Aufgaben zu den Binomischen Formeln

Lösungen

Anwendung der Binomischen Formeln (Teil 1)

a) $(3+b)^2 = 9+6b+b^2$

b) $(4x+2)^2 = 16x^2+16x+4$

c) $(5x+2y)^2 = 25x^2+20xy+4y^2$

d) $(2x-3y)^2 = 4x^2-12xy+9y^2$

e) $(9n-m)^2 = 81n^2-18nm+m^2$

f) $(-2b+3a)^2 = 4b^2-12ba+9a^2$

g) $(2+b)(2-b) = 4-b^2$

h) $(a+3)(a-3) = a^2-9$

i) $(2n+4m)(2n-4m) = 4n^2-16m^2$

j) $(6a-2b)(6a+2b) = 36a^2-4b^2$

k) $(-2a-3b)(-2a+3b) = 4a^2-9b^2$

l) $\left(\frac{1}{2}a+b\right)^2 = \frac{1}{4}a^2+ab+b^2$

m) $\left(\frac{2}{3}a+\frac{3}{2}b\right)^2 = \frac{4}{9}a^2+2ab+\frac{9}{4}b^2$

n) $\left(\frac{1}{2}a-\frac{1}{2}b\right)^2 = \frac{1}{4}a^2-\frac{1}{2}ab+\frac{1}{4}b^2$

o) $\left(-\frac{2}{5}a-\frac{3}{4}b\right)^2 = \frac{4}{25}a^2+\frac{3}{5}ab+\frac{9}{16}b^2$

Anwendung der Binomischen Formeln (Teil 2)

a) $16x^2+8xy+y^2 = (4x+y)^2$

b) $4n^2+8nm+4m^2 = (2n+2m)^2$

c) $36n^2+36nm+9m^2 = (6n+3m)^2$

d) $4x^2-12xy+9y^2 = (2x-3y)^2$

e) $49p^2-28pq+4q^2 = (7p-2q)^2$

f) $49p^2-4q^2 = (7p+2q)(7p-2q)$

g) $9b^2-25a^2 = (3b+5a)(3b-5a)$

h) $\frac{1}{9}c^2+\frac{2}{15}cd+\frac{1}{25}d^2 = \left(\frac{1}{3}c+\frac{1}{5}d\right)^2$

i) $\frac{1}{16}c^2-\frac{1}{3}cd+\frac{4}{9}d^2 = \left(\frac{1}{4}c-\frac{2}{3}d\right)^2$

j) $\frac{4}{25}x^2-\frac{1}{9}y^2 = \left(\frac{2}{5}x+\frac{1}{3}y\right)\left(\frac{2}{5}x-\frac{1}{3}y\right)$

k) $\frac{1}{16}m^2-\frac{1}{4}n^2 = \left(\frac{1}{4}m+\frac{1}{2}n\right)\left(\frac{1}{4}m-\frac{1}{2}n\right)$

Ergänzung

a) $(m+\underline{5n})^2 = m^2+10mn+25n^2$

b) $(3m+\underline{7n})^2 = \underline{9m^2}+42mn+49n^2$

c) $(\underline{a}+6b)^2 = \underline{a^2}+12ab+36b^2$

d) $(\underline{2x}+8y)^2 = \underline{4x^2}+32xy+\underline{64y^2}$

e) $(\underline{3n}-6m)^2 = 9n^2-\underline{36nm}+\underline{36m^2}$

f) $(\underline{4x}+6y)(\underline{4x}-\underline{6y}) = 16x^2-\underline{36y^2}$

g) $(-\underline{2x}+5y)(-\underline{2x}-\underline{5y}) = 4x^2-\underline{25y^2}$

h) $(x+\underline{7y})(\underline{x}-\underline{7y}) = \underline{x^2}-49y^2$

i) $\left(\frac{1}{2}b+\underline{\frac{7}{3}a}\right)^2 = \frac{1}{4}b^2+\frac{7}{3}ba+\underline{\frac{49}{9}a^2}$

j) $\left(\underline{\frac{2}{5}m}+\underline{\frac{3}{5}n}\right)^2 = \frac{4}{25}m^2+\frac{12}{25}mn+\underline{\frac{9}{25}n^2}$

Binomische Formel anwenden oder nicht?

a) $(2m+5n)(2m-5n)$ *Ja*

b) $16a^2+54ab+49b^2$ *Nein*

$(16a^2+56ab+49b^2)$

c) $\frac{1}{9}w^2+\frac{4}{15}wv+\frac{4}{25}v^2$ *Ja*

d) $4q^2+2qp+4p^2$ *Nein*

$\left(\frac{1}{4}q^2+2qp+4p^2\right)$

e) $\frac{36}{4}q^2+\frac{20}{3}qp+\frac{16}{9}p^2$ *Nein*

$\left(\frac{25}{4}q^2+\frac{20}{3}qp+\frac{16}{9}p^2\right)$

f) $\frac{9}{16}m^2+2mk+\frac{16}{9}k^2$ *Ja*

g) $\frac{4}{49}w^2+\frac{12}{25}wv+\frac{9}{25}v^2$ *Nein*

$\left(\frac{4}{49}w^2+\frac{12}{35}wv+\frac{9}{25}v^2\right)$

Terme vereinfachen

a) $\frac{a+b}{a^2+2ab+b^2}=\frac{a+b}{(a+b)^2}=\frac{(a+b)}{(a+b)\cdot(a+b)}=\frac{1}{(a+b)}$

b) $\frac{a^2-b^2}{a+b}=\frac{(a+b)\cdot(a-b)}{(a+b)}=a-b$

c) $\frac{1}{x+y}+\frac{1}{x-y}=\frac{(x-y)}{(x+y)(x-y)}+\frac{(x+y)}{(x+y)(x-y)}=\frac{x-y+x+y}{x^2-y^2}=\frac{2x}{x^2-y^2}$

d) $\frac{a-b}{a+b}+\frac{a+b}{a-b}=\frac{(a-b)^2}{(a+b)\cdot(a-b)}+\frac{(a+b)^2}{(a+b)\cdot(a-b)}=\frac{(a-b)^2+(a+b)^2}{(a+b)\cdot(a-b)}=\frac{a^2-2ab+b^2+a^2+2ab+b^2}{a^2-b^2}$
$=\frac{2(a^2+b^2)}{a^2-b^2}$