

### Uitwerkingen hoofdstuk 3

#### 3.3

1. a.  $10^3 \cdot 10^4 = 10^{3+4} = 10^7$

b.  $10^{10} \cdot 10^{-6} = 10^{10-6} = 10^4$

c.  $2^9 \cdot 2 = 2^{9+1} = 2^{10}$

2. a.  $(2^4)^5 = 2^{4 \cdot 5} = 2^{20}$

b.  $(2^3 \cdot 2^3)^3 = (2^6)^3 = 2^{18}$

c.  $(8 \cdot 4)^3 = (2^3 \cdot 2^2)^3 = (2^5)^3 = 2^{15}$

3. a.  $87^0 = 1$

b.  $9^{-1} = \frac{1}{9}$

c.  $(\frac{1}{2})^{-3} = (2^{-1})^{-3} = 2^{-1 \cdot -3} = 2^3 = 8$

4. a.  $8^{\frac{3}{2}} = (2^3)^{\frac{3}{2}} = 2^{\frac{9}{2}} = 2^{4\frac{1}{2}} = 16\sqrt{2}$

b.  $49^{-\frac{3}{2}} = (7^2)^{-\frac{3}{2}} = 7^{-3} = \frac{1}{7^3} = \frac{1}{343}$

c.  $(\frac{1}{4})^{-\frac{3}{2}} = (2^{-2})^{-\frac{3}{2}} = 2^{-2 \cdot -\frac{3}{2}} = 2^3 = 8$

5. a.  $a^{2\frac{1}{2}} = a^2 \sqrt{a}$

b.  $6^{\frac{4}{5}} = \sqrt[5]{6^4}$

c.  $x^{\frac{1}{3}} = \sqrt[3]{x}$

6. a.  $\sqrt{2^7 \cdot 7} = 2^{3\frac{1}{2}} \cdot 7^{\frac{1}{2}}$

b.  $\frac{1}{3\sqrt[3]{3}} = \frac{1}{3^1 \cdot 3^{\frac{1}{3}}} = \frac{1}{3^{1\frac{1}{3}}} = 3^{-1\frac{1}{3}}$

c.  $\sqrt[3]{x\sqrt{x}} = \sqrt[3]{x^{1\frac{1}{2}}} = x^{\frac{1\frac{1}{2}}{3}} = x^{\frac{1}{2}}$

d.  $2^{23} : 2^{22} = 2^{23-22} = 2$

e.  $\frac{10^3}{10^{-2}} = 10^{3-(-2)} = 10^5$

f.  $\frac{10^{-3}}{10^{-2}} = 10^{-3-(-2)} = 10^{-1}$

d.  $(-2^3 \cdot 2)^2 = (-2^4)^2 = (-1)^2 \cdot (2^4)^2 = 2^8$

e.  $\frac{1}{2 \cdot 2^3} = \frac{1}{2^4} = 2^{-4}$

f.  $\frac{2^6}{1024} = \frac{2^6}{2^{10}} = 2^{-4}$

d.  $1000^{-\frac{1}{3}} = (10^3)^{-\frac{1}{3}} = 10^{3 \cdot -\frac{1}{3}} = 10^{-1} = \frac{1}{10}$

e.  $11 \cdot 10^{-2} = \frac{11}{100} (= 0,11)$

f.  $125^{\frac{2}{3}} = (5^3)^{\frac{2}{3}} = 5^{3 \cdot \frac{2}{3}} = 5^2 = 25$

d.  $8^{-\frac{2}{3}} = (2^3)^{-\frac{2}{3}} = 2^{-2} = \frac{1}{4}$

e.  $\sqrt[4]{2\sqrt{2}} = (2^{1\frac{1}{2}})^{\frac{1}{4}} = 2^{\frac{3}{2} \cdot \frac{1}{4}} = 2^{\frac{3}{8}} = \sqrt[8]{2^3} = \sqrt[8]{8}$

f.  $\sqrt[3]{27^2} = 27^{\frac{2}{3}} = (3^3)^{\frac{2}{3}} = 3^{3 \cdot \frac{2}{3}} = 3^2 = 9$

d.  $(a^2 b^3 c^4)^{\frac{1}{2}} = ab^{1\frac{1}{2}}c^2 = abc^2\sqrt{b}$

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

f.  $(-pq^{\frac{1}{3}})^4 = p^4 q^{\frac{4}{3}} = p^4 q \sqrt[3]{q}$

d.  $\frac{\sqrt[3]{a^2 b^3 c^4}}{\sqrt{a^2 b^3 c^4}} = a^{\frac{2}{3}} b c^{\frac{4}{3}} \cdot a^{-1} b^{-\frac{3}{2}} c^{-2} = a^{-\frac{1}{3}} b^{-\frac{1}{2}} c^{-\frac{2}{3}}$

e.  $\frac{1}{x\sqrt{x}} = x^{-1\frac{1}{2}}$

f.  $(-4\sqrt[3]{5})^4 = (-2^2 \cdot 5^{\frac{1}{3}})^4 = 2^8 \cdot 5^{\frac{4}{3}}$