Name:

2.3 Termumformung 2

1	$j^2 + 13j + 40$	=	$(j + 5)(j + 8)$
2	$y^2 + 8y + 12$	=	$(y+2)(y+6)$
3	$i^2 + 13i + 40$	=	$(i+5)(i+8)$
4	$k^2 + 9k + 20$	=	$(k+4)(k+5)$
5	$u^2 + 14u + 48$	=	$(u+6)(u+8)$
6	$j^2 + 14j + 45$	=	$(j+9)(j+5)$
7	$u^2 + 10u + 21$	=	$(u+7)(u+3)$
8	$r^2 + 10r + 21$	=	$(r+7)(r+3)$
9	$h^2 + 5h + 6$	=	$(h+2)(h+3)$
10	$d^2 + 14d + 45$	=	$(d+9)(d+5)$
11	$u^2 + 17u + 72$	=	$(u+9)(u+8)$
12	$w^2 + 15w + 56$	=	$(w+7)(w+8)$
13	$k^2 + 9k + 8$	=	$(k+8)(k+1)$
14	$e^2 + 8e + 16$	=	$(e+4)(e+4)$
15	$x^2 + 13x + 42$	=	$(x+6)(x+7)$
16	$i^2 + 12i + 35$	=	$(i+7)(i+5)$
17	$b^2 + 6b + 5$	=	$(b+5)(b+1)$
18	$a^2 + 11a + 30$	=	$(a+6)(a+5)$
19	$t^2 + 7t + 12$	=	$(t+3)(t+4)$
20	$c^2 + 7c + 12$	=	$(c+4)(c+3)$
21	$z^2 + 7z + 6$	=	$(z+6)(z+1)$
22	$b^2 + 8b + 16$	=	$(b+4)(b+4)$
23	$a^2 + 16a + 64$	=	$(a+8)^2$
24	$g^2 + 12g + 35$	=	$(g+7)(g+5)$
25	$b^2 + 6b + 9$	=	$(b+3)^2$

2.4 Gleichungen 1

Löse die Gleichung.

		Lösung
1	$(x + 20)(x + 5) = (x + 11)(x + 11)$	$x = \cancel{-19}$ 3
2	$(x + 6)(x + 6) = x(x + 18)$	$x = -18$
3	$x^2 + 16x + 7 = (x + 11)^2$	$x = \cancel{-16}$ 4
4	$(x + 16)(x + 12) = x(x + 2) + 14x$	$x = \cancel{-2}$ 10
5	$(x + 4)^2 = x(x + 15) + 2$	$x = \cancel{2}$ 6
6	$14x + (x + 9)(x + 10) = (x + 12)^2$	$x = \cancel{2}$ 7
7	$15x + x(x + 8) = (x + 3)(x + 8)$	$x = 4$ 8
8	$11x + x(x + 5) = (x + 6)(x + 4)$	$x = 6$ 2
9	$(x + 7)(x + 18) = 3x + x(x + 15)$	$x = \cancel{6}$ 6
10	$(x + 5)(x + 5) = (x + 11)(x + 3)$	$x = \cancel{7}$ 1

☒

4.1 Termumformung 3

Schreibe den Term ohne Klammern und vereinfache so weit wie möglich.

1	$(n-8)(n-2)$	$= n^2 - 10n + 16$
2	$(4-q)^2$	$= 16 - 8q + q^2$
3	$(8e-7f)(3e-7f)$	$= 24e^2 - 77ef + 49f^2$
4	$(v-1)^2$	$= v^2 - 2v + 1$
5	$(v-5)(3-v)$	$= -v^2 + 8v - 15$
6	$(4-a)^2$	$= 16 - 8a + a^2$
7	$(i-5)(i+4)$	$= i^2 - i - 20$
8	$(1-f)^2$	$= 1 - 2f + f^2$
9	$(4m-5n)(m+5n)$	$= 4m^2 + 15mn - 25n^2$
10	$(5t-5)(7t+2)$	$= 35t^2 - 25t - 10$
11	$(5-b)^2$	$= 25 - 10b + b^2$
12	$(x+4)(x-7)$	$= x^2 - 3x - 28$
13	$(d-8)(7-d)$	$= -d^2 + 15d - 56$
14	$(2-y)^2$	$= 4 - 4y + y^2$
15	$(4e-9)^2$	$= 16e^2 - 72e + 81$
16	$(z+5)(2-z)$	$= -z^2 - 3z + 10$
17	$(2m-2n)(3m+7n)$ ~~7n)~~	$= 6m^2 + 8mn - 14n^2$
18	$(g-5)(h+9)$	$= gh + 9g - 5h - 45$
19	$(a+2)(4-a)$	$= -a^2 + 2a + 8$
20	$(6w-3x)(3w+7)$	$= 18w^2 + 42w - 9xw - 21x$
21	$(e+2)(e-7)$	$= e^2 - 5e - 14$
22	$(3-n)^2$	$= 9 - 6n + n^2$
23	$(8d+8e)(5d-7)$	$= 40d^2 - 56d + 40ed - 56e$
24	$(4-m)(m-3)$	$= 7m - 12 - m^2$

4.4 Termumformung 4

1	$h^2 - 7h + 12$	$= (h-3)(h-4)$
2	$r^2 + 6r - 7$	$= (r-1)(r+7)$
3	$r^2 + 3r - 28$	$= (r-4)(r+7)$
4	$s^2 + 5s + 6$	$= (s+2)(s+3)$
5	$t^2 - 3t - 28$	$= (t-7)(t+4)$
6	$c^2 + 15c + 56$	$= (c+8)(c+7)$
7	$y^2 - 2y - 24$	$= (y-6)(y+4)$
8	$u^2 + 8u + 15$	$= (u+5)(u+3)$
9	$c^2 + 2c - 24$	$= (c-4)(c+6)$
10	$v^2 + 5v + 6$	$= (v+2)(v+3)$
11	$a^2 - 2a - 35$	$= (a-7)(a+5)$
12	$e^2 - 4e - 5$	$= (e-5)(e+1)$
13	$p^2 - 6p + 9$	$= (p-3)(p-3)$
14	$t^2 + 5t - 14$	$= (t-2)(t+7)$
15	$q^2 - 12q + 35$	$= (q-7)(q-5)$
16	$m^2 - 16m + 64$	$= (m-8)(m-8)$
17	$a^2 + 2a + 1$	$= (a+1)(a+1)$
18	$x^2 + 13x + 40$	$= (x+8)(x+5)$
19	$f^2 - 2f - 63$	$= (f-9)(f+7)$
20	$g^2 - 3g - 10$	$= (g-5)(g+2)$
21	$d^2 + 14d + 48$	$= (d+12)(d+2)$
22	$h^2 + 9h + 14$	$= (h+2)(h+7)$

4.5 Gleichungen 2

Löse die Gleichung.

		Lösung	
1	$(x+2)(x-20)=x^2-4$	x = ~~-16~~	9
2	$(x+6)(x-3)=(5-x)^2-17$	x = -14	10
3	$(x+10)(x-9)=(x+10)^2+19(x+8)$	x = -9	3
4	$9x+(x-4)(x-1)=(4-x)^2$	x = -9	
5	$x(x+9)=(x+20)(x+9)$	x = ~~-9~~	6
6	$(x-6)(x+6)=x(x+3)-9$	x = ~~-2~~	1
7	$-18x+(x+20)(x+8)=(x+10)^2$	x = 1	4
8	$(x-3)^2-18(x-14)=(x-1)(x-9)$	x = 2	2
9	$(x-12)(x-8)=x(x-14)-12x$	x = ~~6~~	7
10	$(5-x)^2=7x+(x-13)(x-3)$	x = ~~18~~	8

5) $x = \underline{\underline{-20}}$

5.2 Termumformung

Faktorisiere den Term.

1	$25h^2-361$	=	$(25h+19)(25h-19)$
2	$576-q^2$	=	$(24-q)(24+q)$
3	$484-y^2$	=	$(22-y)(22+y)$
4	$144-121e^2$	=	$(12-11e)(12+11e)$
5	$49-25k^2$	=	$(7-5k)(7+5k)$
6	$49-256n^2$	=	$(7-16n)(7+16n)$
7	k^2-64	=	$(k-8)(k+8)$
8	$361w^2-16$	=	$(19w-4)(19w+4)$
9	$9-n^2$	=	$(3-n)(3+n)$
10	$484-i^2$	=	$(22-i)(22+i)$
11	r^2-576	=	$(r-24)(r+24)$
12	$100-q^2$	=	$(10-q)(10+q)$
13	$484-25z^2$	=	$(22-5z)(22+5z)$
14	$25-t^2$	=	$(5-t)(5+t)$
15	c^2-64	=	$(c-8)(c+8)$
16	b^2-225	=	$(b-15)(b+15)$
17	$289m^2-196$	=	$(17m-14)(17m+14)$
18	$169-h^2$	=	$(13-h)(13+h)$
19	$529-361a^2$	=	$(23-19a)(23+19a)$
20	$121f^2-441$	=	$(11f-21)(11f+21)$
21	$256d^2-324$	=	$(16d-18)(16d+18)$

2.4

1) $(x+20)(x+5) = (x+11)(x+11)$ TU

$x^2+25x+100 = x^2+22x+121$ $\mid -x^2$

$25x+100 = 22x+121$ $\mid -22x$

$3x+100 = 121$ $\mid -100$

$3x = 21$ $\mid :3$

$x = 7$

3) $x^2+16x+7 = (x+11)^2$ TU

$x^2+16x+7 = x^2+22x+121$ $\mid -x^2$

$16x+7 = 22x+121$ $\mid -16x$

$7 = 6x+121$ $\mid -121$

$-114 = 6x$ $\mid :6$

$-19 = x$

5) $(x+4)^2 = x(x+15)+2$ TU

$x^2+8x+16 = x^2+15x+2$ $-x^2$

$8x+16 = 15x+2$ $-8x$

$16 = 7x+2$ -2

$14 = 7x$ $:7$

$2 = x$

2.4) 7) $15x + x(x+8) = (x+3)(x+8)$ TU

$15x + x^2 + 8x = x^2 + 11x + 24$ $-x^2$

$23x = 11x + 24$ $-11x$

$12x = 24$ $:12$

$x = \underline{\underline{2}}$

9) $(x+7)(x+18) = 3x + x(x+15)$ TU

$x^2 + 25x + 126 = 3x + x^2 + 15x$ $-x^2$

$25x + 126 = 18x$ $-18x$

$7x + 126 = 0$ -126

$7x = -126$ $:7$

$x = \underline{\underline{-19}}$

2) $(x+6)(x+6) = x(x+18)$ TU

$x^2 + 12x + 36 = x^2 + 18x$ $-x^2$

$12x + 36 = 18x$ $-12x$

$36 = 6x$ $:6$

$\underline{\underline{6}} = x$

4) $(x+16)(x+12) = x(x+2) + 14x$ TU

$x^2 + 28x + 192 = x^2 + 2x + 14x$ $-x^2$

$28x + 192 = 16x$ $-16x$

$12x + 192 = 0$ -192

$12x = -192$ $:12$

$x = \underline{\underline{-16}}$

2.4/

6) $14x + (x+9)(x+10) = (x+12)^2$ TU

$14x + x^2 + 19x + 90 = x^2 + 24x + 144$ $-x^2$

$33x + 90 = 24x + 144$ $-24x$

$9x + 90 = 144$ -90

$9x = 54$ $:9$

$x = 6$

8) $11x + x(x+5) = (x+6)(x+4)$ TU

$11x + x^2 + 5x = x^2 + 10x + 24$ $-x^2$

$16x = 10x + 24$ $-10x$

$6x = 24$ $:6$

$x = 4$

10) $(x+5)(x+5) = (x+11)(x+3)$ TU

$x^2 + 10x + 25 = x^2 + 14x + 33$ $-x^2$

$10x + 25 = 14x + 33$ $-10x$

$25 = 4x + 33$ -33

$-8 = 4x$ $:4$

$-2 = x$

4.5

1) $(x+2)(x-20) = x^2 - 4$ TU

$x^2 - 18x - 40 = x^2 - 4$ $-x^2$

$-18x - 40 = -4$ $+18x$

$-40 = -4 + 18x$ $+4$

$-36 = 18x$ $:18$

$\underline{\underline{-2}} = x$

3) $(x+10)(x-9) = (x+10)^2 + 19(x+8)$ TU

$x^2 + x - 90 = x^2 + 20x + 100 + 19x + 152$ TU

$x^2 + x - 90 = x^2 + 39x + 252$ $-x^2$

$x - 90 = 39x + 252$ $-x$

$-90 = 38x + 252$ -252

$-342 = 38x$ $:38$

$\underline{\underline{-9}} = x$

5) $x(x+9) = (x+20)(x+9)$ TU

$x^2 + 9x = x^2 + 29x + 180$ $-x^2$

$9x = 29x + 180$ $-9x$

$0 = 20x + 180$ -180

$-180 = 20x$ $:20$

$\underline{\underline{-20}} = x$

4.5 / 7)

$$-18x + (x+20)(x+8) = (x+10)^2 \quad \text{TU}$$
$$-18x + x^2 + 28x + 160 = x^2 + 20x + 100 \quad \text{TU}$$
$$10x + x^2 + 160 = x^2 + 20x + 100 \quad -x^2$$
$$10x + 160 = 20x + 100 \quad -10x$$
$$160 = 10x + 100 \quad -100$$
$$60 = 10x \quad :10$$
$$\underline{\underline{6}} = x$$

9) $$(x-12)(x-8) = x(x-14) - 12x \quad \text{TU}$$
$$x^2 - 20x + 96 = x^2 - 14x - 12x \quad -x^2$$
$$-20x + 96 = -26x \quad +20x$$
$$96 = -6x \quad :-6$$
$$\underline{-16} = x$$

2) $$(x+6)(x-3) = (5-x)^2 - 17 \quad \text{TU}$$
$$x^2 + 3x - 18 = 25 - 10x + x^2 - 17 \quad -x^2$$
$$3x - 18 = 25 - 10x - 17 \quad +10x$$
$$13x - 18 = 25 - 17 \quad +18$$
$$13x = 26 \quad :13$$
$$x = \underline{2}$$

4.5) 4) $9x + (x-4)(x-1) = (4-x)^2$ TU

$9x + x^2 - 5x + 4 = 16 - 8x + x^2$ $-x^2$

$4x + 4 = -8x + 16$ $+8x$

$12x + 4 = +16$ -4

$12x = 12$ $:12$

$x = \underline{\underline{1}}$

6) $(x-6)(x+6) = x(x+3) - 9$ TU

$x^2 - 36 = x^2 + 3x - 9$ $-x^2$

$-36 = 3x - 9$ $+9$

$-27 = 3x$ $:3$

$\underline{\underline{-9}} = x$

8) $(x-3)^2 - 18(x-14) = (x-1)(x-9)$ TU

$x^2 - 6x + 9 - 18x + 252 = x^2 - 10x + 9$ $-x^2$

$-24x + 261 = -10x + 9$ $+24x$

$261 = 14x + 9$ -9

$252 = 14x$ $:14$

$\underline{\underline{18}} = x$

10) $(5-x)^2 = 7x + (x-13)(x-3)$ TU

$25 - 10x + x^2 = 7x + x^2 - 16x + 39$ TU

$25 - 10x + x^2 = -9x + x^2 + 39$ $-x^2$

$25 - 10x = -9x + 39$ $+10x$

$25 = x + 39$ -39

$\underline{\underline{-14}} = x$

Potenzen, Wurzeln und Binome: 3b Vom Bild zum Term

6.1 Bruchterme kürzen

Kürze so weit wie möglich.

1 $\frac{m^2 - 4m - 21}{8m - 56} = \frac{\cancel{(m-7)}(m+3)}{8\cancel{(m-7)}} = \frac{m+3}{8}$

2 $\frac{s^2 - 13s + 42}{5s - 30} = \frac{\cancel{(s-6)}(s-7)}{5\cancel{(s-6)}} = \frac{s-7}{5}$

3 $\frac{n^2 + 2n - 24}{n - 4} = \frac{(n+6)\cancel{(n-4)}}{\cancel{(n-4)}} = n+6$

4 $\frac{g^2 + 9g}{g^2 + 15g + 54} = \frac{g\cancel{(g+9)}}{\cancel{(g+9)}(g+6)} = \frac{g}{g+6}$

5 $\frac{y - 5}{y^2 - 7y + 10} = \frac{\cancel{y-5}}{\cancel{(y-5)}(y-2)} = \frac{1}{y-2}$

6 $\frac{x^2 - x - 42}{x^2 - 4x - 21} = \frac{\cancel{(x-7)}(x+6)}{\cancel{(x-7)}(x+3)} = \frac{x+6}{x+3}$

7 $\frac{x^2 - 4}{x^2 - 10x + 16} = \frac{\cancel{(x-2)}(x+2)}{\cancel{(x-2)}(x-8)} = \frac{x+2}{x-8}$

8 $\frac{i^2 + 9i + 14}{i^2 - i - 6} = \frac{\cancel{(i+2)}(i+7)}{(i-3)\cancel{(i+2)}} = \frac{i+7}{i-3}$

9 $\frac{b^2 - 10b + 16}{b^2 - 2b} = \frac{\cancel{(b-2)}(b-8)}{b\cancel{(b-2)}} = \frac{b-8}{b}$

10 $\frac{5m - 15}{m^2 - 5m + 6} = \frac{5\cancel{(m-3)}}{\cancel{(m-3)}(m-2)} = \frac{5}{m-2}$

11 $\frac{6d - 36}{d^2 - 36} = \frac{6\cancel{(d-6)}}{\cancel{(d-6)}(d+6)} = \frac{6}{d+6}$

12 $\dfrac{j+i}{i^2-j^2} = \dfrac{\cancel{(i+j)}}{(i-j)\cancel{(i+j)}} = \dfrac{1}{i+j}$

13 $\dfrac{8f-48}{f^2-7f+6} = \dfrac{8\cancel{(f-6)}}{\cancel{(f-6)}(f-1)} = \dfrac{8}{f-1}$

14 $\dfrac{b^2-3b-40}{b+5} = \dfrac{\cancel{(b+5)}(b-8)}{\cancel{(b+5)}} = b-8$

15 $\dfrac{p^2-64}{p^2+16p+64} = \dfrac{(p-8)\cancel{(p+8)}}{(p+8)\cancel{(p+8)}} = \dfrac{p-8}{p+8}$

16 $\dfrac{w^2+15w+54}{w+9} = \dfrac{\cancel{(w+9)}(w+6)}{\cancel{(w+9)}} = w+6$

17 $\dfrac{s^2-49}{s^2-5s-14} = \dfrac{\cancel{(s-7)}(s+7)}{\cancel{(s-7)}(s+2)} = \dfrac{s+7}{s+2}$

18 $\dfrac{b^2-11b+24}{b^2-b-56} = \dfrac{\cancel{(b-8)}(b-3)}{\cancel{(b-8)}(b+7)} = \dfrac{b-3}{b+7}$

19 $\dfrac{g^2+g-30}{g^2-25} = \dfrac{\cancel{(g-5)}(g+6)}{\cancel{(g-5)}(g+5)} = \dfrac{g+6}{g+5}$

20 $\dfrac{49-x^2}{7+x} = \dfrac{(7-x)\cancel{(7+x)}}{\cancel{(7+x)}} = 7-x$

21 $\dfrac{g+7}{g^2+6g-7} = \dfrac{\cancel{g+7}}{\cancel{(g+7)}(g-1)} = \dfrac{1}{g-1}$

22 $\dfrac{k^2+4k}{k^2+13k+36} = \dfrac{k\cancel{(k+4)}}{\cancel{(k+4)}(k+9)} = \dfrac{k}{k+9}$

23 $\dfrac{4w^2-100}{w^2+14w+45} = \dfrac{4(w^2-25)}{(w+9)(w+5)} = \dfrac{4(w-5)\cancel{(w+5)}}{(w+9)\cancel{(w+5)}} = \dfrac{4(w-5)}{(w+9)}$

Name:

Binome und Operationen

1 $(a + b)^2 + (a - b)^2$ = $a^2+2ab+b^2+a^2-2ab+b^2 = 2a^2+2b^2$

2 $(x - y)^2 - (x + y)^2$ = $x^2-2xy+y^2-(x^2+2xy+y^2) = x^2-2xy+y^2-x^2-2xy-y^2 = -4xy$

3 $(3x - 5)^2 - (5 - 3x)^2$ = $9x^2-30x+25-(25-30x+9x^2) = 9x^2-30x+25-25+30x-9x^2 = 0$

4 $(2a - 3)^2 + (2a - 3)^2$ = $4a^2-12a+9+4a^2-12a+9 = 8a^2-24a+18$

5 $(7z + 1)^2 - (7z - 1)(7z + 1)$ = $49z^2+14z+1-(49z^2-1) = 49z^2+14z+1-49z^2+1 = 14z+2$

6 $(4m - 3)(4m + 3) - (4m - 3)^2$ = $16m^2-9-(16m^2-24m+9) = 16m^2-9-16m^2+24m-9 = 24m-18$

7 $(2y - x)(2y + x) - (2y + x)^2$ = $4y^2-x^2-(4y^2+4xy+x^2) = 4y^2-x^2-4y^2-4xy-x^2 = -2x^2-4xy$

* 8 $2(u - v)^2 - 3(u + v)^2$ = $2(u^2-2uv+v^2)-3(u^2+2uv+v^2) = 2u^2-4uv+2v^2-3u^2-6uv-3v^2$
$= -u^2-10uv-v^2$

* 9 $-4(2x + 3y)^2 - 2(x - 6)^2$ = $-4(4x^2+12xy+9y^2)-2(x^2-12x+36) = -16x^2-48xy-36y^2-2x^2+24x-72$
$= -18x^2-24xy-36y^2-72$

10 $(3x - 2y)^2 + (4x + 3y)^2$ = $9x^2-12xy+4y^2+16x^2+24xy+9y^2 = 25x^2+12xy+13y^2$

Name:

ARAL - Binome

11 $(2u - 3v)(2u + 3v) - (4u + 3v)^2$ $= 4u^2 - 9v^2 - (16u^2 + 24uv + 9v^2) = 4u^2 - 9v^2 - 16u^2 - 24uv - 9v^2$

$= -12u^2 - 24uv - 18v^2$

12 $(5z - 8)^2 + (4z - 3)(4z + 3)$ $= 25z^2 - 80z + 64 + 16z^2 - 9 = 41z^2 - 80z + 55$

13 $(5x - 3)^2 - (9x + 1)(9x + 1)$ $= 25x^2 - 30x + 9 - (81x^2 + 18x + 1) = 25x^2 - 30x + 9 - 81x^2 - 18x - 1$

$= -56x^2 - 48x + 8$

14 $(4a - 1)^2 + (2a - 3)(2a + 3)$ $= 16a^2 - 8a + 1 + 4a^2 - 9 = 20a^2 - 8a - 8$

15 $(2z + 3)(2z - 3) - (3z - 2)(3z + 2)$ $= 4z^2 - 9 - (9z^2 - 4) = 4z^2 - 9 - 9z^2 + 4 = -5z^2 - 5$

* **16** $3(3u + 2)^2 + (8u - 3)^2$ $= 3(9u^2 + 12u + 4) + 64u^2 - 48u + 9 = 27u^2 + 36u + 12 + 64u^2 - 48u + 9$

$= 91u^2 - 12u + 21$

17 $3x(5x - 8) - (4x - 3)^2$ $= 15x^2 - 24x - (16x^2 - 24x + 9) = 15x^2 - 24x - 16x^2 + 24x - 9$

$= -x^2 - 9$

18 $(x - 4)(2x + 5) - 2x(x + 7)$ $= 2x^2 + 5x - 8x - 20 - 2x^2 - 14x = -17x - 20$