1C EKSPONENTE: ANTWOORDE

Eksponensiële Uitdrukkings

LW:
Wanneer jy vermenigvuldig en deel:
beskou tekens, getalle en die letters een op 'n tyd.

Wet 1: $a^m \times a^n = a^{m+n}$

1.1 $2^{-4} \times 2^5 \times 2^0$
$= 2^{-4+5+0}$
$= 2^1$
$= 2$

1.2 $3x^2 \times 2x^3$
$= 6x^5$ ...

$3 \times 2 = 6$
&
$x^2 \times x^3$
$= x^{2+3}$
$= x^5$

1.3 $x^5 \times 2x^3 = 2x^8$

Wet 2: $a^m \div a^n = a^{m-n}$

1.4 $2^5 \div 2^2 = 2^{5-2}$
$= 2^3$

LW: $\frac{a^m}{a^n} = a^{m-n}$ & $\frac{a^m}{a^n} = \frac{1}{a^{n-m}}$

1.5 $\frac{p^7}{p^3} = p^{7-3}$
$= p^4$

1.6 $\frac{a^2}{a^{-1}} = a^{2+1}$
$= a^3$

Wet 3: $(a^m)^n = a^{mn}$

1.7 $(2^3)^2 = 2^{3\times2}$
$= 2^6$
$= 64$

1.8 $(s^3)^5 = s^{3\times5}$
$= s^{15}$

1.9 $(3^x)^2 = 3^{x\times2}$
$= 3^{2x}$

Maak seker jou letters en getalle verskil duidelik - 'n **5** *en 'n* **s** *kan maklik verwar word!*

Wet 4: $(ab)^m = a^m b^m$

1.10 $(2\times5)^2 = 2^2 \times 5^2$
$= 4 \times 25$
$= 100$

Elke faktor binne die hakie moet tot die mag verhef word, d.w.s. die ***teken****, die* ***getal*** *& elke* ***letter****.*

1.11 $(3x^3)^3 = 3^3 . x^{3\times3}$
$= 27x^9$

LW: $(ab^m)^n = a^n b^{mn}$ & $(abc...)^n = a^n b^n c^n ...$

1.12 $(-4a^5b^3)^2$
$= 4^2 a^{5\times2} b^{3\times2}$
$= 16a^{10} b^6$

Pas die gegewe wet wat in elk van die 6 gevalle voorsien is toe, om al hierdie uitdrukkings te vereenvoudig.

Wet 5: $a^0 = 1$

1.13 $5^0 = 1$

1.14 $7a^0 = 7(1)$
$= 7$

1.15 $3p^0 + (3p)^0$
$= 3(1) + (1)$
$= 3 + 1$
$= 4$

Wet 6: $a^{-n} = \frac{1}{a^n}$

1.16 $2^{-3} = \frac{1}{2^3} = \frac{1}{8}$

1.17 $x^{-4} = \frac{1}{x^4}$

1.18 $a^3.b^{-4} = \frac{a^3}{b^4}$

Vrae wat Wette 1 & 2 insluit

2.1 $3a.2ab.3abc$
$= 18a^3b^2c$

2.2 $2x^3 \times -3x^5$
$= -6x^{3+5}$
$= -6x^8$

2.3 $2a^4 \times 4a^2$
$= 8a^{4+2}$
$= 8a^6$

2.4 $a^{-4} \times a^7$
$= a^{-4+7}$
$= a^3$

2.5 $x^3(x^2)^3x^0x^{-2}$
$= x^3x^6x^0x^{-2}$
$= x^{3+6+0-2}$
$= x^7$

OF $x^3(x^2)^3x^0x^{-2}$
$= x^3x^6(1)x^{-2}$ ... *gebruik wet 5*
$= x^{3+6-2}$
$= x^7$

2.6 $6a^5 \times a \div 3a^2$

$= \frac{6a^6}{3a^2}$

$= 2a^{6-2}$

$= 2a^4$

2.7 $5x^3y^5 \times 3x^{-2}y^2$

$= 15x^{3-2}y^{5+2}$

$= 15xy^7$

2.8 $8y^3 \times \frac{1}{4}y^2$

$= \frac{{}^{2}\cancel{8}y^3}{1} \times \frac{y^2}{\cancel{4}_{1}}$

$= 2y^{3+2}$

$= 2y^5$

2.9 $\frac{a^3b^2c}{ab^2c^3}$

$= \frac{a^2}{c^2}$ . . . $\frac{a^{3-1}}{c^{3-1}}$ & $\frac{b^2}{b^2} = 1$

2.10 $\frac{5^2.5^3x^2y^4}{5^6x^3y^2}$

$= \frac{5^5x^2y^4}{5^6x^3y^2}$ . . . *slegs Wet 1*

$= \frac{y^{4-2}}{5^{6-5}x^{3-2}}$ . . . *slegs Wet 2*

$= \frac{y^2}{5x}$

OF $\frac{5^2.5^3x^2y^4}{5^6x^3y^2}$

$= \frac{y^{4-2}}{5^{6-2-3}x^{3-2}}$ . . *Wet 1 & 2 gesamentlik*

$= \frac{y^2}{5x}$

2.11 $\frac{{}^{1}\cancel{3}ab^4c^0}{{}_{6}\cancel{18}a^2bc}$

$= \frac{b^{4-1}}{6a^{2-1}c}$

$= \frac{b^3}{6ac}$

LW:
Bring eksponente bymekaar waar hul som positief sal wees

2.12 $\frac{{}^{1}\cancel{4}x^3y^7}{{}_{2}\cancel{8}x^2y^9}$

$= \frac{x^{3-2}}{2y^{9-7}}$

$= \frac{x}{2y^2}$

Sorg dat jy jou eksponentwette ken:

$a^n \times a^m = a^{n+m}$

$a^n \div a^m = a^{n-m}$

$(a^n)^m = a^{nm}$

$(ab)^n = a^n b^n$

$a^0 = 1$

$a^{-n} = \frac{1}{a^n}$

2.13 $\frac{{}^{2}\cancel{8}b^{-3}c^5}{{}_{3}\cancel{12}b^2c^{-6}}$

$= \frac{2c^{5+6}}{3b^{2+3}}$

$= \frac{2c^{11}}{3b^5}$

2.14 $\frac{{}^{11}\cancel{121}x^7y^{13}}{{}_{1}\cancel{11}x^{-4}y^2}$

$= 11x^{7+4}y^{13-2}$

$= 11x^{11}y^{11}$

2.15 $\frac{{}^{5}\cancel{55}x^3y^{12}}{{}_{1}\cancel{11}x^{-2}y^{17}}$

$= \frac{5x^{3+2}}{y^{17-12}}$

$= \frac{5x^5}{y^5}$

2.16 $\frac{15xy^{-2}}{3x^{-3}y^4}$

$= \frac{{}^{5}\cancel{15}x^{1+3}}{{}_{1}\cancel{3}y^{4+2}}$

$= \frac{5x^4}{y^6}$

2.17 $\frac{{}^{3}\cancel{18}a^{-2}b^3c}{{}_{2}\cancel{12}a^3b^5c^{-4}}$

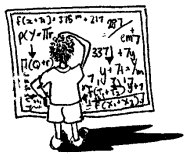
$= \frac{3c^{1+4}}{2a^{3+2}b^{5-3}}$

$= \frac{3c^5}{2a^5b^2}$

2.18 $\frac{{}^{13}\cancel{-39}x^{17}y^{10}}{{}_{1}\cancel{-3}x^4y^{-3}}$

$= 13x^{17-4}y^{10+3}$

$= 13x^{13}y^{13}$



Vrae wat uitbrei na Wette 3 & 4

3.1 $(-3x^2)^2$

$= 9x^4$

3.2 $(-3x^4)(2x^3)$

$= -6x^7$

3.3 $(2^3x^2y)^3$

$= 2^9x^6y^3$

$= 512x^6y^3$

3.4 $(3p^5q^3)^2$

$= 9p^{10}q^6$

3.5 $4(-a)^2 - (-2a)^2$

$= 4a^2 - 4a^2$

$= 0$

3.6 $x^{-7}(x^{13} + x^{11})$

$= x^6 + x^4$ . . .

Hierdie is nie gelyksoortige terme nie
∴ jy kan hulle nie optel nie

3.7 $\frac{ab^2 \times a^3b}{(a^2b^2)^2}$

$= \frac{a^4b^3}{a^4b^4}$

$= \frac{1}{b^{4-3}}$

$= \frac{1}{b}$

. . . $\frac{a^4}{a^4} = \frac{1}{1} = 1$ & $\frac{b^3}{b^4} = \frac{1}{b^{4-3}} = \frac{1}{b}$

3.8 $\frac{ab(-2a^2b^3)^3}{-56b^3}$

$= \frac{ab(-8a^6b^9)}{-56b^3}$

$= \frac{{}^{1}\cancel{-8}a^7b^{10}}{{}_{7}\cancel{-56}b^3}$

$= \frac{a^7b^{10-3}}{7}$

$= \frac{a^7b^7}{7}$

. . . $(a^n)^m = a^{nm}$ & $(abc\ldots)^n = a^n b^n c^n \ldots$ & $(a^n b)^m = a^{nm} b^m$

3.9 $\frac{(3m^3n)(-2mn^4)}{(-2mn)^4}$

$= \frac{-{}^{3}\cancel{6}m^{3+1}n^{1+4}}{{}_{8}\cancel{16}m^4n^4}$

$= \frac{-3m^4n^5}{8m^4n^4}$

$= -\frac{3n^{5-4}}{8}$

$= -\frac{3n}{8}$

. . . *Onthou . . .*
wanneer jy vermenigvuldig, begin met tekens, dan getalle, dan letters; een op 'n slag.

3.10 $\dfrac{(x^2y) \times (x^3y^3)}{(x^2y)^3}$

$= \dfrac{x^5y^4}{x^6y^3}$

$= \dfrac{y^{4-3}}{x^{6-5}}$

$= \dfrac{y}{x}$

Vrae wat uitbrei na Wette 5 & 6

4.1 $\dfrac{x^{-3}}{y^{-4}} = \dfrac{y^4}{x^3}$ . . . $x^{-3} = \dfrac{1}{x^3}$ & $\dfrac{1}{y^{-4}} = y^4$

4.2 $\dfrac{m^5.n^{-2}.p^0}{m.n^3}$

$= \dfrac{m^{5-1}.(1)}{n^{3+2}}$

$= \dfrac{m^4}{n^5}$

4.3 $\dfrac{x.y^{-2}}{x^0.y}$

$= \dfrac{x}{(1)y^{1+2}}$

$= \dfrac{x}{y^3}$

4.4 $\dfrac{x^0}{0{,}25}$

$= \dfrac{1}{\frac{1}{4}}$

$= 1 \times \dfrac{4}{1}$ . . . $1 \div \dfrac{1}{4} = 1 \times \dfrac{4}{1}$

$= 4$

4.5 $\dfrac{(5m)^0}{5m^0}$

$= \dfrac{1}{5(1)} = \dfrac{1}{5}$

4.6 $(a^{-2})(-3a^0)$ . . . *die 0 is slegs van toepassing op die a*

$= (a^{-2})(-3)$

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

$= -\dfrac{3}{a^2}$

4.7 $(-2a^4b^3)^2(-3a^2b^0) = 4a^8b^6(-3a^2)$ . . . $b^0 = 1$

$= -12a^{10}b^6$

4.8 $\dfrac{(2^2q^{-3})^0(p^{-3}q)^{-2}}{(-2pq^{-1})^2}$

$= \dfrac{(1)(p^6q^{-2})}{4p^2q^{-2}}$

$= \dfrac{p^6q^{-2}}{4p^2q^{-2}}$

$= \dfrac{p^4}{4}$

Onthou…

Elke faktor binne die hakie moet tot die eksponent verhef word, d.w.s. die teken, die getal & elke letter.

4.9 $\dfrac{(4x^3)^2(-3x)^0}{-6x^2} = \dfrac{(16x^6)(1)}{-6x^2}$

$= -\dfrac{^{8}\cancel{16}x^6}{_{3}\cancel{6}x^2}$

$= -\dfrac{8x^4}{3}$

Gemengde Vrae

5.1 $3^{-2} + 3^0 + 3^2$

$= \dfrac{1}{3^2} + 1 + 9$

$= \dfrac{1}{9} + \dfrac{1}{1} + \dfrac{9}{1}$

$= \dfrac{1+9+81}{9}$

$= \dfrac{91}{9}$

5.2 $-5^2 \div \sqrt[3]{-1}$

$= -25 \div (-1)$

$= 25$

5.3 $\sqrt{3^2 + 3^1 + 3^0 + 3^{-1} + 3^{-2}}$

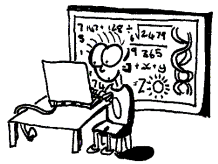
$= \sqrt{9 + 3 + 1 + \dfrac{1}{3} + \dfrac{1}{9}}$

$= \sqrt{\dfrac{13}{1} + \dfrac{1}{3} + \dfrac{1}{9}}$

$= \sqrt{\dfrac{117+3+1}{9}}$

$= \sqrt{\dfrac{121}{9}}$

$= \dfrac{11}{3}$



5.4 $\sqrt[3]{27} - \sqrt{49} + 4$

$= 3 - 7 + 4$

$= 0$

5.5 $\sqrt{9+16}$

$= \sqrt{25}$

$= 5$

5.6 $\sqrt{\dfrac{18}{2}} - (-2)^3$

$= \sqrt{9} - (-8)$

$= 3 + 8$

$= 11$

5.7 $\sqrt[3]{\dfrac{27}{8}} + \sqrt{2\dfrac{1}{4}}$

$= \dfrac{3}{2} + \sqrt{\dfrac{9}{4}}$

$= \dfrac{3}{2} + \dfrac{3}{2}$

$= \dfrac{6}{2}$

$= 3$

5.8 $\sqrt{36x^{36} + 64x^{36}}$ . . . *Tel eers op (gelyks. terme)!*

$= \sqrt{100x^{36}}$

$= 10x^{18}$ . . .

$10 \times 10 = 100$

$\therefore \sqrt{100} = 10$

& $x^{18} \times x^{18} = x^{18+18} = x^{36}$

$\therefore \sqrt{x^{36}} = x^{18}$

5.9 $\sqrt{9x^{10} + 16x^{10}}$

$= \sqrt{25x^{10}}$

$= 5x^5$

5.10 $\sqrt{144a^6b^{10}}.(-2ab^2)$

$= (12a^3b^5)(-2ab^2)$

$= -24a^4b^7$

5.11 $\sqrt{9(a+2b)^2x^4}$

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

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

$= 3ax^2 + 6bx^2$

5.12 $\sqrt{169x^{14}y^{22}}$

$= 13x^7y^{11}$ . . .

$13 \times 13 = 169$;

$x^7 \times x^7 = x^{14}$;

$y^{11} \times y^{11} = y^{22}$

5.13

$$\sqrt{\frac{4a^3}{a^9}}$$

$$= \sqrt{\frac{4}{a^6}}$$

$$= \frac{2}{a^3}$$

5.14

$$\left(\frac{5x^{-1}}{2}\right)^{-1} \cdot \sqrt{25x^4y^{-2}}$$

$$= \left(\frac{5}{2x}\right)^{-1}(5x^2y^{-1})$$

$$= \left(\frac{2x}{5}\right)\left(\frac{5x^2}{y}\right)$$

$$= \frac{2x^3}{y}$$

5.15

$$\sqrt{\frac{(ab^2)^3}{a(-4c)^2}}$$

$$= \sqrt{\frac{a^3b^6}{a(16c^2)}}$$

$$= \sqrt{\frac{a^2b^6}{16c^2}}$$

$$= \frac{ab^3}{4c} \quad \ldots$$

$a \times a = a^2$; $b^3 \times b^3 = b^6$; $4 \times 4 = 16$; $c \times c = c^2$

5.16

$$\frac{(3x^5y^{-3})^2}{-6y^5} \times \frac{2x^{-4}}{x^0} \quad \ldots$$

$$= \frac{3^2x^{10}y^{-6}}{-6y^5} \times \frac{2x^{-4}}{x^0}$$

$$= \frac{3^2x^{10}y^{-6}}{-6y^5} \times \frac{2x^{-4}}{1}$$

$$= \frac{{}^{3}\cancel{9}x^{10^{6}}}{{}_{1}\cancel{2}\cancel{6}y^5y^6} \times \frac{\cancel{2}^{1}}{x^4}$$

$$= -\frac{3x^6}{y^{11}}$$

$x^0 = 1$;

$x^{-4} = \frac{1}{x^4}$;

$y^{-6} = \frac{1}{y^6}$

5.17

$$\frac{2xy^2}{3m} \div \frac{4y^2}{9xm}$$

$$= \frac{{}^{1}\cancel{2}x\cancel{y^2}}{{}_{1}\cancel{3}\cancel{m}} \times \frac{{}^{3}\cancel{9}x\cancel{m}}{{}_{2}\cancel{4}\cancel{y^2}}$$

$$= \frac{3x^2}{2}$$

5.18

$$\frac{3x}{y^2z^3} \div \frac{9x^2}{2yz^4}$$

$$= \frac{{}^{1}\cancel{3}x}{y^2z^3} \times \frac{2yz^4}{{}_{3}\cancel{9}x^2}$$

$$= \frac{2z^{4-3}}{3x^{2-1}y^{2-1}} \quad \ldots$$

$$= \frac{2z}{3xy}$$

Dit kan gedoen word deur die wette te gebruik, of uit te kanselleer

5.19

$$\frac{(2ac^2)^4}{4a^4} \times \frac{(a^2b^3)^2}{(b^2c)^3}$$

$$= \frac{{}^{4}16\cancel{a^4}c^{8^{5}}}{{}_{1}\cancel{4}\cancel{a^4}} \times \frac{a^4b^6}{b^6c^3}$$

$$= 4a^4c^5$$

5.20

$$\frac{(2a^2b^3)^4 \times (8ab^{-2})^2}{4ab^5 \times 12a^9b^7}$$

$$= \frac{2^4a^8b^{12} \times 8^2a^2b^{-4}}{48a^{10}b^{12}}$$

$$= \frac{1\,024a^{10}b^8}{48a^{10}b^{12}}$$

$$= \frac{64}{3b^4}$$

5.21

$$\frac{(5x^{-3}y)^2}{4xy \times (x^2y)^2} \div \left(\frac{5xy}{2}\right)^2$$

$$= \frac{25x^{-6}y^2}{4xy \times x^4y^2} \div \frac{25x^2y^2}{4}$$

$$= \frac{\cancel{25}x^{-6}\cancel{y^2}}{\cancel{4}x^5\cancel{y^3}} \times \frac{\cancel{4}}{\cancel{25}x^2\cancel{y^2}}$$

$$= \frac{1}{x^{5+2+6} \cdot y^{3+2-2}}$$

$$= \frac{1}{x^{13}y^3}$$

5.22

$$\frac{xy^3}{x^2} \div \frac{x^3y}{x^4} \times \frac{x^0}{x^2y}$$

$$= \frac{y^3}{x} \div \frac{y}{x} \times \frac{1}{x^2y} \quad \ldots$$

$$= \frac{y^3}{x} \times \frac{x}{y} \times \frac{1}{x^2y}$$

$$= \frac{xy^3}{x^3y^2}$$

$$= \frac{y}{x^2}$$

Vereenvoudig eers elke breuk.

5.23

$$\frac{x^2y^3}{x^4} \times \frac{x^3y^4}{y^7} \div \frac{x^2}{x^3}$$

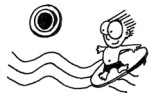
$$= \frac{y^3}{x^2} \times \frac{x^3}{y^3} \div \frac{1}{x} \quad \ldots$$

$$= \frac{y^3}{x^2} \times \frac{x^3}{y^3} \times \frac{x}{1}$$

$$= \frac{x^4y^3}{x^2y^3}$$

$$= x^2$$

Vereenvoudig eers elke breuk.



5.24

$$\frac{x^4y}{y^0} \div \frac{xy^3}{x^2} \div \frac{x^2y^3}{x^{-3}y^4}$$

$$= \frac{x^4y}{1} \div \frac{y^3}{x} \div \frac{x^5}{y} \quad \ldots$$

$$= \frac{x^4y}{1} \times \frac{x}{y^3} \times \frac{y}{x^5}$$

$$= \frac{x^5y^2}{x^5y^3}$$

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

Vereenvoudig eers elke breuk.

5.25

$$\frac{\sqrt{49a^6b^{-2}} \cdot (3a^2b^{-1})^{-2}}{2a^0b^{-3}}$$

$$= \frac{7a^3b^{-1} \cdot 3^{-2}a^{-4}b^2}{2a^0b^{-3}}$$

$$= \frac{7b^{-1+2+3}}{9 \times 2a^{0-3+4}}$$

$$= \frac{7b^4}{18a}$$

OF

$$\frac{\sqrt{49a^6b^{-2}} \cdot (3a^2b^{-1})^{-2}}{2a^0b^{-3}}$$

$$= \frac{7a^3b^{-1}}{(3a^2b^{-1})^2 \times 2a^0b^{-3}}$$

$$= \frac{7a^3b^{-1}}{9a^4b^{-2} \times 2(1)b^{-3}}$$

$$= \frac{7b^{-1+2+3}}{18a^{4-3}}$$

$$= \frac{7b^4}{18a}$$

6.1

$$\left(\frac{1}{7}\right)^{-7} = 7^7 = 823543$$

$$7^{\frac{10}{7}} = 16{,}11695207\ldots$$

$$\sqrt[7]{777777} = 6{,}943056958\ldots$$

$$777{,}777^{\frac{1}{7}} = 2{,}588089552\ldots$$

$$0{,}7^{-0{,}7} = 1{,}283604917\ldots$$

$\therefore \left(\frac{1}{7}\right)^{-7}$ is die grootste waarde.

6.2 $2^{-5} = \frac{1}{2^5} = \frac{1}{32}$ & $5^{-2} = \frac{1}{5^2} = \frac{1}{25}$

$\frac{1}{32} < \frac{1}{25}$ ... *As breuke se tellers gelyk is, word die breuk al kleiner, hoe groter sy noemer is.*

$\therefore$ 5^{-2} is groter

7.1 $\pi \times \sqrt[5]{237} = 9{,}377\,769\,242 \approx 9{,}378$

7.2 $\left(\frac{1}{7}\right)^{-7} \times 0{,}135 = 111\,178{,}305$

8. $32 = 2^5$ & $2 = 2^1 = 2^{2 \times \frac{1}{2}} = (2^2)^{\frac{1}{2}} = 4^{\frac{1}{2}}$

$a^{mn} = (a^m)^n$ & $2 \times \frac{1}{2} = 1$

$\therefore 32 = (4^{\frac{1}{2}})^5$

$= 4^{\frac{5}{2}}$ ...

$(a^m)^n = a^{mn}$ & $\frac{1}{2} \times 5 = \frac{1}{2} \times \frac{5}{1} = \frac{5}{2}$

9.1 D ... *daar is geen gemene faktore om te kanselleer nie.*

9.2 A ... $\sqrt{36} = 6$ & $\sqrt{x^{16}} = x^8$

9.3 A ... $\sqrt{64} = 8$ *want* $8 \times 8 = 64$

$\sqrt{a^{16}} = a^8$ *want* $a^8 \times a^8 = a^{16}$

$\sqrt{b^{36}} = b^{18}$ *want* $b^{18} \times b^{18} = b^{36}$

En ook, $\sqrt{\frac{x}{y}} = \frac{\sqrt{x}}{\sqrt{y}}$

9.4 B ... $-p^2 = -\left(-\frac{1}{2}\right)^2 = -\left(\frac{1}{4}\right) = -\frac{1}{4}$

9.5 D ... $a^{-1} = \frac{1}{a}$ *en* $b^{-1} = \frac{1}{b}$

10.1 $x^2 + x^2 = 2x^2$ 10.2 $\frac{1}{6x^{-2}} = \frac{x^2}{6}$

Uitdrukking	W/V	Korrekte oplossing/ Verduideliking
11.1 $2a^{-3} = \frac{1}{2a^3}$	V	$2a^{-3} = \frac{2}{a^3}$
11.2 $(-1)^5 = -1$	W	... *die produk van 'n onewe getal negatiewes is* -
11.3 $(2ab^3)^3 = 6a^3b^9$	V	$(2ab^3)^3 = 2^3a^3b^9 = 8a^3b^9$
11.4 $a^0 = 0$	V	$a^0 = 1$
11.5 $2^{-1} = -2$	V	$2^{-1} = \frac{1}{2}$
11.6 $a^{-3}a^2 = \frac{1}{a}$	W	... $a^{-3}a^2 = a^{-3+2} = a^{-1} = \frac{1}{a}$
11.7 $\left(\frac{3}{4}\right)^{-1} = \frac{4}{3}$	W	... $\left(\frac{3}{4}\right)^{-1} = \frac{1}{\frac{3}{4}} = 1 \div \frac{3}{4}$ $= 1 \times \frac{4}{3} = \frac{4}{3}$
11.8 $\frac{a^3b^5}{ab^7} = \left(\frac{a}{b}\right)^2$	W	... $\frac{a^3b^5}{ab^7} = \frac{a^{3-1}}{b^{7-5}} = \frac{a^2}{b^2} = \left(\frac{a}{b}\right)^2$
11.9 $2^3 \times 2^4 = 4^7$	V	$2^3 \times 2^4 = 2^{3+4} = 2^7$
11.10 $5^2 \div 5^5 = \frac{1}{5^3}$	W	... $5^2 \div 5^5 = 5^{2-5} = 5^{-3} = \frac{1}{5^3}$

Substitusie

12.1 $a \times b^c$

$= (3)(2)^{-1}$

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

$= \frac{3}{2}$

12.2 $(ab)^c$

$= ([(1)(5)]^{-2}$

$= 5^{-2}$

$= \frac{1}{5^2}$

$= \frac{1}{25}$

12.3 $a^b + b^c$

$= (2)^{-1} + (-1)^3$

$= \frac{1}{2} - 1$

$= -\frac{1}{2}$

Eksponensiële Vergelykings

13.1 $2^x = 2^3$

$\therefore x = 3$

13.2 $5^{x-1} = 5^2$

$\therefore x - 1 = 2$

$\therefore x = 3$

13.3 $3^{2x} = 3^6$

$2x = 6$

$\therefore x = 3$

Wanneer jy aan albei kante dieselfde grondtal het, kan jy aanneem die eksponente is gelyk.

13.4 $3^x = 9$

$3^x = 3^2$

$\therefore x = 2$

13.5 $8^x = 64$

$8^x = 8^2$

$\therefore x = 2$

OF

$8^x = 64$

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

$2^{3x} = 2^6$

$3x = 6$

$\therefore x = 2$

13.6 $2^x = \frac{1}{4}$

$2^x = 2^{-2}$

$\therefore x = -2$

13.7 $7^x = 1$

$\therefore x = 0$ ...

Wet 5: $a^0 = 1$; $a \neq 0$

13.8 $5^{2x} = 5$

$\therefore 2x = 1$

$\therefore x = \frac{1}{2}$

13.9 $11^x = 121$

$11^x = 11^2$

$\therefore x = 2$

13.10 $7^x = 49$

$7^x = 7^2$

$\therefore x = 2$

13.11 $3^{x-2} = 81$

$3^{x-2} = 3^4$

$x - 2 = 4$

$\therefore x = 6$

13.12 $10^x = 0,1$ ... $0,1 = \frac{1}{10} = 10^{-1}$

$10^x = 10^{-1}$

$\therefore x = -1$

13.13 $\left(\frac{1}{3}\right)^x = 3$

$(3^{-1})^x = 3^1$

$3^{-x} = 3^1$

$-x = 1$

$\therefore x = -1$

13.14 $9^x = 27$

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

$3^{2x} = 3^3$

$2x = 3$

$\therefore x = \frac{3}{2}$

13.15 $2^x = 0,125$ ... $0,125 = \frac{125}{1\,000} = \frac{1}{8}$

$2^x = \frac{1}{8}$

$2^x = 2^{-3}$

$\therefore x = -3$

13.16 $5^x = 0,04$ ... $0,04 = \frac{4}{100} = \frac{1}{25}$

$5^x = \frac{1}{25}$

$5^x = 5^{-2}$

$\therefore x = -2$

13.17 $3^{2x+1} = 3^{x+3}$

$2x + 1 = x + 3$

$2x - x = 3 - 1$

$\therefore x = 2$

13.18 $2^x.2^3 = 32$

$2^{x+3} = 2^5$

$x + 3 = 5$

$\therefore x = 2$

13.19 $(4^x)^2 = 64$

$4^{2x} = 4^3$

$2x = 3$

$\therefore x = \frac{3}{2}$

13.20 $\frac{5^x}{5^2} = 125$

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

$x - 2 = 3$

$\therefore x = 5$

13.21 $8^{x+1} = \frac{1}{8}$

$\therefore 8^{x+1} = 8^{-1}$

$\therefore x + 1 = -1$

$\therefore x = -2$

13.22 $7^{x-2} = 1$

$x - 2 = 0$ ... **Wet 5: $a^0 = 1$; $a \neq 0$**

$\therefore x = 2$

13.23 $9^{x-2} = 81$

$9^{x-2} = 9^2$

$x - 2 = 2$

$\therefore x = 4$

OF $9^{x-2} = 81$

$(3^2)^{x-2} = 81$

$3^{2x-4} = 3^4$

$2x - 4 = 4$

$2x = 8$

$x = \frac{8}{2}$

$x = 4$

13.24 $x^3 = -8$

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

$\therefore x = -2$

13.25 $2x^3 = 54$

$x^3 = 27$

$x^3 = 3^3$

$\therefore x = 3$

13.26 $x = \sqrt[3]{27}$

$\therefore x = 3$ ... $3 \times 3 \times 3 = 27$

13.27 $x^{-1} = \frac{1}{2}$ ... $\frac{1}{2} = 2^{-1}$ $\therefore x^{-1} = 2^{-1}$

$\therefore x = 2$

13.28 $x^{-2} = \frac{4}{9}$ **OF** $x^{-2} = \frac{4}{9}$

$x^2 = \frac{9}{4}$ $x^{-2} = \frac{2^2}{3^2}$

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

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

$x = \frac{3}{2}$ $x = \frac{3}{2}$

14. $(P^x)^3 = P^2 \cdot P^4$

$P^{3x} = P^{2+4}$

$P^{3x} = P^6$

$3x = 6$

$\therefore x = 2$

15. $2^x + 3^y = 41$

$2^5 + 3^2 = 41$

$\therefore$ die bewering is waar vir $x = 5$ en $y = 2$

$\therefore xy = (5)(2) = 10$

... $41 - 3^2 = 41 - 9$

$= 32$ *wat* 2^5 *is.*

$41 - 3^1 = 41 - 3 = 38$;
$41 - 3^3 = 41 - 27 = 14$
waarvan nie een magte van 2 is nie.

16. If $x = 3$ en $y = -2$:

16.1 $y^2 \square x^2$

$(-2)^2 \square (3)^2$

$4 < 9$

$\therefore y^2 < x^2$ as $x = 3$ en $y = -2$

16.2 $(3^x)^3 \square (y^2)^2$

$[3^{(3)}]^3 \square [(-2)^2]^2$

$3^9 > 4^2$ ... $3^9 = 52\,488$ & $4^2 = 16$

$\therefore (3^x)^3 > (y^2)^2$ as $x = 3$ en $y = -2$

16.3 $(x.y)^4 \square (4)^{xy}$

$[(3)(-2)]^4 \square (4)^{(3)(-2)}$

$(-6)^4 > 4^{-6}$ ... $(-6)^4 = 1\,296$ & $4^{-6} = \frac{1}{4^6} = \frac{1}{4\,096}$

$\therefore (xy)^4 > (4)^{xy}$ as $x = 3$ en $y = -2$

NOTAS