

* الدرس الخامس: الأسس النسبية والجذور

* أتدرب وأحل المسائل :

$$(1*) p^{\frac{1}{6}} = \sqrt[6]{p}$$

$$(2*) \sqrt[8]{u} = u^{\frac{1}{8}}$$

$$(3*) 9^{\frac{1}{4}} = \sqrt[4]{9}$$

$$(4*) \sqrt[5]{-8} = (-8)^{\frac{1}{5}}$$

أو $-8^{\frac{1}{5}}$

$$(5*) \omega^{\frac{8}{3}} = \sqrt[3]{\omega^8}$$

$$(6*) \sqrt[6]{v^5} = v^{\frac{5}{6}}$$

$$(7*) 16^{\frac{3}{4}} = \sqrt[4]{16^3}$$

$$(8*) \sqrt[5]{(-35)^9} = (-35)^{\frac{9}{5}}$$

أو $-35^{\frac{9}{5}}$

$$(9*) 32^{\frac{1}{5}} = \sqrt[5]{32} = 2$$

$$(10*) 256^{\frac{1}{4}} = \sqrt[4]{256} = 4$$

$$(11*) (-125)^{\frac{1}{3}} = -5$$

$$(12*) 4096^{\frac{1}{6}} = \sqrt[6]{4096} = 4$$

$$(13*) 16^{\frac{3}{4}} = (\sqrt[4]{16})^3 = (2)^3 = 8$$

$$(14*) \left(-\frac{1}{32}\right)^{\frac{2}{5}} = \left(\sqrt[5]{-\frac{1}{32}}\right)^2 = \left(-\frac{1}{2}\right)^2 = \frac{1}{4}$$

$$(15*) \left(\frac{9}{4}\right)^{\frac{5}{2}} = \left(\sqrt{\frac{9}{4}}\right)^5 = \left(\frac{3}{2}\right)^5 = \frac{3^5}{2^5} = \frac{243}{32}$$

$$(16*) \left(-\frac{27}{8}\right)^{\frac{2}{3}} = \left(\sqrt[3]{-\frac{27}{8}}\right)^2 = \left(-\frac{3}{2}\right)^2 = -\frac{243}{32}$$

* أتتحقق من فهمي : ص 38

$$(5) c^{\frac{1}{8}} = \sqrt[8]{c}$$

$$(6) \sqrt[4]{x} = x^{\frac{1}{4}}$$

$$(7) 25^{\frac{1}{10}} = \sqrt[10]{25}$$

$$(8) \sqrt[3]{-12} = (-12)^{\frac{1}{3}}$$

أو $-12^{\frac{1}{3}}$
لأن الجذر فردي

* أتتحقق من فهمي : ص 39

$$(4) 225^{\frac{1}{2}} = \sqrt{225} = 15$$

$$(5) (-243)^{\frac{1}{5}} = \sqrt[5]{-243} = -3$$

$$(6) 128^{\frac{1}{7}} = \sqrt[7]{128} = 2$$

* أتتحقق من فهمي : ص 39

$$(5) d^{\frac{5}{2}} = \sqrt{d^5}$$

$$(6) \sqrt[4]{b^7} = b^{\frac{7}{4}}$$

$$(7) 18^{\frac{9}{5}} = \sqrt[5]{18^9}$$

$$(8) \sqrt[3]{(-16)^8} = (-16)^{\frac{8}{3}}$$

لأن الجذر فردي يفرج السالب
ولكون القوة زوجية يصبح العدد
موجباً إذا $(16^{\frac{8}{3}})$

* أتتحقق من فهمي : ص 40

$$(3) 32^{\frac{2}{5}} = \left(\sqrt[5]{32}\right)^2 = 2^2 = 4$$

$$(4) \left(-\frac{27}{64}\right)^{\frac{2}{3}} = \left(\sqrt[3]{-\frac{27}{64}}\right)^2 = \left(-\frac{3}{4}\right)^2 = \frac{9}{16}$$

* الدرس السادس : ضرب الأسس النسبية وقسمة

~~48~~ * ~~أشرف وأصل المسائل~~ : 48
أشرف وأصل المسائل :

$$(1) 25^{\frac{2}{3}} \times 5^{\frac{2}{3}} = (5^2)^{\frac{2}{3}} \times 5^{\frac{2}{3}} \quad (25 = 5^2)$$

$$= 5^{\frac{4}{3}} \times 5^{\frac{2}{3}} = 5^{\frac{6}{3}} = 5^2 = 25$$

$$(2) \sqrt[6]{64 \times 3^{12}} = \sqrt[6]{2^6 \times 3^{12}} \quad (64 = 2^6)$$

$$= \sqrt[6]{2^6} \times \sqrt[6]{3^{12}} = 2 \times 3^2 = 18$$

$$(3) \frac{9^{\frac{5}{2}}}{27^{\frac{2}{3}}} = \frac{(3^2)^{\frac{5}{2}}}{(3^3)^{\frac{2}{3}}} = \frac{3^5}{3^2} \quad (27 = 3^3)$$

$$= 3^{5-2} = 3^3 = 27$$

$$(4) \frac{\sqrt[3]{216}}{36^{-\frac{3}{2}}} = \frac{\sqrt[3]{6^3}}{(6^2)^{-\frac{3}{2}}} = \frac{6}{6^{-3}} \quad (216 = 6^3)$$

$$= 6^{1-(-3)} = 6^4 \quad (36 = 6^2)$$

$$(5) \left(\frac{25}{64}\right)^{-\frac{3}{2}} = \left(\frac{64}{25}\right)^{\frac{3}{2}} = \left(\frac{8^2}{5^2}\right)^{\frac{3}{2}}$$

$$= \frac{(8^2)^{\frac{3}{2}}}{(5^2)^{\frac{3}{2}}} = \frac{8^3}{5^3} = \frac{512}{125}$$

$$(6) \left(\frac{2187}{128}\right)^{-\frac{5}{7}} = \left(\frac{128}{2187}\right)^{\frac{5}{7}} \quad (2187 = 3^7)$$

$$= \left(\frac{2^7}{3^7}\right)^{\frac{5}{7}} = \frac{(2^7)^{\frac{5}{7}}}{(3^7)^{\frac{5}{7}}} = \frac{2^5}{3^5} \quad (128 = 2^7)$$

$$= \frac{32}{243}$$

* ~~أشرف وأصل المسائل~~ : 45
أشرف وأصل المسائل : 45

$$(5) 32^{\frac{1}{3}} \times 2^{\frac{4}{3}} = (2^5)^{\frac{1}{3}} \times 2^{\frac{4}{3}} \quad (32 = 2^5)$$

$$= 2^{\frac{5}{3}} \times 2^{\frac{4}{3}} = 2^{\frac{9}{3}} = 2^3 = 8$$

* في حالة الضرب تجمع الأسس إذا كان الأساس نفسه

$$(6) \sqrt[4]{81 \times 2^4} = \sqrt[4]{3^4 \times 2^4} \quad (81 = 3^4)$$

$$= \sqrt[4]{3^4} \times \sqrt[4]{2^4} = 3 \times 2 = 6$$

الجزء يكون في حالة الضرب والقسمة

$$(7) \frac{\sqrt[3]{243}}{\sqrt[3]{9}} = \frac{\sqrt[3]{3^5}}{\sqrt[3]{3^2}} = \frac{3^{\frac{5}{3}}}{3^{\frac{2}{3}}} \quad (243 = 3^5)$$

$$= 3^{\frac{5}{3}-\frac{2}{3}} = 3^{\frac{3}{3}} = 3 \quad (9 = 3^2)$$

* في حالة القسمة تطرح الأسس إذا كان الأساس نفسه

$$(8) \left(\frac{16}{81}\right)^{\frac{5}{4}} = \left(\frac{2^4}{3^4}\right)^{\frac{5}{4}} \quad (16 = 2^4)$$

$$= \left(\frac{2^4}{3^4}\right)^{\frac{5}{4}} = \frac{(2^4)^{\frac{5}{4}}}{(3^4)^{\frac{5}{4}}} = \frac{2^5}{3^5} = \frac{243}{32}$$

* ~~أشرف وأصل المسائل~~ : 46
أشرف وأصل المسائل : 46

$$(4) y^{\frac{4}{5}} \times y^{-\frac{1}{5}} = y^{\frac{4}{5} + (-\frac{1}{5})} = y^{\frac{3}{5}}$$

$$= y^{-1} = \frac{1}{y}$$

$$(5) \frac{4^{-\frac{1}{2}}}{4^{-4}} = 4^{-\frac{1}{2} - (-4)} = 4^{-\frac{1}{2} + 4} = 4^{\frac{7}{2}} = \sqrt[4]{4}$$

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

* الدرس السابع : الصيغة العلمية

* أنصحق من فهمي : م 51

(3) 7864 7.864×10^3	(4) 4277.38 4.27738×10^3
(5) 0.00000874 8.74×10^{-6}	(6) 0.002 2×10^{-3}

* أنصحق من فهمي : م 52

(3) 6.432×10^6 6432000	(4) 3.45×10^{-2} 0.0345
(5) 7×10^{-4} 0.0007	(6) 8×10^3 8000

* أنصحق من فهمي : م 54

(3) $(5.6 \times 10^{11}) (2.8 \times 10^{-14})$
 $= (5.6 \times 2.8) \times (10^{11} \times 10^{-14})$
 $= 15.68 \times 10^{-3} = 1.568 \times 10^1 \times 10^{-3}$
 ليس بالصيغة العلمية
 $= 1.568 \times 10^{-2}$

(4) $(1.305 \times 10^5) \div (1.45 \times 10^8)$
 $= (1.305 \div 1.45) \times (10^5 \div 10^8)$
 $= 0.9 \times 10^{-3}$
 ليس بالصيغة العلمية
 $= 9 \times 10^{-4}$

(7) $p^{-\frac{3}{4}} \times p^{\frac{11}{4}} = p^{-\frac{3}{4} + \frac{11}{4}} = p^{\frac{8}{4}} = p^2$

(8) $\frac{u^{-\frac{2}{3}}}{u^{-3}} = u^{-\frac{2}{3} - (-3)} = u^{-\frac{2}{3} + 3} = u^{\frac{7}{3}} = \sqrt[3]{u^7}$

(9) $y^6 \times (y^{\frac{2}{3}})^{-3} = y^6 \times y^{-3} = y^{6-3} = y^3$

(10) $\frac{1}{n^2} y^{-2} (n^{\frac{5}{3}})^2 = n^{-2} y^{-2} n^{\frac{10}{3}} = n^{-2} \times y^{-2} \times n^{\frac{10}{3}} = n^{-2 + \frac{10}{3}} y^{-2} = n^{\frac{4}{3}} y^{-2} = \sqrt[3]{n^4} y^{-2}$

(11) $\frac{w^2 \times w^{-\frac{9}{2}}}{w^{-3}} = \frac{w^{2 - \frac{9}{2}}}{w^{-3}} = \frac{w^{-\frac{5}{2}}}{w^{-3}} = w^{-\frac{5}{2} - (-3)} = w^{-\frac{5}{2} + 3} = w^{\frac{1}{2}} = \sqrt{w}$

(12) $d^{-\frac{1}{2}} \times d^{-\frac{3}{2}} = d^{-\frac{1}{2} - \frac{3}{2}} = d^{-2} = \frac{1}{d^2}$

(17) $A_{\square} = L \times w = 2x^{\frac{3}{2}} \times 2x^{\frac{3}{2}} = 2x^{\frac{3}{2} + \frac{3}{2}} = 2x^3$

* التدرّب وأصل المسائل: مسائل 69

* التدرّب وأصل المسائل: مسائل 70

$$(3) (2c+10)^2 = (2c)^2 + 2 \times 2c \times 10 + (10)^2 = 4c^2 + 40c + 100$$

$$(4) (d^2+4)^2 = (d^2)^2 + 2 \times d^2 \times 4 + 4^2 = d^4 + 8d^2 + 16$$

* التدرّب وأصل المسائل: مسائل 71

$$(3) (7t^2-1)^2 = (7t^2)^2 + 2 \times 7t^2 \times (-1) + (-1)^2 = 49t^4 - 14t^2 + 1$$

$$(4) (x^3-4y^2)^2 = (x^3)^2 + 2 \times x^3 \times (-4y^2) + (-4y^2)^2 = x^6 - 8x^3y^2 + 16y^4$$

* التدرّب وأصل المسائل: مسائل 72

$$(3) (6w+d^4)(6w-d^4) = 36w^2 - d^8$$

$$(4) (x^3+3h^7)(x^3-3h^7) = x^6 - 9h^{14}$$

* التدرّب وأصل المسائل: مسائل 73

$$(1) (w+2)^2 = w^2 + 2 \times w \times 2 + 2^2 = w^2 + 4w + 4$$

$$(2) (x-11)^2 = x^2 + 2 \times x \times (-11) + (-11)^2 = x^2 - 22x + 121$$

* التدرّب وأصل المسائل: مسائل 74

$$(1) 250 = 2.5 \times 10^2$$

$$(3) 56,0043 = 5.60043 \times 10^1$$

$$(5) 2.46 \times 10^2 = 246$$

$$(7) 5.67 \times 10^{-4} = 0.000567$$

$$(10) (7.3 \times 10^{-3})(4 \times 10^2) = (7.3 \times 4)(10^{-3} \times 10^2) = 29.2 \times 10^{-1} = 2.92$$

$$(11) (2 \times 10^{-2})^3 = 2^3 \times (10^{-2})^3 = 8 \times 10^{-6}$$

$$(12) (4.8 \times 10^4) \div (3 \times 10^4) = (4.8 \div 3) \times (10^4 \div 10^4) = 1.6 \times 10^0 = 1.6$$

$$(13) \sqrt{36 \times 10^{-4}} = \sqrt{36} \times \sqrt{10^{-4}} = 6 \times (10^{-4})^{\frac{1}{2}} = 6 \times 10^{-2}$$

* التحقق من فهمي: 78

$$(3) \quad 20y + 12$$

$$= 4(5y + 3)$$

(4) $7d^2 - 5d$

* تكون القوة الأصغر هي العامل المشترك

$$= d(7d - 5)$$

(5) $3r^2c^3 + 6r^3 + 21r^7$

r^2, r^3, r^7 الأصغر

$$= 3r^2(c^3 + 2r^3 + 7r^5)$$

(6) $2 - 16x + 8y$

$$= 2(1 - 8x + 4y)$$

* التحقق من فهمي: 79

(3) $(x^3 + 2x^2) + (3x + 6)$

$$= (x^3 + 2x^2) + (3x + 6)$$

$$= x^2(x + 2) + 3(x + 2)$$

$$= (x + 2)(x^2 + 3)$$

(4) $(4s^2 - s) + (12st - 3t)$

$$= s(4s - 1) + 3t(4s - 1)$$

$$= (4s - 1)(s + 3t)$$

(3) $(4m^3 - 5y)^2$

$$= (4m^3)^2 + 2 \times 4m^3 \times (-5y) + (-5y)^2$$

$$= 16m^6 - 40m^3y + 25y^2$$

(4) $(w^2 - 7)(w^2 - 7)$

$$= (w^2 - 7)^2$$

$$= (w^2)^2 + 2 \times w^2 \times (-7) + (-7)^2$$

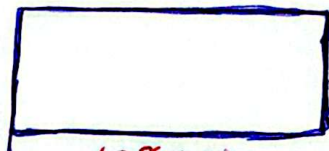
$$= w^4 - 14w^2 + 49$$

(5) $(5a + 4)(5a - 4)$ (فروق بين مربعين)

$$= 25a^2 - 16$$

(6) $(x^2 + 7y^4)(x^2 - 7y^4)$

$$= x^4 - 49y^8$$

(7) 

$(3x - 6)$

$(3x + 6)$

$$A = L \times w$$

$$= (3x - 6)(3x + 6)$$

$$= 9x^2 - 36$$

- الدرس الثاني: التحليل بإخراج العامل المشترك الأكبر

* التحقق من فهمي: 76

(3) $14b^2c, 21c^3$ $7c = 1.2.7$

$$14b^2c = 2 \times 7 \times b \times b \times c$$

$$21c^3 = 3 \times 7 \times c \times c \times c$$

(4) $2y^3x^5, 3y^3x^3$ $y^3x^3 = 1.3.3$

$$2y^3x^5 = 2 \times y \times y \times y \times x \times x \times x \times x \times x$$

$$3y^3x^3 = 3 \times y \times y \times y \times x \times x \times x$$

$$(7) \overset{2}{\sqrt{}} 6r^2 - \overset{2}{\sqrt{}} 10r$$

$$= 2r(3r - 5)$$

$$(8) ab^2 - 2ab$$

$$= ab(b - 2)$$

$$(9) \overset{4}{\sqrt{}} 12n^2m - \overset{4}{\sqrt{}} 8nm^2$$

$$= 4nm(3n - 2m^2)$$

$$(10) \overset{5}{\sqrt{}} 15wx - \overset{5}{\sqrt{}} 10wy^2$$

$$= 5w(3x - 2y^2)$$

$$(11) \overset{2}{\sqrt{}} 4t^2 + \overset{2}{\sqrt{}} 2t - \overset{2}{\sqrt{}} 12tu$$

$$= 2t(2t + 1 - 6u)$$

$$(12) \overset{6}{\sqrt{}} 12p + \overset{6}{\sqrt{}} 24q - \overset{6}{\sqrt{}} 6$$

$$= 6(2p + 4q - 1)$$

$$(13) (y - 2y^2) + 18y + 9$$

$$= (y - 2y^2) + (-18y + 9)$$

$$= y(1 - 2y) + 9(-2y + 1)$$

$$= (1 - 2y)(y + 9)$$

$$(14) (48ab - 90a) + (32b - 60)$$

$$= 6a(8b - 15) + 4(8b - 15)$$

$$= (8b - 15)(6a + 4)$$

$$= 2(8b - 15)(3a + 2)$$

* التحقق من صوابي: 80

$$(3) a(r-t) + m(t-r)$$

أخرج سالب داخ

$$= a(r-t) + (-1)m(r-t)$$

$$= a(r-t) - m(r-t)$$

$$= (r-t)(a-m)$$

$$(4) (2t - 14st) + (7st^2 - t^2)$$

$$= (2t - 14st) + (7st^2 - t^2)$$

$$= 2t(1 - 7s) - t^2(1 - 7s)$$

$$= (1 - 7s)(2t - t^2)$$

يحتوي تحليل

$$= t(1 - 7s)(2 - t)$$

* ~~أنتدرب وأحل المسائل: ج 8~~

$$(1) \overset{4}{\sqrt{}} 12a, \overset{4}{\sqrt{}} 16ab$$

* نأخذ أقل قوة عامل مشترك

$$4a : 1$$

$$(2) \overset{4}{\sqrt{}} 8a, \overset{4}{\sqrt{}} 12b$$

$$4 : 1$$

$$(3) \overset{5}{\sqrt{}} 10x^2y^3, \overset{5}{\sqrt{}} 45x^2y^7$$

$$5x^2y : 1$$

$$(4) \overset{4}{\sqrt{}} 12d^2w^2r^5, \overset{4}{\sqrt{}} 4w^3d^{10}$$

$$4d^2w^2 : 1$$

$$(5) \overset{3}{\sqrt{}} n^3s^3r^5, \overset{3}{\sqrt{}} 6n^3s^3r^4$$

$$n^3s^3r : 1$$

$$(6) \overset{4}{\sqrt{}} 5k^8w^3h^2, \overset{4}{\sqrt{}} 11k^2h^4$$

$$k^2h^2 : 1$$