$$5. (a) \left(+\frac{2}{3}\right) + \left(+\frac{1}{2}\right) = +1\frac{1}{6}(\text{答}).$$

$$(b) \left(+\frac{2}{3}\right) + \left(-\frac{1}{2}\right) = +\frac{1}{6}(\text{答}).$$

$$(c) \left(-\frac{1}{2}\right) + \left(+\frac{1}{5}\right) = -\frac{3}{10}(\text{答}).$$

$$(d) \left(-\frac{1}{2}\right) + \left(-\frac{1}{5}\right) = -\frac{7}{10}(\text{答}).$$

$$(e) (+10) + \left(+\frac{2}{3}\right) + \left(-\frac{1}{2}\right) = \left(+10\frac{2}{3}\right) + \left(-\frac{1}{2}\right) \\ = +10\frac{1}{6}(\text{答}).$$

$$(f) \left(-\frac{1}{6}\right) + \left(+\frac{2}{3}\right) + \left(-\frac{1}{2}\right) = \left(+\frac{1}{2}\right) + \left(-\frac{1}{2}\right) \\ = 0(\text{答}).$$

第四習題 B. (13-14頁)

1. (a) 少昇 5 度, 則爲 $(+10) - (+5) = +5$ 度,

少昇 10 度, 則爲 $(+10) - (+10) = 0$ 度,

少昇 15 度, 則爲 $(+10) - (+15) = -5$ 度.

(b) 少降 5 度, 則爲 $(+10) - (-5) = +15$ 度,

少降 10 度, 則爲 $(+10) - (-10) = +20$ 度,

少降 15 度, 則爲 $(+10) - (-15) = +25$ 度.

2. (a) 少昇 5 度, 則爲 $(-10) - (+5) = -15$ 度,

少昇 10 度, 則爲 $(-10) - (+10) = -20$ 度,

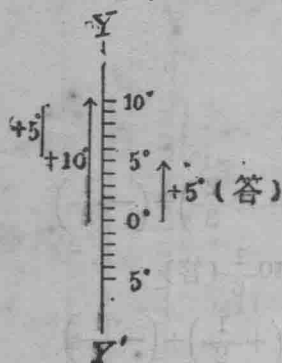
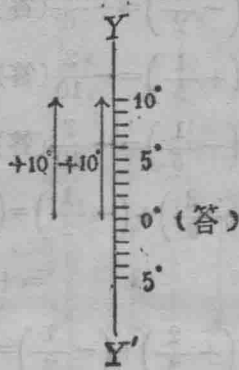
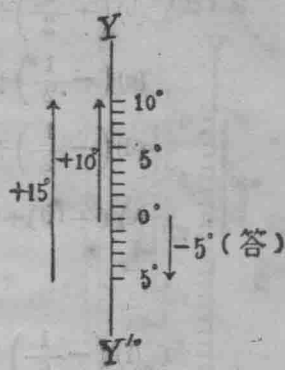
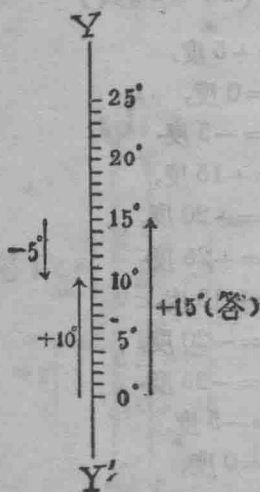
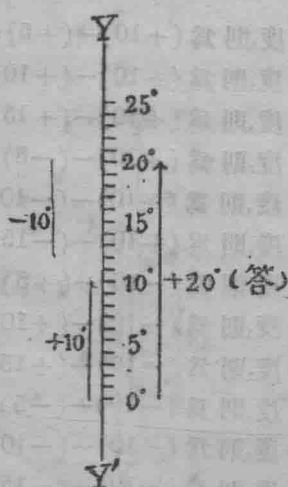
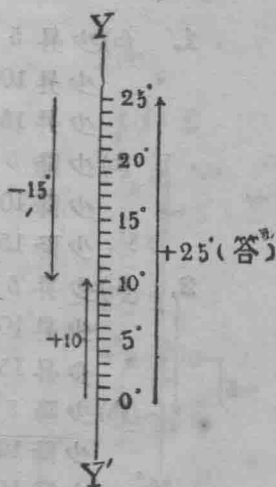
少昇 15 度, 則爲 $(-10) - (+15) = -25$ 度.

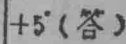
(b) 少降 5 度, 則爲 $(-10) - (-5) = -5$ 度,

少降 10 度, 則爲 $(-10) - (-10) = 0$ 度,

少降 15 度, 則爲 $(-10) - (-15) = +5$ 度.

3.

1(a)₁1(a)₂1(a)₃1(b)₁1(b)₂1(b)₃



$$4. (a) \left(+\frac{7}{6}\right) - \left(+\frac{2}{3}\right) = +\frac{3}{6} = +\frac{1}{2}(\text{答}).$$

$$(b) \left(-\frac{3}{10}\right) - \left(-\frac{1}{2}\right) = +\frac{2}{10} = +\frac{1}{5}(\text{答}).$$

$$(c) \left(+10\frac{1}{6}\right) - \left(-\frac{1}{2}\right) = +10\frac{4}{6} = +10\frac{2}{3}(\text{答}).$$

$$(d) \left(+10\frac{2}{3}\right) - \left(+\frac{2}{3}\right) = +10(\text{答}).$$

$$(e) \left(+10\frac{1}{6}\right) - \left[\left(-\frac{1}{2}\right) + \left(+\frac{2}{3}\right)\right] = \left(+10\frac{1}{6}\right) - \left(+\frac{1}{6}\right) = +10(\text{答}).$$

$$(f) \left(-\frac{1}{6}\right) - \left[\left(+\frac{2}{3}\right) + \left(-\frac{1}{2}\right)\right] = \left(-\frac{1}{6}\right) - \left(+\frac{1}{6}\right) = -\frac{1}{3}(\text{答}).$$

第四習題 C. (15頁)

$$1. (a) (+30) \times \left(+\frac{1}{5}\right) = +6(\text{答}).$$

$$(b) (+30) \times \left(+\frac{1}{6}\right) = +5(\text{答}).$$

$$(c) (+30) \times \left(-\frac{1}{5}\right) = -6(\text{答}).$$

$$(d) (+30) \times \left(-\frac{1}{6}\right) = -5(\text{答}).$$

$$(e) (-30) \times \left(+\frac{1}{5}\right) = -6(\text{答}).$$

$$(f) (-30) \times \left(+\frac{1}{6}\right) = -5(\text{答}).$$

$$(g) (-30) \times \left(-\frac{1}{5}\right) = +6(\text{答}).$$

$$(h) (-30) \times \left(-\frac{1}{6}\right) = +5(\text{答}).$$

2. (a) 8日後氣溫較今日高 $\left(+\frac{1}{4}\right) \times (+8) = +2$ 度, 即高2度.

(b) 8日前氣溫較今日高 $\left(+\frac{1}{4}\right) \times (-8) = -2$ 度, 即低2度.

3. (a) 8日後氣溫較今日高 $\left(-\frac{1}{4}\right) \times (+8) = -2$ 度, 即低2度.

(b) 8日前氣溫較今日高 $\left(-\frac{1}{4}\right) \times (-8) = +2$ 度, 即高2度.

4. $x^2 = (+5)^2$ 或 $(-5)^2 = (+5) \times (+5)$ 或 $(-5) \times (-5) = +25$ (答).

$x^3 = (+5)^3$ 或 $(-5)^3$

$= (+5) \times (+5) \times (+5)$ 或 $(-5) \times (-5) \times (-5)$

$= (+25) \times (+5)$ 或 $(+25) \times (-5)$

$= +125$ 或 -125 (答).

$x^4 = (+5)^4$ 或 $(-5)^4$

$= (+5) \times (+5) \times (+5) \times (+5)$ 或 $(-5) \times (-5) \times (-5) \times (-5)$

$= (+25) \times (+5) \times (+5)$ 或 $(+25) \times (-5) \times (-5)$

$= (+125) \times (+5)$ 或 $(-125) \times (-5) = +625$ (答).

$x^5 = (+5)^5$ 或 $(-5)^5$

$= (+5) \times (+5) \times (+5) \times (+5) \times (+5)$ 或 $(-5) \times (-5) \times (-5) \times (-5) \times (-5)$

$= (+25) \times (+5) \times (+5) \times (+5)$ 或 $(+25) \times (-5) \times (-5) \times (-5)$

$= (+125) \times (+5) \times (+5)$ 或 $(-125) \times (-5) \times (-5)$

$= (+625) \times (+5)$ 或 $(-625) \times (-5) = +3125$ (答).

$$\begin{aligned}
 &= (+625) \times (+5) \text{ 或 } (+625) \times (-5) \\
 &= +3125 \text{ 或 } -3125 (\text{答}).
 \end{aligned}$$

第四習題 D. (16-17頁)

1. (a) $(+5) \div \left(+\frac{1}{6}\right) = +30 (\text{答}).$

(b) $(-5) \div \left(+\frac{1}{6}\right) = -30 (\text{答}).$

(c) $(+5) \div \left(-\frac{1}{6}\right) = -30 (\text{答}).$

(d) $(-5) \div \left(-\frac{1}{6}\right) = +30 (\text{答}).$

(e) $(-30) \div (+6) = -5 (\text{答}).$

(f) $(-5) \div (-5) = +1 (\text{答}).$

(g) $(-30) \div [(+6)(-5)] = (-30) \div (-30) = +1 (\text{答}).$

(h) $(+30) \div [(-5)(+6)] = (+30) \div (-30) = -1 (\text{答}).$

2. (a) 明日氣溫較今日高 $(+2) \div (+8) = +\frac{1}{4}$ 度, 即高 $\frac{1}{4}$ 度.

(b) 昨日氣溫較今日高 $(+2) \div (-8) = -\frac{1}{4}$ 度, 即低 $\frac{1}{4}$ 度.

3. (a) 明日氣溫較今日高 $(-2) \div (+8) = -\frac{1}{4}$ 度, 即低 $\frac{1}{4}$ 度.

(b) 昨日氣溫較今日高 $(-2) \div (-8) = +\frac{1}{4}$ 度, 即高 $\frac{1}{4}$ 度.

4. 本題前半可以第四習題 C, 1 題各式證之, 後半可以 1 題前四式證之.