中三級數學科第二章整數指數定律

姓名：_____ 日期：_____

法則一：任何數的零次方都是 1，例：$10^0=1$；$10000^0=1$

(a) $20^0=$ 1	(b) $-7^0=$ -1
(c) $(b^5)^0=$ 1	(d) $(-6)^0=$ 1
(e) $(\frac{1}{a})^0=$ 1	(f) $(ab^2)^0=$ 1
(g) $5*2^0=$ $5\times1=5$	(h) $24*12^0=$ 24

法則二：$a^{-n}=$ $\frac{1}{a^n}$，例：

(a) $3^{-3}=$ $\frac{1}{3^3}=\frac{1}{27}$	(b) $5^{-2}=$ $\frac{1}{5^2}=\frac{1}{25}$
(c) $(ab)^{-2}=$ $\frac{1}{(ab)^2}=$	(d) $(-6)^{-4}=$ $\frac{1}{(-6)^4}=\frac{1}{64}$
(e) $3^{-4}\times6^2=$ $\frac{1}{3^4}\times6\times6=\frac{4}{9}$	(f) $2^{-3}\times4^0\times3^{-2}=$ $\frac{1}{2^3}\times1\times\frac{1}{3^2}=\frac{1}{72}$

法則三：同底數冪的乘法 $a^m\times a^n=a^m\cdot a^n=a^{m+n}$，$a\neq0$

練習題：化簡下列各式

1. $2^2\times2^3=$ 2^5
2. $3\times3^5=$ 3^6
3. $7^5(7^4)=$ 7^9
4. $2^6\times2^{31}=$ 2^{37}
5. $a^2\times a^3=$ a^5
6. $b^3(b^5)=$ b^8
7. $4y^3\times3y^4=$ $12y^7$
8. $23x^3(23x^{23})=$ $23^2x^{26}=529x^{26}$
9. $xy^5\times x^3y^2=$ x^4y^7
10. $x^2y^4\times x^6y=$ x^8y^5
11. $a^2\cdot a\cdot a^5=$ a^8
12. $b(b^2)(b^3)=$ b^6
13. $2\times2^3\times2^5=$ 2^9
14. $3^0\times3^3\times3^6=$ 3^9
15. $a^2\times b^3\times a^4\times b^3=$ a^6b^6
16. $16a^2(32a^4)=$ $512a^6$

法則四：同底數冪的除法 $a^m\div a^n=\frac{a^m}{a^n}=a^{m-n}$，$a\neq0$ 並暫假設 $m>n$。

練習題：化簡下列各式

1. $2^3\div2^2=$ 2
2. $8^5\div8^3=$ 8^2
3. $7^5\div7^4=$ 7
4. $23^{13}\div23^9=$ 23^{14}
5. $a^3\div a^2=$ a
6. $b^5\div b^3=$ b^2
7. $\frac{x^5}{x^4}=$ x
8. $\frac{y^{13}}{y^9}=$ x^4
9. $(xy)^5\div(xy)^2=$ $(xy)^3$
10. $\frac{(ab^2)^3}{(ab^2)^2}=$ ab^2

總練習

1. $7^6\div7^3\times7^2=$ 7^5
2. $7^6\times7^3\div7^2=$ 7^7
3. $a^6\div a^3\times a^2=$ a^5
4. $y^6\times5^0\div y^2=$ y^4
5. $(x^3y)^5\div(x^3y)^2\times(x^3y)=$ $(x^3y)^4$

計算下列各數的值。

1. (a) 4^3 64 (b) 3^4 81 (c) $(2)^5$ 32

2. (a) $(-6)^2$ 36 (b) $(-3)^3$ -27 (c) -4^4 -256

3. (a) $x^3 \cdot x^3$ x^6 (b) $y^4 \cdot x^5 \cdot y^3 \cdot y^2$ x^8y^6 (c) $m^3 \cdot m^6 \cdot x^2 \cdot$ x^2m^9

4. (a) $t^9 \div t^5$ t^4 (b) $2y^{12} \div y^4$ $2y^8$ (c) $12x^6 \div 3x^2$ $4x^4$

5. (a) $3x^3 \cdot 4x^2$ $12x^5$ (b) $(2r^5)(2r^3)(4r^2)$ $16r^{10}$ (c) $(3y^2)(2y^3)(y)$ $6y^6$

6. (a)$(6h^2) \div 3h$ $2h$ (b) $(24x^7) \div (6x^2)$ $4x^5$ (c) $(-12r^9) \div (-4r^5)$ $3r^4$

7. (a) $(xy^2)(x^3y^5)$ x^4y^7 (b) $(a^3b^2)(4a^2b)$ $4a^5b^3$ (c) $(5r^4s^8)(4r^3)(2s^7)$ $40r^7s^{15}$

8. (a) $\frac{x^3y^4}{xy}$ x^2y^3 (b) $\frac{25x^6y^2}{5x^4y}$ $5x^2y$ (c) $(-10x^6y^3) \div (5xy^2)$ $-2x^5y$

9. (a) $x^6 \cdot (-x)^2$ x^8 (b) $(-h)^2 \cdot (h)^5$ h^7 (c) $-h^2 \cdot h^3 \cdot (-h)^3$ h^8

法則四：$(a^m)^n = a^{m*n}$，$a \neq 0$，　例：$(a^2)^6 =$ a^{12}

(a) $(a^2)^5$ a^{10}	(b) $(2^4)^3$ 2^{12}	(c) $(m^2)^{-3}$ $\frac{1}{(m^2)^3} = \frac{1}{m^6}$

法則五：$(ab)^n = a^n b^n$，$a \neq 0$，　例：$(a^3b)^6 =$

(a) $(hk^2)^4$ h^4k^8	(b) $(m^3n^4)^5$ $m^{15}n^{20}$	(c) $(3a^3)^2$ $9a^6$
(d) $(2a^2b)^2$ $4a^4b^2$	(e) $(-2d^2)^3$ $-8d^6$	(f) $(-5d^4)^{-2}$ $\frac{1}{(-5d)^4} = \frac{1}{625d^4}$

法則六：$(\frac{a}{b})^n = \frac{a^n}{b^n}$，$b \neq 0$，　例：$(\frac{a^4}{b})^6 =$ $\frac{a^{24}}{b^6}$

(a) $\left(\frac{a}{b}\right)^3 = \frac{a^3}{b^3}$	(b) $\left(\frac{3}{2}\right)^2 = \frac{9}{4}$	(c) $\left(\frac{x^2}{y^3}\right)^3 = \frac{x^6}{y^9}$

(d) $\left(\frac{4x^7}{y^3}\right)^2$

$= \frac{16x^{14}}{y^6}$

(e) $\left(\frac{5y^3}{2x^4}\right)^4$

$= \frac{625y^{12}}{16x^{16}}$

(f) $\left(\frac{x^5y^3}{x^4y}\right)^5$

$= \frac{x^{25}y^{15}}{x^{20}y^5}$

$= x^5y^{10}$

總練習：

(a) $2008^0 - 2009^0 = 1 - 1 = 0$

(b) $(2a^3b^0)^2 = 4a^6$

(c) $(c^2)^{-1}$ $\frac{1}{c^2}$

(d) $(2m^3)^{-2}$ $\frac{1}{4m^6}$

(e) $f^{-1} \times f^3 \div f^{-5}$

$= f^{-1+3-(-5)}$

$= f^7$

(f) $12f^2 \div f^{-4} \times f^0$

$= 12f^{2-(-4)+0} = 12f^6$

(g) $12f^2 \div 4f^{-4} \times 5f^0$

$= \frac{12 \times 5}{4} f^{2-(-4)+0} = 15f^6$

(h) $x^5(xy)^2y^3$

$= x^7y^5$

(i) $(7x)^5(7x^4)$

$= 7^5x^5 \cdot 7 \cdot x^4 = 7^6x^9$

(j) $(2b^3)^2 \times (4b^5)^3$

$= 2^2b^6 \times 4^3b^{15} = 256b^{21}$

(k) $(4a^{-6}b^3)(3a^4b^{-1})$

$= 12a^{-6+4}b^{3+(-1)}$

$= 12a^{-2}b^2 = \frac{12b^2}{a^2}$

(l) $(xy)^5 \cdot (ab^2)^3 \cdot (xy)^2 \cdot (ab^2)^2$

$= x^5y^5 \cdot a^3b^6 \cdot x^2y^2 \cdot a^2b^4$

$= x^7y^7 \cdot a^5b^{10}$

(m) $(xy)^5 \div xy^2 =$

$= \frac{x^5y^5}{xy^2}$

$= x^4y^3$

(n) $\frac{2^4a^5}{4a} = 4a^4$

(o) $\frac{a^4b^3}{a^{-3}b^{-2}} = a^7b^5$

(p) $\frac{(ab^2)^3}{(ab)^2} = \frac{a^3b^6}{a^2b^2} = ab^4$

(q) $\frac{(2 \times 7)^5}{2^2 \times 7^4} = \frac{2^5 \times 7^5}{2^2 7^4}$

$= 2^3 \times 7 = 56$

(r) $\frac{(xy^2)^5}{(x^2y)^2} = \frac{x^5y^{10}}{}$

(s) $\frac{(a^2b^{-1})^3}{a^{-2}b^3} = \frac{a^6b^{-3}}{a^{-2}b^3}$

$= a^{6-(-2)}b^{-3-3} = a^8b^{-6}$

$= \frac{a^8}{b^6}$

(t) $\left(\frac{x}{y^2}\right)^4\left(\frac{y}{x}\right)^3$

$= \frac{x^4}{y^8} \cdot \frac{y^3}{x^3} = \frac{x}{y^5}$

(u) $\frac{(xy)^5(ab^2)^3}{(x^2y)^2a(b^2)^2} = \frac{x^5y^5 \cdot a^3b^6}{x^4y^2 \cdot a \cdot b^4}$

$= xy^3a^2b^2$

(v) $\left(\frac{3x}{y^2}\right)^2\left(\frac{5y}{6x}\right)^3 = \frac{9x^2}{y^4} \cdot \frac{125y^3}{6 \cdot 6 \cdot x^3}$

$= \frac{125}{24xy}$