

數學 I 3-1 指數 2

總 分

年 班 座號 姓名 我是解答

1. 試化簡 (以根式表示) 下列各式：

$$(1) 16^{\frac{1}{2}} = 4$$

$$\sqrt{16} = 4$$

$$(2) 125^{\frac{1}{3}} = 5$$

$$\sqrt[3]{125} = \sqrt[3]{5 \times 5 \times 5} = 5$$

$$(3) \left(\frac{9}{4}\right)^{\frac{1}{2}} = \frac{3}{2}$$

$$\sqrt{\frac{9}{4}} = \frac{3}{2}$$

$$(4) 3^{\frac{1}{2}} = \sqrt{3}$$

$$(5) 2^{\frac{1}{3}} = \sqrt[3]{2}$$

$$(6) 8^{\frac{1}{2}} = 2\sqrt{2}$$

$$\sqrt{8} = 2\sqrt{2}$$

$$(7) 2^{\frac{3}{2}} = 2\sqrt{2}$$

$$\sqrt{2^3} = 2\sqrt{2}$$

$$(8) 2^{\frac{3}{5}} = \sqrt[5]{8}$$

$$\sqrt[5]{2^3} = \sqrt[5]{8}$$

$$(9) 3^{\frac{3}{2}} = 3\sqrt{3}$$

$$\sqrt{3^3} = 3\sqrt{3}$$

$$(10) 3^{-\frac{3}{2}} = \frac{\sqrt{3}}{9}$$

$$\left(\frac{1}{3}\right)^{\frac{3}{2}} = \frac{1}{\sqrt{3^3}} = \frac{\sqrt{3}}{9} \#$$

$$(11) 3^{-\frac{2}{5}} = \frac{\sqrt[5]{27}}{3}$$

$$\left(\frac{1}{3}\right)^{\frac{2}{5}} = \frac{1}{\sqrt[5]{3^2}} = \frac{\sqrt[5]{3^3}}{3} = \frac{\sqrt[5]{27}}{3} \#$$

$$(12) (-8)^{\frac{1}{3}} = \text{無定義}$$

2. 試化簡下列各值：

$$(1) \sqrt{125} = 5\sqrt{5}$$

$$\sqrt{5 \times 5 \times 5} = 5\sqrt{5}$$

$$(2) \sqrt[3]{16} = 2\sqrt[3]{2}$$

$$\sqrt[3]{2 \times 2 \times 2 \times 2} = 2\sqrt[3]{2}$$

$$(3) \sqrt[3]{2^5} = 2\sqrt[3]{4}$$

$$2\sqrt[3]{4}$$

3. 試利用指數律化簡下列各式：((7)~(9)可先將根式化為有理指數)

$$(1) 64^{\frac{2}{3}} = 16$$

$$(4^3)^{\frac{2}{3}} = 4^2 = 16$$

$$(2) 32^{\frac{3}{5}} = 8$$

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

$$(3) \left(\frac{9}{4}\right)^{-\frac{1}{2}} = \frac{2}{3}$$

$$\left(\left(\frac{3}{2}\right)^2\right)^{-\frac{1}{2}} = \left(\frac{3}{2}\right)^{-1} = \frac{2}{3}$$

$$(4) (0.008)^{-\frac{1}{3}} = 5$$

$$\left((0.2)^3\right)^{-\frac{1}{3}} = 0.2^{-1} = \left(\frac{1}{5}\right)^{-1} = 5$$

$$(5) 1000 \times 125^{-\frac{2}{3}} = 40$$

$$1000 \times (5^3)^{-\frac{2}{3}} = 1000 \times 5^{-2} = \frac{1000}{25} = 40$$

$$(6) \frac{5^{-1.2} \times 5^{1.8}}{5^{-1.4}} = 25$$

$$5^{-1.2+1.8-(-1.4)} = 5^2 = 25$$

$$(7) \sqrt[4]{5\sqrt{5}} = \sqrt[3]{5}$$

$$(5 \times 5^{\frac{1}{2}})^{\frac{1}{4}} = (5^{\frac{3}{2}})^{\frac{1}{4}} = 5^{\frac{3}{8}}$$

$$= 5^{\frac{1}{3}}$$

$$= \sqrt[3]{5}$$

$$(8) \sqrt[4]{81\sqrt{9}} = 3\sqrt[3]{3}$$

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

$$(9) \sqrt[3]{2^{\frac{9}{2}} \cdot \sqrt{2^{-3}} \cdot \sqrt[3]{2^{-7}} \cdot \sqrt[3]{2}} = 1$$

$$\left(2^{\frac{9}{2}} \times 2^{-\frac{3}{2}}\right)^{\frac{1}{3}} \times \left(2^{-\frac{7}{3}} \times 2^{\frac{1}{3}}\right)^{\frac{1}{2}}$$

$$= \sqrt[3]{2^3} \times \sqrt[3]{2^{-2}} = 2 \times 2^{-1} = 1$$

$$= 2 \times 2^{-1} = \frac{2}{2} = 1 \#$$