

Hoofdstuk 3

Machten en wortels

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

3.1

A

$$2^3 = 2 \times 2 \times 2 = 8$$

B

$$3^2 = 3 \times 3 = 9$$

C

$$4^5 = 4 \times 4 \times 4 \times 4 \times 4 = 1024$$

D

$$5^4 = 5 \times 5 \times 5 \times 5 = 625$$

E

$$2^8 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 256$$

3.2

A

$$(-2)^3 = (-2) \times (-2) \times (-2) = -8$$

B

$$(-3)^2 = (-3) \times (-3) = 9$$

C

$$(-4)^5 = (-4) \times (-4) \times (-4) \times (-4) \times (-4) = -1024$$

D

$$(-5)^4 = (-5) \times (-5) \times (-5) \times (-5) = 625$$

E

$$(-2)^6 = (-2) \times (-2) \times (-2) \times (-2) \times (-2) \times (-2) = 64$$

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

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

B

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

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

$$(-4)^3 = (-4)x(-4)x(-4) = -64$$

B

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

C

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

D

$$2^4 = 2x2x2x2 = 16$$

E

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

3.6

A

$$-2^0 = 1$$

B

$$0^2 = 0 \times 0 = 0$$

C

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

D

$$(-7)^2 = (-7) \times (-7) = 49$$

E

$$(-2)^{-7} = \frac{1}{(-2)^7} = \frac{1}{(-2) \times (-2) \times (-2) \times (-2) \times (-2) \times (-2) \times (-2)} = \frac{1}{-128} = -\frac{1}{128}$$

3.7

A

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

B

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

C

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

D

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

3.8

A

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

B

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

C

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

D

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

3.9

A

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

B

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

C

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

D

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

3.10

A

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

B

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

C

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

D

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

3.11

A

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

B

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

C

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

D

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

3.12

A

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

B

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

C

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

D

$$\begin{aligned} \left(\frac{3}{6}\right)^{-5} &= \frac{1}{\left(\frac{3}{6}\right)^5} = \frac{1}{\frac{3^5}{6^5}} = \frac{1}{\frac{3 \times 3 \times 3 \times 3 \times 3}{6 \times 6 \times 6 \times 6 \times 6}} = \frac{1}{\frac{3 \times 3 \times 3 \times 3 \times 3}{(2 \times 3) \times (2 \times 3) \times (2 \times 3) \times (2 \times 3) \times (2 \times 3)}} = \frac{1}{\frac{1}{2 \times 2 \times 2 \times 2 \times 2}} = \frac{1}{\frac{1}{32}} \\ &= 1 \times \frac{32}{1} = 32 \end{aligned}$$

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

Tip: ontbind de volgende wortels tot priemgetallen.

3.13

A

$$\sqrt{36} = \sqrt{2 \times 2 \times 3 \times 3} = 2 \times 3 \times \sqrt{1} = 2 \times 3 \times 1 = 6$$

B

$$\sqrt{81} = \sqrt{3 \times 3 \times 3 \times 3} = 3 \times 3 \times \sqrt{1} = 2 \times 3 \times 1 = 9$$

C

$$\sqrt{121} = \sqrt{11 \times 11} = 11 \sqrt{1} = 11 \times 1 = 11$$

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

$$\sqrt{512} = \sqrt{2x2x2x2x2x2x2x2} = 2x2x2x2\sqrt{2} = 16\sqrt{2}$$

D

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

E

$$\sqrt{588} = \sqrt{2 \times 2 \times 3 \times 7 \times 7} = 2 \times 7 \sqrt{3} = 14\sqrt{3}$$

3.20

A

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

B

$$\sqrt{972} = \sqrt{2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 3} = 2 \times 3 \times 3 \sqrt{3} = 18\sqrt{3}$$

C

$$\sqrt{2025} = \sqrt{3 \times 3 \times 3 \times 3 \times 5 \times 5} = 3 \times 3 \times 5 \sqrt{1} = 45 \times 1 = 45$$

D

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

E

$$\sqrt{676} = \sqrt{2 \times 2 \times 13 \times 13} = 2 \times 13 \sqrt{1} = 2 \times 13 \times 1 = 26$$

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

3.21

A

$$\sqrt{6} \times \sqrt{3} = \sqrt{2 \times 3} \times \sqrt{3} = \sqrt{2} \times 3 = 3\sqrt{2}$$

B.

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

C.

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

D.

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

E.

$$3\sqrt{30} \times 2\sqrt{42} = 3\sqrt{2 \times 3 \times 5} \times 2\sqrt{2 \times 3 \times 7} = 3\sqrt{5} \times 2\sqrt{7} \times 2 \times 3 = 6\sqrt{35} \times 2 \times 3 = 36\sqrt{35}$$

3.22

A.

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

B.

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

C.

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

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.

$$\begin{aligned} \left(\frac{2\sqrt{3}}{\sqrt{2}}\right)^3 &= \frac{2\sqrt{3}^3}{\sqrt{2}^3} = \frac{2\sqrt{3} \times 2\sqrt{3} \times 2\sqrt{3}}{\sqrt{2} \times \sqrt{2} \times \sqrt{2}} = \frac{(2\sqrt{3} \times 2\sqrt{3}) \times 2\sqrt{3}}{(\sqrt{2} \times \sqrt{2}) \times \sqrt{2}} = \frac{(4 \times 3) \times 2\sqrt{3}}{(2) \times \sqrt{2}} = \frac{24\sqrt{3}}{2\sqrt{2}} \times \left(\frac{\sqrt{2}}{\sqrt{2}}\right) \\ &= \frac{24\sqrt{3} \times \sqrt{2}}{2\sqrt{2} \times \sqrt{2}} = \frac{24\sqrt{6}}{2 \times 2} = \frac{24}{4} \sqrt{6} = 6\sqrt{6} \end{aligned}$$

Let op: Ontbind de onderstaande wortels in priemgetallen indien mogelijk

3.25

A.

$$\begin{aligned} \left(\frac{\sqrt{3}}{\sqrt{6}}\right)^3 &= \frac{\sqrt{3}^3}{\sqrt{6}^3} = \frac{\sqrt{3} \times \sqrt{3} \times \sqrt{3}}{\sqrt{6} \times \sqrt{6} \times \sqrt{6}} = \frac{(\sqrt{3} \times \sqrt{3}) \times \sqrt{3}}{(\sqrt{6} \times \sqrt{6}) \times \sqrt{6}} = \frac{(3) \times \sqrt{3}}{(6) \times \sqrt{6}} = \frac{3\sqrt{3}}{6\sqrt{6}} = \frac{3\sqrt{3}}{6\sqrt{2 \times 3}} = \frac{3\sqrt{1}}{6\sqrt{2}} \\ &= \frac{3\sqrt{1}}{6\sqrt{2}} \times \left(\frac{\sqrt{2}}{\sqrt{2}}\right) = \frac{3\sqrt{1} \times \sqrt{2}}{6\sqrt{2} \times \sqrt{2}} = \frac{3\sqrt{2}}{6 \times 2} = \frac{3}{12} \sqrt{2} = \frac{1}{4} \sqrt{2} \end{aligned}$$

B.

$$\begin{aligned} \left(\frac{2\sqrt{3}}{3\sqrt{2}}\right)^3 &= \frac{2\sqrt{3}^3}{3\sqrt{2}^3} = \frac{2\sqrt{3} \times 2\sqrt{3} \times 2\sqrt{3}}{3\sqrt{2} \times 3\sqrt{2} \times 3\sqrt{2}} = \frac{(2\sqrt{3} \times 2\sqrt{3}) \times 2\sqrt{3}}{(3\sqrt{2} \times 3\sqrt{2}) \times 3\sqrt{2}} = \frac{(4 \times 3) \times 2\sqrt{3}}{(9 \times 2) \times 3\sqrt{2}} = \frac{24\sqrt{3}}{54\sqrt{2}} = \frac{24\sqrt{3}}{54\sqrt{2}} \\ &= \frac{24\sqrt{3}}{54\sqrt{2}} \times \left(\frac{\sqrt{2}}{\sqrt{2}}\right) = \frac{24\sqrt{3} \times \sqrt{2}}{54\sqrt{2} \times \sqrt{2}} = \frac{24\sqrt{6}}{54 \times 2} = \frac{24}{108} \sqrt{6} = \frac{2}{9} \sqrt{6} \end{aligned}$$

C.

$$\begin{aligned} \left(\frac{-\sqrt{7}}{2\sqrt{2}}\right)^4 &= \frac{-\sqrt{7}^4}{2\sqrt{2}^4} = \frac{-\sqrt{7} \times -\sqrt{7} \times -\sqrt{7} \times -\sqrt{7}}{2\sqrt{2} \times 2\sqrt{2} \times 2\sqrt{2} \times 2\sqrt{2}} = \frac{(-\sqrt{7} \times -\sqrt{7}) \times (-\sqrt{7} \times -\sqrt{7})}{(2\sqrt{2} \times 2\sqrt{2}) \times (2\sqrt{2} \times 2\sqrt{2})} \\ &= \frac{(7) \times (7)}{(4 \times 2) \times (4 \times 2)} = \frac{49}{64} \end{aligned}$$

D.

$$\begin{aligned} \left(\frac{\sqrt{3}}{\sqrt{2}}\right)^3 &= \frac{\sqrt{3}^3}{\sqrt{2}^3} = \frac{\sqrt{3} \times \sqrt{3} \times \sqrt{3}}{\sqrt{2} \times \sqrt{2} \times \sqrt{2}} = \frac{(\sqrt{3} \times \sqrt{3}) \times \sqrt{3}}{(\sqrt{2} \times \sqrt{2}) \times \sqrt{2}} = \frac{(3) \times \sqrt{3}}{(2) \times \sqrt{2}} = \frac{3\sqrt{3}}{2\sqrt{2}} = \frac{3\sqrt{3}}{2\sqrt{2}} \times \left(\frac{\sqrt{2}}{\sqrt{2}}\right) \\ &= \frac{3\sqrt{3} \times \sqrt{2}}{2\sqrt{2} \times \sqrt{2}} = \frac{3\sqrt{6}}{2 \times 2} = \frac{3}{4} \sqrt{6} \end{aligned}$$

E.

$$\begin{aligned} \left(\frac{\sqrt{4}}{\sqrt{3}}\right)^5 &= \frac{\sqrt{4}^5}{\sqrt{3}^5} = \frac{\sqrt{4} \times \sqrt{4} \times \sqrt{4} \times \sqrt{4} \times \sqrt{4}}{\sqrt{3} \times \sqrt{3} \times \sqrt{3} \times \sqrt{3} \times \sqrt{3}} = \frac{(\sqrt{4} \times \sqrt{4}) \times (\sqrt{4} \times \sqrt{4}) \times \sqrt{4}}{(\sqrt{3} \times \sqrt{3}) \times (\sqrt{3} \times \sqrt{3}) \times \sqrt{3}} = \frac{(4) \times (4) \times \sqrt{4}}{(3) \times (3) \times \sqrt{3}} \\ &= \frac{16\sqrt{2 \times 2}}{9\sqrt{3}} = \frac{16 \times 2}{9\sqrt{3}} = \frac{32}{9\sqrt{3}} = \frac{32}{9\sqrt{3}} \times \left(\frac{\sqrt{3}}{\sqrt{3}}\right) = \frac{32 \times \sqrt{3}}{9\sqrt{3} \times \sqrt{3}} = \frac{32\sqrt{3}}{9 \times 3} = \frac{32}{27} \sqrt{3} \end{aligned}$$

3.26

A.

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

B.

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

C.

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

D.

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

E.

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

3.27

A.

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

B.

$$\sqrt{\frac{4}{27}} = \frac{\sqrt{4}}{\sqrt{27}} = \frac{\sqrt{2 \times 2}}{\sqrt{3 \times 3 \times 3}} = \frac{2}{3\sqrt{3}} = \frac{2 \times \sqrt{3}}{3\sqrt{3} \times \sqrt{3}} = \frac{2\sqrt{3}}{3 \times 3} = \frac{2\sqrt{3}}{9} = \frac{2}{9} \sqrt{3}$$

C.

$$\sqrt{\frac{9}{20}} = \frac{\sqrt{9}}{\sqrt{20}} = \frac{\sqrt{3 \times 3}}{\sqrt{2 \times 2 \times 5}} = \frac{3}{2\sqrt{5}} = \frac{3 \times \sqrt{5}}{2\sqrt{5} \times \sqrt{5}} = \frac{3\sqrt{5}}{2 \times 5} = \frac{3\sqrt{5}}{10} = \frac{3}{10} \sqrt{5}$$

D.

$$\sqrt{\frac{6}{15}} = \frac{\sqrt{6}}{\sqrt{15}} = \frac{\sqrt{2 \times 3}}{\sqrt{3 \times 5}} = \frac{\sqrt{2}}{\sqrt{5}} = \frac{\sqrt{2} \times \sqrt{5}}{\sqrt{5} \times \sqrt{5}} = \frac{\sqrt{10}}{5} = \frac{\sqrt{10}}{5} = \frac{1}{5} \sqrt{10}$$

E.

$$\sqrt{\frac{7}{32}} = \frac{\sqrt{7}}{\sqrt{32}} = \frac{\sqrt{7}}{\sqrt{2 \times 2 \times 2 \times 2 \times 2}} = \frac{\sqrt{7}}{2 \times 2 \times \sqrt{2}} = \frac{\sqrt{7} \times \sqrt{2}}{4 \times 2 \times \sqrt{2}} = \frac{\sqrt{14}}{4 \times 2} = \frac{\sqrt{14}}{8} = \frac{1}{8} \sqrt{14}$$

3.28

A.

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

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.

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

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.

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

3.34

A.

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

B.

$$\sqrt[4]{4} \cdot \sqrt[4]{14} = \sqrt[4]{2 \cdot 2 \cdot 2 \cdot 2 \cdot 7} = \sqrt[4]{56}$$

C.

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

D.

$$\sqrt[4]{18} \cdot \sqrt[4]{45} = \sqrt[4]{3 \cdot 3 \cdot 2 \cdot 3 \cdot 3 \cdot 5} = \sqrt[4]{2 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 5} = 3\sqrt[4]{2 \cdot 5} = 3\sqrt[4]{10}$$

E.

$$\sqrt[5]{16} \cdot \sqrt[5]{12} = \sqrt[5]{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3} = 2\sqrt[5]{2 \cdot 3} = 2\sqrt[5]{6}$$

3.35

A.

$$\sqrt[4]{24} \cdot \sqrt[4]{54} = \sqrt[4]{2 \cdot 2 \cdot 2 \cdot 3 \cdot 2 \cdot 3 \cdot 3 \cdot 3} = \sqrt[4]{2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \cdot 3 \cdot 3} = 2 \cdot 3 = 6$$

B.

$$\sqrt[3]{36} \cdot \sqrt[3]{12} = \sqrt[3]{2 \cdot 2 \cdot 3 \cdot 3 \cdot 2 \cdot 2 \cdot 3} = \sqrt[3]{2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \cdot 3} = 2 \cdot 3 \sqrt[3]{2} = 6\sqrt[3]{2}$$

C.

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

D.

$$\begin{aligned} \sqrt[6]{288} \cdot \sqrt[6]{324} &= \sqrt[6]{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \cdot 3 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \cdot 3 \cdot 3} = \sqrt[6]{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3} \\ &= 2 \cdot 3 \sqrt[6]{2} = 6\sqrt[6]{2} \end{aligned}$$

E.

$$\sqrt[3]{200} \cdot \sqrt[3]{35} = \sqrt[3]{2 \cdot 2 \cdot 2 \cdot 5 \cdot 5 \cdot 5 \cdot 7} = \sqrt[3]{2 \cdot 2 \cdot 2 \cdot 5 \cdot 5 \cdot 5 \cdot 7} = 2 \cdot 5 \sqrt[3]{7} = 10\sqrt[3]{7}$$

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.

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

C.

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

D.

$$\sqrt[2]{\frac{36}{121}} = \sqrt[2]{\frac{2^2 x 3^2}{11^2}} = \frac{6}{11}$$

E.

$$\sqrt[4]{\frac{1296}{625}} = \sqrt[4]{\frac{2^4 x 3^4}{5^4}} = \frac{6}{5}$$

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.

$$\sqrt[2]{\frac{144}{25}} = \sqrt[2]{\frac{2^2 x 2^2 x 3^2}{5^2}} = \frac{12}{5}$$

3.38

A.

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

B.

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

C.

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

D.

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

E.

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

3.39

A.

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

B.

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

C.

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

D.

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

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.

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

C.

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

D.

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

3.41

A.

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

B.

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

C.

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

D.

$$\frac{\sqrt[3]{35}}{\sqrt[3]{36}} = \frac{\sqrt[3]{5x^7}}{\sqrt[3]{2^2x^3}} = \frac{\sqrt[3]{5x^7x^2x^3}}{\sqrt[3]{2^2x^3x^2x^3}} = \frac{\sqrt[3]{210}}{\sqrt[3]{2^3x^3}} = \frac{1}{6} \sqrt[3]{210}$$

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.

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

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

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

B.

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

C.

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

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.

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

Schrijf de volgende uitdrukkingen als wortel in standaardvorm

3.48

A.

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

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.

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

D.

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

E.

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

3.49

A.

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

B.

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

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.

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

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.

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