Hoofdstuk 3

*Machten en wortels*

Schrijf alle volgende uitdrukkingen als een geheel getal of als een onvereenvoudigbare breuk.

**3.1**

A

$$2^{3}=2x2x2=8$$

B

$3^{2}=3x3 $= 9

C

$$4^{5}=4x4x4x4x4=1024$$

D

$$5^{4}=5x5x5x5=625$$

E

$$2^{8}=2x2x2x2x2x2x2x2=256$$

**3.2**

A

$$(-2)^{3}=\left(-2\right)x\left(-2\right)x\left(-2\right)=-8$$

B

$$(-3)^{2}=\left(-3\right)x\left(-3\right)=9$$

C

$$(-4)^{5}=\left(-4\right)x\left(-4\right)x\left(-4\right)x\left(-4\right)x\left(-4\right)=-1024$$

D

$$(-5)^{4}=\left(-5\right)x\left(-5\right)x\left(-5\right)x\left(-5\right)=625$$

E

$$(-2)^{6}=\left(-2\right)x\left(-2\right)x\left(-2\right)x\left(-2\right)x\left(-2\right)x\left(-2\right)=64$$

**Tip: - Wanneer de macht een even getal is wordt het antwoord positief**

**- Wanneer de macht een oneven getal is wordt het antwoord negatief**

**In de volgende sommen wordt de rekenregel: ‘delen door een breuk is vermenigvuldigen met het omgekeerde’ toegepast. Zie uitleg en voorbeelden van deze rekenregel hoofdstuk 2.22**

**3.3**

A

$$2^{-3}= \frac{1}{2^{3}}= \frac{1}{2x2x2}=\frac{1}{8}$$

B

$$4^{-2}= \frac{1}{4^{2}}= \frac{1}{4x4}=\frac{1}{16}$$

C

$$3^{-4}= \frac{1}{3^{4}}= \frac{1}{3x3x3x3}=\frac{1}{81}$$

D

$$7^{-1}= \frac{1}{7^{1}}= \frac{1}{7}$$

E

$$2^{-7}= \frac{1}{2^{7}}= \frac{1}{2x2x2x2x2x2x2}=\frac{1}{128}$$

**3.4**

A

$$2^{0}= 1$$

B

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

C

$$11^{-2}= \frac{1}{11^{2}}= \frac{1}{11x11}=\frac{1}{121}$$

D

$$9^{-3}= \frac{1}{9^{3}}= \frac{1}{9x9x9}= \frac{1}{729}$$

E

$$10^{-4}= \frac{1}{10^{4}}= \frac{1}{10x10x10x10}=\frac{1}{10000}$$

**3.5**

A

$$(-4)^{3}=\left(-4\right)x\left(-4\right)x\left(-4\right)=-64$$

B

$$3^{-5}= \frac{1}{3^{5}}= \frac{1}{3x3x3x3x3}=\frac{1}{243}$$

C

$$(-3)^{-3}= \frac{1}{\left(-3\right)^{3}}=\frac{1}{\left(-3\right)x\left(-3\right)x\left(-3\right)}=\frac{1}{-27}=-\frac{1}{27}$$

D

$$2^{4}=2x2x2x2=16$$

E

$$(-2)^{-4}= \frac{1}{\left(-2\right)^{4}}=\frac{1}{\left(-2\right)x\left(-2\right)x\left(-2\right)x(-2)}=\frac{1}{16}$$

**3.6**

A

$$-2^{0}= 1$$

B

$0^{2}= 0x0 $= 0

C

$$12^{-1}= \frac{1}{12^{1}}= \frac{1}{12}$$

D

$$(-7)^{2}=\left(-7\right)x\left(-7\right)=49$$

E

$$(-2)^{-7}= \frac{1}{\left(-2\right)^{7}}=\frac{1}{\left(-2\right)x\left(-2\right)x\left(-2\right)x\left(-2\right)x\left(-2\right)x\left(-2\right)x\left(-2\right)}=\frac{1}{-128}= -\frac{1}{128}$$

**3.7**

A

$$\left(\frac{2}{3}\right)^{2}= \frac{2^{2}}{3^{2}}= \frac{2x2}{3x3}= \frac{4}{9}$$

B

$$\left(\frac{1}{2}\right)^{4}= \frac{1^{4}}{2^{4}}= \frac{1x1x1x1}{2x2x2x2}= \frac{1}{16}$$

C

$$\left(\frac{4}{5}\right)^{3}= \frac{4^{3}}{5^{3}}= \frac{4x4x4}{5x5x5}= \frac{64}{125}$$

D

$$\left(\frac{2}{7}\right)^{2}= \frac{2^{2}}{7^{2}}= \frac{2x2}{7x7}= \frac{4}{49}$$

**3.8**

A

$$\left(\frac{2}{3}\right)^{-2}= \frac{1}{\left(\frac{2}{3}\right)^{2}}=\frac{1}{\frac{2^{2}}{3^{2}}}= \frac{1}{\frac{2x2}{3x3}}= \frac{1}{\frac{4}{9}}= 1 x \frac{9}{4}= \frac{9}{4}$$

B

$$\left(\frac{1}{2}\right)^{-3}= \frac{1}{\left(\frac{1}{2}\right)^{3}}=\frac{1}{\frac{1^{3}}{2^{3}}}= \frac{1}{\frac{1x1x1}{2x2x2}}= \frac{1}{\frac{1}{8}}= 1 x \frac{8}{1}= \frac{8}{1}=8$$

C

$$\left(\frac{7}{9}\right)^{-1}= \frac{1}{\left(\frac{7}{9}\right)^{1}}=\frac{1}{\frac{7^{1}}{9^{1}}}= \frac{1}{\frac{7}{9}}= 1 x \frac{9}{7}= \frac{9}{7}$$

D

$$\left(\frac{3}{2}\right)^{-4}= \frac{1}{\left(\frac{3}{2}\right)^{4}}=\frac{1}{\frac{3^{4}}{2^{4}}}= \frac{1}{\frac{3x3x3x3}{2x2x2x2}}= \frac{1}{\frac{81}{16}}= 1 x \frac{16}{81}= \frac{16}{81}$$

**3.9**

A

$$\left(\frac{4}{3}\right)^{-2}= \frac{1}{\left(\frac{4}{3}\right)^{2}}=\frac{1}{\frac{4^{2}}{3^{2}}}= \frac{1}{\frac{4x4}{3x3}}= \frac{1}{\frac{16}{9}}= 1 x \frac{9}{16}= \frac{9}{16}$$

B

$$\left(\frac{1}{2}\right)^{-4}= \frac{1}{\left(\frac{1}{2}\right)^{4}}=\frac{1}{\frac{1^{4}}{2^{4}}}= \frac{1}{\frac{1x1x1x1}{2x2x2x2}}= \frac{1}{\frac{1}{16}}= 1 x \frac{16}{1}= 16$$

C

$$\left(\frac{4}{5}\right)^{-1}= \frac{1}{\left(\frac{4}{5}\right)^{1}}=\frac{1}{\frac{4^{1}}{5^{1}}}= \frac{1}{\frac{4}{5}}= 1 x \frac{5}{4}= \frac{5}{4}$$

D

$$\left(\frac{2}{3}\right)^{-5}= \frac{1}{\left(\frac{2}{3}\right)^{5}}=\frac{1}{\frac{2^{5}}{3^{5}}}= \frac{1}{\frac{2x2x2x2x2}{3x3x3x3x3}}= \frac{1}{\frac{32}{243}}= 1 x \frac{243}{32}=\frac{243}{32}$$

**3.10**

A

$$\left(\frac{1}{4}\right)^{-1}= \frac{1}{\left(\frac{1}{4}\right)^{1}}=\frac{1}{\frac{1^{1}}{4^{1}}}= \frac{1}{\frac{1}{4}}= 1 x \frac{4}{1}= \frac{4}{1}=4$$

B

$$\left(\frac{6}{5}\right)^{0}= 1$$

C

$$\left(\frac{4}{3}\right)^{3}= \frac{4^{3}}{3^{3}}= \frac{4x4x4}{3x3x3}= \frac{64}{27}$$

D

$$\left(\frac{5}{2}\right)^{-4}= \frac{1}{\left(\frac{5}{2}\right)^{4}}=\frac{1}{\frac{5^{4}}{2^{4}}}= \frac{1}{\frac{5x5x5x5}{2x2x2x2}}= \frac{1}{\frac{625}{16}}= 1 x \frac{16}{625}= \frac{16}{625}$$

**3.11**

A

$$\left(\frac{6}{7}\right)^{2}= \frac{6^{2}}{7^{2}}= \frac{6x6}{7x7}= \frac{36}{49}$$

B

$$\left(\frac{8}{7}\right)^{0}= 1$$

C

$$\left(\frac{6}{7}\right)^{-2}= \frac{1}{\left(\frac{6}{7}\right)^{2}}=\frac{1}{\frac{6^{2}}{7^{2}}}= \frac{1}{\frac{6x6}{7x7}}= \frac{1}{\frac{36}{49}}= 1 x \frac{49}{36}=\frac{49}{36}$$

D

$$\left(\frac{2}{7}\right)^{3}= \frac{2^{3}}{7^{3}}= \frac{2x2x2}{7x7x7}= \frac{8}{343}$$

**3.12**

A

$$\left(\frac{4}{9}\right)^{3}= \frac{4^{3}}{9^{3}}= \frac{4x4x4}{9x9x9}= \frac{64}{729}$$

B

$$\left(\frac{5}{3}\right)^{-3}= \frac{1}{\left(\frac{5}{3}\right)^{3}}=\frac{1}{\frac{5^{3}}{3^{3}}}= \frac{1}{\frac{5x5x5}{3x3x3}}= \frac{1}{\frac{125}{27}}= 1 x \frac{27}{125}= \frac{27}{125}$$

C

$$\left(\frac{5}{11}\right)^{2}= \frac{5^{2}}{11^{2}}= \frac{5x5}{11x11}= \frac{25}{121}$$

D

$$\left(\frac{3}{6}\right)^{-5}= \frac{1}{\left(\frac{3}{6}\right)^{5}}=\frac{1}{\frac{3^{5}}{6^{5}}}= \frac{1}{\frac{3x3x3x3x3}{6x6x6x6x6}}= \frac{1}{\frac{3x3x3x3x3}{\left(2x3\right)x\left(2x3\right)x\left(2x3\right)x\left(2x3\right)x(2x3)}} = \frac{1}{\frac{1}{2x2x2x2x2}} =\frac{1}{\frac{1}{32}}= 1 x \frac{32}{1}=32 $$

Schrijf alle volgende uitdrukkingen in standaardvorm, dat wil zeggen in de vorm a$√b$ waarin a een geheel getal en $\sqrt{b}$ een onvereenvoudigbare wortel is.

**Tip: ontbind de volgende wortels tot priemgetallen.**

**3.13**

A

$$\sqrt{36}= \sqrt{2x2x3x3}=2x3x\sqrt{1}=2x3x1=6$$

B

$$\sqrt{81}= \sqrt{3x3x3x3}= 3x3x\sqrt{1}=2x3x1=9$$

C

$$\sqrt{121}= \sqrt{11x11}=11\sqrt{1}=11x1=11$$

D

$$\sqrt{64}= \sqrt{2x2x2x2x2x2}=2x2x2\sqrt{1}=2x2x2x1=8$$

E

$$\sqrt{169}= \sqrt{13x13}=13\sqrt{1}=13x1=13$$

**3.14**

A

$$\sqrt{225}= \sqrt{5x5x3x3}=5x3\sqrt{1}=5x3x1=15$$

B

$$\sqrt{16}= \sqrt{2x2x2x2}=2x2\sqrt{1}=2x2x1=4$$

C

$$\sqrt{196}= \sqrt{2x2x7x7}=2x7\sqrt{1}=2x7x1=14$$

D

$$\sqrt{256}= \sqrt{2x2x2x2x2x2x2x2}=2x2x2x2\sqrt{1}=2x2x2x2x1=16$$

E

$$\sqrt{441}= \sqrt{3x3x7x7}=3x7\sqrt{1}=3x7x1=21$$

**3.15**

A

$$\sqrt{8}= \sqrt{2x2x2}=2\sqrt{2}$$

B

$$\sqrt{12}= \sqrt{2x2x3}=2\sqrt{3}$$

C

$$\sqrt{18}= \sqrt{2x3x3}=3\sqrt{2}$$

D

$$\sqrt{24}= \sqrt{2x2x2x3}=2\sqrt{2x3}= 2\sqrt{6}$$

E

$$\sqrt{50}= \sqrt{2x5x5}=5\sqrt{2} $$

**3.16**

A

$$\sqrt{72}= \sqrt{2x2x2x3x3}=2x3\sqrt{2}=6\sqrt{2}$$

B

$$\sqrt{32}= \sqrt{2x2x2x2x2}=2x2\sqrt{2}= 4\sqrt{2}$$

C

$$\sqrt{20}= \sqrt{2x2x5}=2\sqrt{5}$$

D

$$\sqrt{98}= \sqrt{2x7x7}=7\sqrt{2}= 7\sqrt{2}$$

E

$$\sqrt{40}= \sqrt{2x2x2x5}=2\sqrt{2x5}=2\sqrt{10} $$

**3.17**

A

$$\sqrt{54}= \sqrt{2x3x3x3}=3\sqrt{2x3}=3\sqrt{6}$$

B

$$\sqrt{99}= \sqrt{3x3x11}=3\sqrt{11}$$

C

$$\sqrt{80}= \sqrt{2x2x2x2x5}=2x2\sqrt{5}=4\sqrt{5} $$

D

$$\sqrt{96}= \sqrt{2x2x2x2x2x3}=2x2\sqrt{2x3}= 4\sqrt{6}$$

E

$$\sqrt{200}= \sqrt{2x2x2x5x5}=2x5\sqrt{2}=10\sqrt{2} $$

**3.18**

A

$$\sqrt{147}= \sqrt{3x7x7}=7\sqrt{3}$$

B

$$\sqrt{242}= \sqrt{2x11x11}=11\sqrt{2}$$

C

$$\sqrt{125}= \sqrt{5x5x5}=5\sqrt{5} $$

D

$$\sqrt{216}= \sqrt{2x2x2x3x3x3}=2x3\sqrt{2x3}= 6\sqrt{6}$$

E

$$\sqrt{288}= \sqrt{2x2x2x2x2x3x3}=2x2x3\sqrt{2}=12\sqrt{2} $$

**3.19**

A

$$\sqrt{675}= \sqrt{3x3x3x5x5}=3x5\sqrt{3}=15\sqrt{3} $$

B

$$\sqrt{405}= \sqrt{3x3x3x3x5}=3x3\sqrt{5}=9\sqrt{5} $$

C

$$\sqrt{512}= \sqrt{2x2x2x2x2x2x2x2x2}=2x2x2x2\sqrt{2}=16\sqrt{2} $$

D

$$\sqrt{338}= \sqrt{2x13x13}=13\sqrt{2}$$

E

$$\sqrt{588}= \sqrt{2x2x3x7x7}=2x7\sqrt{3}=14\sqrt{3} $$

**3.20**

A

$$\sqrt{1331}= \sqrt{11x11x11}=11\sqrt{11} $$

B

$$\sqrt{972}= \sqrt{2x2x3x3x3x3x3}=2x3x3\sqrt{3}=18\sqrt{3} $$

C

$$\sqrt{2025}= \sqrt{3x3x3x3x5x5}=3x3x5\sqrt{1}=45x1=45 $$

D

$$\sqrt{722}= \sqrt{2x19x19}=19\sqrt{2}$$

E

$$\sqrt{676}= \sqrt{2x2x13x13}=2x13\sqrt{1}=2x13x1=26 $$

**Tip: ontbind de volgende wortels tot priemgetallen. De vermenigvuldiging van twee gelijke wortels laat de wortel verdwijnen.**

**3.21**

A

$\sqrt{6} x \sqrt{3}= \sqrt{2x3} x \sqrt{3}= \sqrt{2} x 3=3\sqrt{2} $

B.

$\sqrt{10} x \sqrt{15}= \sqrt{2x5} x \sqrt{3x5}= \sqrt{2} x \sqrt{3} x 5=\sqrt{6} x 5=5\sqrt{6}$

C.

$2\sqrt{14} x-3\sqrt{21}= 2\sqrt{2x7} x-3\sqrt{3x7}= 2\sqrt{2} x-3\sqrt{3} x 7=-6\sqrt{6} x 7= -42\sqrt{6}$

D.

$-4\sqrt{22} x 5\sqrt{33}= -4\sqrt{2x11} x 5\sqrt{3x11}= -4\sqrt{2} x 5\sqrt{3} x 11=-20\sqrt{6} x 11= -220\sqrt{6}$

E.

$3\sqrt{30} x 2\sqrt{42}= 3\sqrt{2x3x5} x 2\sqrt{2x3x7}= 3\sqrt{5} x 2\sqrt{7} x 2 x 3=6\sqrt{35} x 2 x 3=36\sqrt{35}$

**3.22**

A.

$$\sqrt{5} x \sqrt{3}= \sqrt{15} $$

B.

$$-\sqrt{2} x \sqrt{7}= -\sqrt{14} $$

C.

$$\sqrt{3} x \sqrt{5} x \sqrt{2}= \sqrt{30} $$

D.

$2\sqrt{14} x 3\sqrt{6}= 2\sqrt{2x7} x 3\sqrt{2x3}= 2\sqrt{7} x 3\sqrt{3} x 2= 6\sqrt{21} x 2= 12\sqrt{21}$

E.

$3\sqrt{5} x-2\sqrt{6} x 4\sqrt{10}= 3\sqrt{5} x-2\sqrt{2x3} x 4\sqrt{2x5}= 3\sqrt{1} x-2\sqrt{3} x 4\sqrt{1} x 2 x 5=-24\sqrt{3} x 10= -240\sqrt{3}$

**3.23**

A.

$3\sqrt{6} x 2\sqrt{15} x 4\sqrt{10}= 3\sqrt{2x3} x 2\sqrt{3x5} x 4\sqrt{2x5}= 3\sqrt{1} x 2\sqrt{1} x 4\sqrt{1} x 2 x 3 x 5= 24\sqrt{1} x 30= 24 x 1 x 30=720$

B.

$-5\sqrt{5} x 10\sqrt{10} x 2\sqrt{2}= -5\sqrt{5} x 10\sqrt{2x5} x 2\sqrt{2}= -5\sqrt{1} x 10\sqrt{1} x 2\sqrt{1} x 2 x 5= -100\sqrt{1} x 10= -100 x 1 x 10=-1000$

C.

$$2\sqrt{21} x-\sqrt{14} x-3\sqrt{10}= 2\sqrt{3x7} x-\sqrt{2x7} x-3\sqrt{2x5}= 2\sqrt{3} x-\sqrt{1} x-3\sqrt{5} x 2 x 7= 6\sqrt{15} x 14= 84\sqrt{15}$$

D.

$\sqrt{15} x 2\sqrt{3} x-3\sqrt{35}= \sqrt{3x5} x 2\sqrt{3} x-3\sqrt{5x7}= \sqrt{1} x 2\sqrt{1} x-3\sqrt{7} x 3 x 5= -6\sqrt{7} x 15= -90\sqrt{7}$

E.

$$-3\sqrt{30} x 12\sqrt{14} x-2\sqrt{21}= -3\sqrt{2x3x5} x 12\sqrt{2x7} x-2\sqrt{3x7}= -3\sqrt{5} x 12\sqrt{1} x-2\sqrt{1} x 2 x 3 x 7= 72\sqrt{5} x 42= 3024\sqrt{5}$$

Schrijf alle volgende uitdrukkingen in standaardvorm, dat wil zeggen in vorm $a\sqrt{b}$ waarin a een geheel getal of een onvereenvoudigbare breuk, en $\sqrt{b}$ een onvereenvoudigbare wortel is.

**3.24**

A.

$$\left(\frac{\sqrt{3}}{2}\right)^{2}= \frac{\sqrt{3}^{2}}{2^{2}}=\frac{\sqrt{3} x \sqrt{3}}{2x2}=\frac{3}{4} $$

B.

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

C.

$$\left(\frac{\sqrt{3}}{\sqrt{2}}\right)^{2}= \frac{\sqrt{3}^{2}}{\sqrt{2}^{2}}=\frac{\sqrt{3} x \sqrt{3}}{\sqrt{2} x \sqrt{2}}=\frac{3}{2}$$

D.

$$\left(\frac{\sqrt{2}}{3}\right)^{3}= \frac{\sqrt{2}^{3}}{3^{3}}=\frac{\sqrt{2} x \sqrt{2} x \sqrt{2}}{3x3x3}= \frac{(\sqrt{2} x \sqrt{2}) x \sqrt{2}}{3x3x3}= \frac{2 x \sqrt{2}}{27}=\frac{2}{27} \sqrt{2} $$

E.

$$\left(\frac{2\sqrt{3}}{\sqrt{2}}\right)^{3}= \frac{2\sqrt{3}^{3}}{\sqrt{2}^{3}}=\frac{2\sqrt{3} x 2\sqrt{3} x 2\sqrt{3}}{\sqrt{2} x \sqrt{2} x \sqrt{2}}=\frac{(2\sqrt{3} x 2\sqrt{3}) x 2\sqrt{3}}{(\sqrt{2} x \sqrt{2)} x \sqrt{2}}=\frac{(4 x 3) x 2\sqrt{3}}{(2) x \sqrt{2}}=\frac{24\sqrt{3}}{2\sqrt{2}}x \left(\frac{\sqrt{2}}{\sqrt{2}}\right)= \frac{24\sqrt{3} x \sqrt{2}}{2\sqrt{2} x \sqrt{2}}= \frac{24\sqrt{6}}{2x2}=\frac{24}{4} \sqrt{6}=6\sqrt{6}$$

**Let op: Ontbind de onderstaande wortels in priemgetallen indien mogelijk**

**3.25**

A.

$$\left(\frac{\sqrt{3}}{\sqrt{6}}\right)^{3}= \frac{\sqrt{3}^{3}}{\sqrt{6}^{3}}=\frac{\sqrt{3} x \sqrt{3} x \sqrt{3}}{\sqrt{6} x \sqrt{6} x \sqrt{6}}=\frac{(\sqrt{3} x \sqrt{3}) x \sqrt{3}}{(\sqrt{6} x \sqrt{6}) x \sqrt{6}}=\frac{(3) x \sqrt{3}}{(6) x \sqrt{6}}=\frac{3\sqrt{3}}{6\sqrt{6}}= \frac{3\sqrt{3}}{6\sqrt{2x3}}=\frac{3\sqrt{1}}{6\sqrt{2}}=\frac{3\sqrt{1}}{6\sqrt{2}} x \left(\frac{\sqrt{2}}{\sqrt{2}}\right)= \frac{3\sqrt{1} x \sqrt{2}}{6\sqrt{2} x \sqrt{2}}= \frac{3\sqrt{2}}{6x2}= \frac{3}{12} \sqrt{2}= \frac{1}{4} \sqrt{2}$$

B.

$$\left(\frac{2\sqrt{3}}{3\sqrt{2}}\right)^{3}= \frac{2\sqrt{3}^{3}}{3\sqrt{2}^{3}}=\frac{2\sqrt{3} x 2\sqrt{3} x 2\sqrt{3}}{3\sqrt{2} x 3\sqrt{2} x 3\sqrt{2}}=\frac{(2\sqrt{3} x 2\sqrt{3}) x 2\sqrt{3}}{(3\sqrt{2} x 3\sqrt{2}) x 3\sqrt{2}}=\frac{(4x3) x 2\sqrt{3}}{(9x2) x 3\sqrt{2}}=\frac{24\sqrt{3}}{54\sqrt{2}}= \frac{24\sqrt{3}}{54\sqrt{2}}=\frac{24\sqrt{3}}{54\sqrt{2}} x \left(\frac{\sqrt{2}}{\sqrt{2}}\right)= \frac{24\sqrt{3} x \sqrt{2}}{54\sqrt{2} x \sqrt{2}}= \frac{24\sqrt{6}}{54x2}= \frac{24}{108} \sqrt{6}= \frac{2}{9} \sqrt{6}$$

C.

$$\left(\frac{-\sqrt{7}}{2\sqrt{2}}\right)^{4}= \frac{-\sqrt{7}^{4}}{2\sqrt{2}^{4}}=\frac{-\sqrt{7} x-\sqrt{7} x-\sqrt{7} x-\sqrt{7}}{2\sqrt{2} x 2\sqrt{2} x 2\sqrt{2} x 2\sqrt{2}}=\frac{(-\sqrt{7} x-\sqrt{7}) x (-\sqrt{7} x-\sqrt{7})}{(2\sqrt{2} x 2\sqrt{2}) x (2\sqrt{2} x 2\sqrt{2})}=\frac{(7) x (7)}{(4x2) x (4x2)}=\frac{49}{64}$$

D.

$$\left(\sqrt{\frac{3}{2}}\right)^{3}= \frac{\sqrt{3}^{3}}{\sqrt{2}^{3}}=\frac{\sqrt{3} x \sqrt{3} x \sqrt{3}}{\sqrt{2} x \sqrt{2} x \sqrt{2}}=\frac{(\sqrt{3} x \sqrt{3}) x \sqrt{3}}{(\sqrt{2} x \sqrt{2}) x \sqrt{2}}=\frac{(3) x \sqrt{3}}{(2) x \sqrt{2}}=\frac{3\sqrt{3}}{2\sqrt{2}}=\frac{3\sqrt{3}}{2\sqrt{2}} x \left(\frac{\sqrt{2}}{\sqrt{2}}\right)= \frac{3\sqrt{3} x \sqrt{2}}{2\sqrt{2} x \sqrt{2}}= \frac{3\sqrt{6}}{2x2}= \frac{3}{4} \sqrt{6}$$

E.

$$\left(\sqrt{\frac{4}{3}}\right)^{5}= \frac{\sqrt{4}^{5}}{\sqrt{3}^{5}}=\frac{\sqrt{4} x \sqrt{4} x \sqrt{4 } x \sqrt{4} x \sqrt{4 }}{\sqrt{3} x \sqrt{3} x \sqrt{3} x \sqrt{3} x \sqrt{3}}=\frac{\left(\sqrt{4} x \sqrt{4}\right)x \left(\sqrt{4} x \sqrt{4}\right)x \sqrt{4}}{\left(\sqrt{3} x \sqrt{3}\right)x\left(\sqrt{3} x \sqrt{3}\right)x \sqrt{3}}=\frac{(4)x(4) x \sqrt{4}}{(3)x(3) x \sqrt{3}}=\frac{16\sqrt{2x2}}{9\sqrt{3}}=\frac{16x2}{9\sqrt{3}}= \frac{32}{9\sqrt{3}}=\frac{32}{9\sqrt{3}} x \left(\frac{\sqrt{3}}{\sqrt{3}}\right)= \frac{32 x \sqrt{3}}{9\sqrt{3} x \sqrt{3}}= \frac{32\sqrt{3}}{9x3}= \frac{32}{27} \sqrt{3}$$

**3.26**

A.

$$\sqrt{\frac{2}{3}}= \frac{\sqrt{2}}{\sqrt{3}}= \frac{\sqrt{2 } x \sqrt{3}}{\sqrt{3} x \sqrt{3}}= \frac{\sqrt{6}}{3}= \frac{1}{3} \sqrt{6}$$

B.

$$\sqrt{\frac{3}{2}}= \frac{\sqrt{3}}{\sqrt{2}}= \frac{\sqrt{3 } x \sqrt{2}}{\sqrt{2} x \sqrt{2}}= \frac{\sqrt{6}}{2}= \frac{1}{2} \sqrt{6}$$

C.

$$\sqrt{\frac{6}{5}}= \frac{\sqrt{6}}{\sqrt{5}}= \frac{\sqrt{6 } x \sqrt{5}}{\sqrt{5} x \sqrt{5}}= \frac{\sqrt{30}}{5}= \frac{1}{5} \sqrt{30}$$

D.

$$\sqrt{\frac{7}{2}}= \frac{\sqrt{7}}{\sqrt{2}}= \frac{\sqrt{7 } x \sqrt{2}}{\sqrt{2} x \sqrt{2}}= \frac{\sqrt{14}}{2}= \frac{1}{2} \sqrt{14}$$

E.

$$\sqrt{\frac{2}{7}}= \frac{\sqrt{2}}{\sqrt{7}}= \frac{\sqrt{2 } x \sqrt{7}}{\sqrt{7} x \sqrt{7}}= \frac{\sqrt{14}}{7}= \frac{1}{7} \sqrt{14}$$

**3.27**

A.

$$\sqrt{\frac{5}{12}}= \frac{\sqrt{5}}{\sqrt{12}}= \frac{\sqrt{5 }}{\sqrt{2x2x3} }= \frac{\sqrt{5}}{2\sqrt{3}}= \frac{\sqrt{5} x \sqrt{3}}{2\sqrt{3} x \sqrt{3}}= \frac{\sqrt{15}}{2 x 3}=\frac{\sqrt{15}}{6}=\frac{1}{6} \sqrt{15}$$

B.

$$\sqrt{\frac{4}{27}}= \frac{\sqrt{4}}{\sqrt{27}}= \frac{\sqrt{2x2 }}{\sqrt{3x3x3} }= \frac{2}{3\sqrt{3}}= \frac{2 x \sqrt{3}}{3\sqrt{3} x \sqrt{3}}= \frac{2\sqrt{3}}{3 x 3}=\frac{2\sqrt{3}}{9}=\frac{2}{9} \sqrt{3}$$

C.

$$\sqrt{\frac{9}{20}}= \frac{\sqrt{9}}{\sqrt{20}}= \frac{\sqrt{3x3 }}{\sqrt{2x2x5} }= \frac{3}{2\sqrt{5}}= \frac{3 x \sqrt{5}}{2\sqrt{5} x \sqrt{5}}= \frac{3\sqrt{5}}{2 x 5}=\frac{3\sqrt{5}}{10}=\frac{3}{10} \sqrt{5}$$

D.

$$\sqrt{\frac{6}{15}}= \frac{\sqrt{6}}{\sqrt{15}}= \frac{\sqrt{2x3 }}{\sqrt{3x5} }= \frac{\sqrt{2}}{\sqrt{5}}= \frac{\sqrt{2} x \sqrt{5}}{\sqrt{5} x \sqrt{5}}= \frac{\sqrt{10}}{5}=\frac{\sqrt{10}}{5}= \frac{1}{5} \sqrt{10}$$

E.

$$\sqrt{\frac{7}{32}}= \frac{\sqrt{7}}{\sqrt{32}}= \frac{\sqrt{7 }}{\sqrt{2x2x2x2x2} }= \frac{\sqrt{7}}{2x2\sqrt{2}}= \frac{\sqrt{7} x \sqrt{2}}{4\sqrt{2} x \sqrt{2}}= \frac{\sqrt{14}}{4 x 2}=\frac{\sqrt{14}}{8}= \frac{1}{8} \sqrt{14}$$

**3.28**

A.

$$\frac{\sqrt{3}}{\sqrt{2}}= \frac{\sqrt{3} x \sqrt{2}}{\sqrt{2} x \sqrt{2}}= \frac{\sqrt{6}}{2}= \frac{1}{2}\sqrt{6}$$

B.

$$\frac{\sqrt{5}}{\sqrt{3}}= \frac{\sqrt{5} x \sqrt{3}}{\sqrt{3} x \sqrt{3}}= \frac{\sqrt{15}}{3}= \frac{1}{3}\sqrt{15}$$

C.

$$\frac{\sqrt{7}}{\sqrt{11}}= \frac{\sqrt{7} x \sqrt{11}}{\sqrt{11} x \sqrt{11}}= \frac{\sqrt{77}}{11}= \frac{1}{11}\sqrt{77}$$

D.

$$\frac{\sqrt{11}}{\sqrt{5}}= \frac{\sqrt{11} x \sqrt{5}}{\sqrt{5} x \sqrt{5}}= \frac{\sqrt{55}}{5}= \frac{1}{5}\sqrt{55}$$

E.

$$\frac{\sqrt{2}}{\sqrt{11}}= \frac{\sqrt{2} x \sqrt{11}}{\sqrt{11} x \sqrt{11}}= \frac{\sqrt{22}}{11}= \frac{1}{11}\sqrt{22}$$

**3.29**

A.

$$\frac{3\sqrt{5}}{\sqrt{6}}= \frac{3\sqrt{5} x \sqrt{6}}{\sqrt{6} x \sqrt{6}}= \frac{3\sqrt{30}}{6}= \frac{3}{6}\sqrt{30}= \frac{1}{2}\sqrt{30}$$

B.

$$\frac{2\sqrt{3}}{\sqrt{10}}= \frac{2\sqrt{3} x \sqrt{10}}{\sqrt{10} x \sqrt{10}}= \frac{2\sqrt{30}}{10}= \frac{2}{10}\sqrt{30}= \frac{1}{5}\sqrt{30}$$

C.

$$\frac{4\sqrt{12}}{\sqrt{20}}= \frac{4\sqrt{2x2x3} }{\sqrt{2x2x5} }= \frac{4x2\sqrt{3}}{2\sqrt{5}}= \frac{8\sqrt{3} x \sqrt{5}}{2\sqrt{5} x \sqrt{5}}=\frac{8\sqrt{15}}{2x5}=\frac{8}{10}\sqrt{15}= \frac{4}{5}\sqrt{15}$$

D.

$$\frac{-5\sqrt{2}}{\sqrt{15}}= \frac{-5\sqrt{2} x \sqrt{15}}{\sqrt{15} x \sqrt{15}}= \frac{-5\sqrt{30}}{15}= -\frac{5}{15}\sqrt{30}=-\frac{1}{3}\sqrt{30}$$

E.

$$\frac{6\sqrt{6}}{3\sqrt{3}}= \frac{6\sqrt{2x3} }{3\sqrt{3}}= \frac{6\sqrt{2}}{3}= \frac{6}{3}\sqrt{2}= 2\sqrt{2}$$

**3.30**

A.

$$\sqrt[3]{8}= \sqrt[3]{2x2x2}=2$$

B.

$$\sqrt[4]{81}= \sqrt[4]{3x3x3x3}=3$$

C.

$$\sqrt[3]{125}= \sqrt[3]{5x5x5}=5$$

D.

$$\sqrt[5]{1024}= \sqrt[5]{2x2x2x2x2x2x2x2x2x2}=2x2=4$$

E.

$$\sqrt[3]{216}= \sqrt[3]{2x2x2x3x3x3}=2x3=6$$

**3.31**

A.

$$\sqrt[3]{-27}= \sqrt[3]{-3x-3x-3}=-3$$

B.

$$\sqrt[4]{16}= \sqrt[4]{2x2x2x2}=2$$

C.

$$\sqrt[5]{243}= \sqrt[5]{3x3x3x3x3}=3$$

D.

$$\sqrt[7]{-128}= \sqrt[7]{-2x-2x-2x-2x-2x-2x-2}=-2$$

E.

$$\sqrt[2]{144}= \sqrt[2]{2x2x2x2x3x3}=2x2x3=12 $$

**3.32**

A.

$$\sqrt[3]{16}= \sqrt[3]{2x2x2x2}=2\sqrt[3]{2}$$

B.

$$\sqrt[4]{243}= \sqrt[4]{3x3x3x3x3}=3\sqrt[4]{3}$$

C.

$$\sqrt[3]{375}= \sqrt[3]{3x5x5x5}=5\sqrt[3]{3}$$

D.

$$\sqrt[5]{96}= \sqrt[5]{2x2x2x2x2x3}=2\sqrt[5]{3}$$

E.

$$\sqrt[3]{54}= \sqrt[3]{2x3x3x3}=3\sqrt[3]{2}$$

**3.33**

A.

$$\sqrt[3]{-40}= \sqrt[3]{-2x-2x-2x5}=-2\sqrt[3]{5}$$

B.

$$\sqrt[4]{48}= \sqrt[4]{2x2x2x2x3}=2\sqrt[4]{3}$$

C.

$$\sqrt[5]{320}= \sqrt[5]{2x2x2x2x2x2x5}=2\sqrt[5]{2x5}=2\sqrt[5]{10}$$

D.

$$\sqrt[3]{432}= \sqrt[3]{2x2x2x2x3x3x3}=2x3\sqrt[3]{2}=6\sqrt[3]{2} $$

E.

$$\sqrt[6]{192}= \sqrt[6]{2x2x2x2x2x2x3}=2\sqrt[6]{3}$$

**3.34**

A.

$$\sqrt[3]{5} x \sqrt[3]{7}=\sqrt[3]{5x7}=\sqrt[3]{35} $$

B.

$$\sqrt[4]{4} x \sqrt[4]{14}=\sqrt[4]{2x2x2x7}=\sqrt[4]{56}$$

C.

$$\sqrt[3]{6} x \sqrt[3]{4}=\sqrt[3]{2x3x2x2}= \sqrt[3]{2x2x2x3}= 2\sqrt[3]{3} $$

D.

$$\sqrt[4]{18} x \sqrt[4]{45}=\sqrt[4]{3x3x2x3x3x5}= \sqrt[4]{2x3x3x3x3x5}= 3\sqrt[4]{2x5}= 3\sqrt[4]{10}$$

E.

$$\sqrt[5]{16} x \sqrt[5]{12}= \sqrt[5]{2x2x2x2x2x2x3}= 2\sqrt[5]{2x3}= 2\sqrt[5]{6}$$

**3.35**

A.

$$\sqrt[4]{24} x \sqrt[4]{54}=\sqrt[4]{2x2x2x3x2x3x3x3}=\sqrt[4]{2x2x2x2x3x3x3x3}=2x3=6 $$

B.

$$\sqrt[3]{36} x \sqrt[3]{12}=\sqrt[3]{2x2x3x3x2x2x3}= \sqrt[3]{2x2x2x2x3x3x3}= 2x3\sqrt[3]{2}=6\sqrt[3]{2} $$

C.

$$\sqrt[5]{81} x \sqrt[5]{15}= \sqrt[5]{3x3x3x3x3x5}= 3\sqrt[5]{5} $$

D.

$$\sqrt[6]{288} x \sqrt[6]{324}=\sqrt[\begin{array}{c}\\6\end{array}]{2x2x2x2x2x3x3x2x2x3x3x3x3}= \sqrt[6]{2x2x2x2x2x2x2x3x3x3x3x3x3}= 2x3\sqrt[6]{2}=6\sqrt[6]{2} $$

E.

$$\sqrt[3]{200} x \sqrt[3]{35}=\sqrt[3]{2x2x2x5x5x5x7}= \sqrt[3]{2x2x2x5x5x5x7}= 2x5\sqrt[3]{7}=10\sqrt[3]{7}$$

**Tip: Ontbind de noemer eerst in priemgetallen. Vervolgens vermenigvuldig je de noemer in de breuk met een zodanige factor dat de noemer dezelfde macht krijgt als de wortel.**

**3.36**

A.

$$\sqrt[3]{\frac{1}{343}}= \sqrt[3]{\frac{1}{7^{3}}}=\frac{1}{7} $$

B.

$\sqrt[4]{\frac{-16}{81}} Wortel van een-getal BESTAAT NIET$ bij een even macht

C.

$$\sqrt[5]{\frac{32}{-243}}= \sqrt[5]{\frac{2^{5}}{-3^{5}}}=-\frac{2}{3} $$

D.

$$\sqrt[2]{\frac{36}{121}}= \sqrt[2]{\frac{2^{2}x3^{2}}{11^{2}}}=\frac{6}{11} $$

E.

$$\sqrt[4]{\frac{1296}{625}}= \sqrt[4]{\frac{2^{4}x3^{4}}{5^{4}}}=\frac{6}{5}$$

**3.37**

A.

$$\sqrt[3]{\frac{8}{27}}= \sqrt[3]{\frac{2^{3}}{3^{3}}}=\frac{2}{3} $$

B.

$$\sqrt[4]{\frac{625}{16}}= \sqrt[4]{\frac{5^{4}}{2^{4}}}=\frac{5}{2}$$

C.

$$\sqrt[5]{\frac{32}{243}}= \sqrt[5]{\frac{2^{5}}{3^{5}}}=\frac{2}{3} $$

D.

$$\sqrt[3]{\frac{216}{1000}}= \sqrt[3]{\frac{2^{3}x 3^{3}}{2^{3}x 5^{3}}}=\frac{6}{10}= \frac{3}{5} $$

E.

$$\sqrt[2]{\frac{144}{25}}= \sqrt[2]{\frac{2^{2}x2^{2}x3^{2}}{5^{2}}}=\frac{12}{5}$$

**3.38**

A.

$$\sqrt[3]{\frac{1}{4}}= \sqrt[3]{\frac{1}{2^{2}}}=\sqrt[3]{\frac{1x2}{2^{2}x2 }}= \sqrt[3]{\frac{2}{2^{3}}}= \frac{1}{2}\sqrt[3]{2}$$

B.

$$\sqrt[4]{\frac{2}{27}}= \sqrt[4]{\frac{2}{3^{3}}}=\sqrt[4]{\frac{2x3}{3^{3}x3}}=\sqrt[4]{\frac{6}{3^{4}}}=\frac{1}{3}\sqrt[4]{6}$$

C.

$$\sqrt[3]{\frac{3}{25}}= \sqrt[3]{\frac{3}{5^{2}}}=\sqrt[3]{\frac{3x5}{5^{2}x5 }}= \sqrt[3]{\frac{15}{5^{3}}}= \frac{1}{5}\sqrt[3]{15}$$

D.

$$\sqrt[3]{\frac{5}{9}}= \sqrt[3]{\frac{5}{3^{2}}}=\sqrt[3]{\frac{5x3}{3^{2}x3 }}= \sqrt[3]{\frac{15}{3^{3}}}= \frac{1}{3}\sqrt[3]{15}$$

E.

$$\sqrt[6]{\frac{3}{8}}= \sqrt[6]{\frac{3}{2^{3}}}=\sqrt[6]{\frac{3x}{2^{3}x2^{3} }}= \sqrt[6]{\frac{3x2^{3}}{2^{6}}}= \frac{1}{2}\sqrt[6]{24}$$

**3.39**

A.

$$\sqrt[3]{\frac{5}{24}}= \sqrt[3]{\frac{5}{2^{3}x3}}=\sqrt[3]{\frac{5x3^{2}}{2^{3}x3x3^{2} }}= \sqrt[3]{\frac{45}{2^{3}x3^{3}}}= \frac{1}{6}\sqrt[3]{45}$$

B.

$$\sqrt[4]{\frac{7}{72}}= \sqrt[4]{\frac{7}{2^{3}x3^{2}}}=\sqrt[4]{\frac{7x2x3^{2}}{2^{3}x3^{2}x2x3^{2}}}=\sqrt[4]{\frac{126}{2^{4}x3^{4}}}=\frac{1}{6}\sqrt[4]{126}$$

C.

$$\sqrt[5]{\frac{5}{648}}= \sqrt[5]{\frac{5}{2^{3}x3^{4}}}=\sqrt[5]{\frac{5x2^{2}x3}{2^{3}x3^{4}x2^{2}x3}}=\sqrt[5]{\frac{60}{2^{5}x3^{5}}}=\frac{1}{6}\sqrt[5]{60}$$

D.

$$\sqrt[3]{\frac{9}{100}}= \sqrt[3]{\frac{9}{2^{2}x5^{2}}}=\sqrt[3]{\frac{9x2x5}{2^{2}x5^{2}x2x5 }}= \sqrt[3]{\frac{90}{2^{3}x5^{3}}}= \frac{1}{10}\sqrt[3]{90}$$

**3.40**

A.

$$\frac{\sqrt[3]{2}}{\sqrt[3]{3}}= \frac{\sqrt[3]{2x3^{2}}}{\sqrt[3]{3x3^{2}}}=\frac{\sqrt[3]{18}}{\sqrt[3]{3^{3}}} =\frac{1}{3} \sqrt[3]{18}$$

B.

$$\frac{\sqrt[4]{3}}{\sqrt[4]{8}}=\frac{\sqrt[4]{3}}{\sqrt[4]{2^{3}}}= \frac{\sqrt[4]{3x2}}{\sqrt[4]{2^{3}x2}}= \frac{\sqrt[4]{6}}{\sqrt[4]{2^{4}}}=\frac{1}{2} \sqrt[4]{6}$$

C.

$$\frac{\sqrt[5]{1}}{\sqrt[5]{16}}=\frac{\sqrt[5]{1}}{\sqrt[5]{2^{4}}}= \frac{\sqrt[5]{1x}2}{\sqrt[5]{2^{4}x2}}= \frac{\sqrt[5]{2}}{\sqrt[5]{2^{5}}}=\frac{1}{2} \sqrt[5]{2}$$

D.

$$\frac{\sqrt[6]{6}}{\sqrt[6]{81}}=\frac{\sqrt[6]{6}}{\sqrt[6]{3^{4}}}= \frac{\sqrt[6]{6x}3^{2}}{\sqrt[6]{3^{4}x3^{2}}}= \frac{\sqrt[6]{54}}{\sqrt[6]{3^{6}}}=\frac{1}{3} \sqrt[6]{54}$$

**3.41**

A.

$$\frac{\sqrt[3]{-3}}{\sqrt[3]{2}}= \frac{\sqrt[3]{-3x2^{2}}}{\sqrt[3]{2x2^{2}}}=\frac{\sqrt[3]{-12}}{\sqrt[3]{2^{3}}} =\frac{1}{2} \sqrt[3]{-12}= -\frac{1}{2} \sqrt[3]{12} $$

B.

$$\frac{\sqrt[4]{3}}{\sqrt[4]{4}}=\frac{\sqrt[4]{3}}{\sqrt[4]{2^{2}}}= \frac{\sqrt[4]{3x2^{2}}}{\sqrt[4]{2^{2}x2^{2}}}= \frac{\sqrt[4]{12}}{\sqrt[4]{2^{4}}}=\frac{1}{2} \sqrt[4]{12}$$

C.

$$\frac{\sqrt[5]{7}}{\sqrt[5]{-27}}=\frac{\sqrt[5]{7}}{\sqrt[5]{-3^{3}}}= \frac{\sqrt[5]{7x}3^{2}}{\sqrt[5]{-3^{3}x3^{2}}}= \frac{\sqrt[5]{63}}{\sqrt[5]{-3^{5}}}=-\frac{1}{3} \sqrt[5]{63}$$

D.

$$\frac{\sqrt[3]{35}}{\sqrt[3]{36}}= \frac{\sqrt[3]{5x7}}{\sqrt[3]{2^{2}x3^{2}}}=\frac{\sqrt[3]{5x7x2x3}}{\sqrt[3]{2^{2}x3^{2}x2x3}} =\frac{\sqrt[3]{210}}{\sqrt[3]{2^{3}x3^{3}}} =\frac{1}{6} \sqrt[3]{210}$$

Schrijf de volgende twee opgaven als wortel:

$$Tip: a^{\frac{m}{n}}= \sqrt[n]{a^{m}}$$

**3.42**

A.

$$2^{\frac{1}{2}}= \sqrt[2]{2^{1}}= \sqrt{2}$$

B.

$$3^{\frac{3}{2}}= \sqrt[2]{3^{3}}= \sqrt{27}$$

C.

$$7^{\frac{2}{3}}= \sqrt[3]{7^{2}}= \sqrt[3]{49}$$

D.

$$5^{\frac{5}{4}}= \sqrt[4]{5^{5}}= \sqrt[4]{3125}$$

E.

$$4^{\frac{4}{3}}= \sqrt[3]{4^{4}}= \sqrt[3]{256}$$

**3.43**

A.

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

B.

$$7^{-\frac{3}{2}}= \sqrt[2]{7^{-3}}= \sqrt{\frac{1}{343}}$$

C.

$$4^{-\frac{1}{3}}= \sqrt[3]{4^{-1}}= \sqrt[3]{\frac{1}{4}} $$

D.

$$9^{-\frac{2}{5}}= \sqrt[5]{9^{-2}}= \sqrt[5]{\frac{1}{81}} $$

E.

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

Schrijf de volgende twee opgaven als macht:

**3.44**

A.

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

B.

$$\sqrt[2]{7}=7^{\frac{1}{2}}$$

C.

$$\sqrt[4]{2}=2^{\frac{1}{4}}$$

D.

$$\sqrt[6]{12}=12^{\frac{1}{6}}$$

E.

$$\sqrt[5]{5}=5^{\frac{1}{5}}$$

**3.45**

A.

$$\frac{1}{\sqrt[2]{5}}= \sqrt[2]{\frac{1}{5}}= \sqrt[2]{5^{-1}}= 5^{-\frac{1}{2}}$$

B.

$$\frac{1}{\sqrt[3]{6}}= \sqrt[3]{\frac{1}{6}}= \sqrt[3]{6^{-1}}= 6^{-\frac{1}{3}}$$

C.

$\frac{1}{2\sqrt[4]{2}}= \frac{1}{\sqrt[4]{2x2^{2}x2^{2}}}= \frac{1}{\sqrt[4]{2^{5}}}= \sqrt[4]{\frac{1}{2^{5}}}= \sqrt[4]{2^{-5}}=2^{-\frac{5}{4}}$

D.

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

E.

$$\frac{7}{\sqrt[5]{7}}= \frac{\sqrt[5]{7^{5}}}{\sqrt[5]{7}}=\frac{\sqrt[5]{7^{4}}}{\sqrt[5]{7}}=\sqrt[5]{7^{4}}=7^{\frac{4}{5}}$$

Schrijf de volgende twee opgaven als macht van 2

**3.46**

A.

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

B.

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

C.

$$\sqrt[4]{32}=\sqrt[4]{2^{5}}=2^{\frac{5}{4}}$$

D.

$$\sqrt[6]{16}=\sqrt[6]{2^{4}}=2^{\frac{4}{6}}= 2^{\frac{2}{3}}$$

E.

$$\sqrt[3]{32}=\sqrt[3]{2^{5}}=2^{\frac{5}{3}}$$

**Tip 1: Indien de teller geen wortel is: Maak van de teller een zelfde machtswortel als de noemer (vb.:** $\frac{8}{\sqrt[3]{4}}= \frac{\sqrt[3]{2^{3}x2^{3}x2^{3}}}{\sqrt[3]{2^{2}}}= \frac{\sqrt[3]{2^{9}}}{\sqrt[3]{2^{2}}}$ **) Vervolgens kan je boven en onder de teller gelijke getallen wegstrepen**

**Tip 2: Indien in de noemer een getal voor de wortel staat, zet dit getal om in een zelfde machtswortel**

**3.47**

A.

$$\frac{4}{\sqrt[2]{2}}=\frac{\sqrt[2]{2^{2}x2^{2}}}{\sqrt[2]{2^{1}}}= \frac{\sqrt[2]{2^{4}}}{\sqrt[2]{2^{1}}}= \frac{\sqrt[2]{2^{3}}}{\sqrt[2]{2^{1}}}=\sqrt[2]{2^{3}} =2^{\frac{3}{2}}$$

B.

$$\frac{1}{2\sqrt[2]{2}}= \frac{1}{\sqrt[2]{2x2^{2}}}= \frac{1}{\sqrt[2]{2^{3}}}= \sqrt[2]{\frac{1}{2^{3}}}= \sqrt[2]{2^{-3}}=2^{-\frac{3}{2}}$$

C.

$$\frac{8}{\sqrt[3]{4}}= \frac{\sqrt[3]{2^{3}x2^{3}x2^{3}}}{\sqrt[3]{2^{2}}}= \frac{\sqrt[3]{2^{9}}}{\sqrt[3]{2^{2}}}= \frac{\sqrt[3]{2^{7}}}{\sqrt[3]{2^{2}}}=\sqrt[3]{2^{7}}=2^{\frac{7}{3}}$$

D.

$$\frac{2}{\sqrt[4]{8}}= \frac{\sqrt[4]{2^{4}}}{\sqrt[4]{2^{3}}}=\frac{\sqrt[4]{2^{1}}}{\sqrt[4]{2^{3}}}=\sqrt[4]{2^{1}} =2^{\frac{1}{4}}$$

E.

$\frac{1}{4\sqrt[3]{16}}=\frac{1}{\sqrt[3]{2^{4}x2^{3}x2^{3}}}= \frac{1}{\sqrt[3]{2^{10}}}= \sqrt[3]{\frac{1}{2^{10}}}= \sqrt[3]{2^{-10}}=2^{-\frac{10}{3}}$

Schrijf de volgende uitdrukkingen als wortel in standaardvorm

**3.48**

A.

$$\sqrt[2]{2} x \sqrt[3]{2}=2^{\frac{1}{2} }x 2^{\frac{1}{3}}=2^{\frac{5}{6}}= \sqrt[6]{2^{5}}=\sqrt[6]{32} $$

B.

$$\sqrt[3]{3} x \sqrt[2]{3}=3^{\frac{1}{3} }x 3^{\frac{1}{2}}=3^{\frac{5}{6}}= \sqrt[6]{3^{5}}=\sqrt[6]{243} $$

C.

$$\sqrt[4]{8} x \sqrt[3]{16}=\sqrt[4]{2^{3}} x \sqrt[3]{2^{4}} =2^{\frac{3}{4 }}x 2^{\frac{4}{3}}=2^{2\frac{1}{12}}=2^{2}x2^{\frac{1}{12}} =4\sqrt[12]{2}$$

D.

$$\sqrt[5]{27} x \sqrt[3]{9}=\sqrt[5]{3^{3}} x \sqrt[3]{3^{2}} =3^{\frac{3}{5 }}x 3^{\frac{2}{3}}=3^{1\frac{4}{15}}=3^{1}x3^{\frac{4}{15}} =3\sqrt[15]{3^{4}}= 3\sqrt[15]{81}$$

E.

$$\sqrt[3]{16} x \sqrt[6]{16}=\sqrt[3]{16} x \sqrt[6]{16} =16^{\frac{1}{3 }}x 16^{\frac{1}{6}}=16^{\frac{1}{2}} =\sqrt[2]{16}=4$$

**3.49**

A.

$$\sqrt[2]{7} x \sqrt[3]{49}=\sqrt[2]{7} x \sqrt[3]{7^{2}}=7^{\frac{1}{2} }x 7^{\frac{2}{3}}=7^{1\frac{1}{6}}=7^{1}x 7^{\frac{1}{6}}= 7\sqrt[6]{7}$$

B.

$$\sqrt[3]{3^{2}} x \sqrt[2]{3}=3^{\frac{2}{3} }x 3^{\frac{1}{2}}=3^{1\frac{1}{6}}=3^{1}x3^{\frac{1}{6}}=3\sqrt[6]{3}$$

C.

$$\sqrt[4]{25} x \sqrt[3]{5}=\sqrt[4]{5^{2}} x \sqrt[3]{5} =5^{\frac{2}{4 }}x 5^{\frac{1}{3}}=5^{\frac{5}{6}}=\sqrt[6]{5^{5}}= \sqrt[6]{3125}$$

D.

$$\sqrt[5]{81} x \sqrt[4]{27}=\sqrt[5]{3^{4}} x \sqrt[4]{3^{3}} =3^{\frac{4}{5 }}x 3^{\frac{3}{4}}=3^{1\frac{11}{20}}=3^{1}x3^{\frac{11}{20}} =3\sqrt[20]{3^{11}}= 3\sqrt[20]{177147}$$

E.

$$\sqrt[4]{49} x \sqrt[2]{7}=\sqrt[4]{7^{2}} x \sqrt[2]{7} =7^{\frac{2}{4 }}x 7^{\frac{1}{2}}=7 $$

**3.50**

A.

$$\sqrt[2]{2} : \sqrt[3]{2}=2^{\frac{1}{2}} : 2^{\frac{1}{3}}=2^{\frac{1}{6}}= \sqrt[6]{2}$$

B.

$$\sqrt[3]{9} : \sqrt[2]{3}=\sqrt[3]{3^{2}} : \sqrt[2]{3}=3^{\frac{2}{3}} : 3^{\frac{1}{2}}=3^{\frac{1}{6}}= \sqrt[6]{3}$$

C.

$$\sqrt[4]{8} : \sqrt[2]{2}=\sqrt[4]{2^{3}} : \sqrt[2]{2}=2^{\frac{3}{4}} : 2^{\frac{1}{2}}=2^{\frac{1}{4}}= \sqrt[4]{2}$$

D.

$$\sqrt[3]{9} : \sqrt[5]{27}=\sqrt[3]{3^{2}} : \sqrt[5]{3^{3}}=3^{\frac{2}{3}} : 3^{\frac{3}{5}}=3^{\frac{1}{15}}= \sqrt[15]{3}$$

E.

$$\sqrt[2]{2} : \sqrt[3]{4}=\sqrt[2]{2} : \sqrt[3]{2^{2}}=2^{\frac{1}{2}} : 2^{\frac{2}{3}}=2^{-\frac{1}{6}}= \sqrt[6]{2^{-1}}= \sqrt[6]{\frac{1}{2}}= \frac{\sqrt[6]{1}}{\sqrt[6]{2}}= \frac{\sqrt[6]{1}x\sqrt[6]{2^{5}}}{\sqrt[6]{2}x\sqrt[6]{2^{5}}}= \frac{1}{2}\sqrt[6]{2^{5}}= \frac{1}{2}\sqrt[6]{32}$$