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Arbeitsheft

Mathematik im Berufskolleg I

Baden-Württemberg



Merkur 
Verlag Rinteln

Basiswissen

Terme und Gleichungen

1. Vereinfachen Sie den Term.

$$x - 3x - 8(x + 1) = x - 3x - 8x - 8 = -10x - 8$$

$$x + 5(x - y + 2) - 6x - 2y =$$

$$7(x - 2) + 3(x - 5) =$$

$$12x - 6(x - 1) + 12 =$$

$$2 \cdot 4a \cdot 3b + 5a \cdot 2b - 18ab =$$

$$2(x^2 - x) + (x^2 - x - 3) \cdot (-5) =$$

$$8a - 3x + 6a - (x + a) - 5(a - 2x) =$$

2. Multiplizieren Sie aus.

$$2x(1 + 6y) + x(3 - 2y) = 2x + 12xy + 3x - 2xy = 5x + 10xy$$

$$4(x + 2y - 3z) + 4 =$$

$$(x - 7)(x - 2) =$$

$$\frac{1}{4}(x - 2)(x + 6) =$$

$$4(x - 6y) - 8(x - 6y) =$$

3. Klammern Sie aus.

$$24x + 16y - 12 = 4 \cdot 6x + 4 \cdot 4y - 4 \cdot 3 = 4(6x + 4y - 3)$$

$$4x + 8y - 12z =$$

$$tx - 3tx + t =$$

$$24a + 16ab - 12ac =$$

$$4(x - 6y) - 8(x - 6y) =$$

4. Berechnen Sie ohne Hilfsmittel.

| | | | |
|---|---|---|--|
| $1 - \frac{1}{7}$ | $= \frac{7}{7} - \frac{1}{7} = \frac{6}{7}$ | $-2 \cdot (-\frac{2}{9}) \cdot (-\frac{2}{5})$ | $= \frac{4}{9} \cdot (-\frac{2}{5}) = -\frac{8}{45}$ |
| $-\frac{2}{5} + \frac{6}{5}$ | $=$ | $\frac{1}{9} \cdot (-7)$ | $=$ |
| $-\frac{24}{5} - 5$ | $=$ | $-\frac{2}{5} \cdot \frac{5}{6}$ | $=$ |
| $\frac{2}{9} - 1 - \frac{5}{9}$ | $=$ | $-\frac{5+3}{4} \cdot (-4)$ | $=$ |
| $-\frac{(5+3)}{6} - \frac{4}{6}$ | $=$ | $\frac{9}{2} \cdot (-\frac{4}{9})$ | $=$ |
| $\frac{9-2}{-7}$ | $=$ | $(\frac{2}{3})^2 - \frac{4}{3} \cdot \frac{2}{3}$ | $=$ |
| $\frac{3}{2} - \frac{4}{5} - \frac{6}{4} - \frac{4}{5}$ | $=$ | $5 - \frac{7}{3} - \frac{1+3}{6}$ | $=$ |
| $-\frac{5+7}{12} + \frac{5-7}{12}$ | $=$ | $-\frac{1}{a} \cdot \frac{3}{5} + \frac{1}{a}$ | $=$ |

5. Formulieren Sie einen Term für den Text.

| | |
|---|--|
| Summe aus dem fünffachen einer Zahl und 13 | |
| Subtrahiere von 46 das Doppelte einer Zahl | |
| Gesamtkosten aus: Fixkosten 20 €, Kosten pro Stück 0,75 € | |

6. Wenden Sie eine binomische Formel an.

| | | | |
|-------------------------|------------------|-------------------|---------------|
| $(x+1)^2$ | $= x^2 + 2x + 1$ | $x^2 - 12x + 36$ | $= (x - 6)^2$ |
| $x^2 + 8x + 16$ | $=$ | $(x - 5)^2$ | $=$ |
| $(x - 3t)^2$ | $=$ | $(x - a)^2$ | $=$ |
| $4(x - 6y)(x + 6y)$ | $=$ | $(2x - 1)^2$ | $=$ |
| $x^2 - x + \frac{1}{4}$ | $=$ | $x^2 + 20x + 100$ | $=$ |

7. Ergänzen Sie den Term.

| | |
|--|--|
| $(x + \underline{\quad})^2 = x^2 + \underline{\quad} \cdot 5x \underline{\quad}$ | $(x + 2)^2 = x^2 + 2 \cdot 5x + 25$ |
| $\frac{5}{4}a - \frac{3}{4}b = \frac{1}{4} \cdot (\underline{\quad})$ | $49 - 14a + a^2 = (\underline{\quad}) \cdot (\underline{\quad})$ |
| $(x - 3\underline{\quad})^2 = x^2 - 6tx \underline{\quad}$ | $x^2 + 7x + 10 = (x \underline{\quad})(x \underline{\quad})$ |
| $(x - \underline{\quad}y)(x + \underline{\quad}y) = x^2 \underline{\quad} 4y^2$ | $2x^2 - \dots x = x(\underline{\quad} - 5)$ |

8. Lösen Sie nach x bzw t auf.

| | | | |
|-------------------------------------|----------------|------------------------------|-----------------------|
| $A = \frac{1}{2}xy$ | $U = 2(a + x)$ | $V = \frac{G}{3} \cdot (5x)$ | $v = a \cdot t + v_0$ |
| $A = \frac{1}{2}xy \quad \cdot 2$ | | | |
| $2A = xy \quad : y$ | | | |
| $x = \frac{2A}{y}$ | | | |

9. Stellen Sie als eine Potenz dar.

| | |
|-------------------------------|---------------------------------------|
| $12 \cdot 12 \cdot 12 = 12^3$ | $4^6 \cdot 2^6 = (4 \cdot 2)^6 = 8^6$ |
| $36 \cdot 6 =$ | $9^3 \cdot 9^2 =$ |
| $144 =$ | $2^3 + 2^3 =$ |
| $2^2 \cdot 8 =$ | $2^4 - 2^3 =$ |
| $(5 - 7) \cdot (5 - 7) =$ | $(9 - 2) \cdot 7^3 =$ |

10. Berechnen Sie.

| | |
|-------------------------------------|-------------------------|
| $6^2 + 3^2 - 2^3 = 36 + 9 - 8 = 37$ | $2^4 - 1 = 16 - 1 = 15$ |
| $a^2 \cdot a =$ | $3^3 \cdot 2 =$ |
| $x^4 - 4x^4 - 5x^4 =$ | $4^3 \cdot 4^2 =$ |
| $c^3 \cdot c^3 \cdot c^4 =$ | $1^5 + 1^{18} =$ |
| $10^5 =$ | $-(1 - 2)^{13} =$ |

11. Vereinfachen Sie, wenn möglich.

| | |
|--|----------------------------|
| $\sqrt{4} \cdot \sqrt{3} = \sqrt{4 \cdot 3} = \sqrt{12}$ | $(\sqrt{2,5})^2 = 2,5$ |
| $3 \cdot \sqrt{6} - \sqrt{6} =$ | $(\sqrt{\frac{1}{2}})^4 =$ |
| $\sqrt{2} \cdot \sqrt{18} =$ | $(\sqrt{5})^3 =$ |
| $\sqrt{\frac{16}{9} + 6 \cdot \frac{8}{9}} =$ | $\sqrt{5} \sqrt{20} =$ |
| $\sqrt{-1} =$ | $\sqrt{3} + \sqrt{12} =$ |

12. Lösen Sie die Gleichungen.

| | | |
|--|--|---------------------------------------|
| $x = -3x - 8$ | $x + 5 = 2 - 6x$ | $7(x - 2) = 3(x - 5)$ |
| $x = -3x - 8 \quad + 3x$ Sortieren: $4x = -8 \quad : 4$ $x = -2$ | | |
| $12x - 12(x + 1) + 12 = 0$ | $\frac{1}{2}x - \frac{3}{2} = 1 - 2x$ | $3(6x - 14) = 12x + 6(x - 3)$ |
| | | |
| $\frac{7}{2}x - 1 = -\frac{7}{3}x$ | $\frac{3}{2}(6 - 3x) = 6 - 3x$ | $x(2x - 1) = 1 + 2x^2 + 6x$ |
| | | |
| $4 - \frac{x}{5} - \frac{x}{3} = -1$ | $\frac{2x}{3} - 4 = -\frac{5}{6}x - 1$ | $1 - 2x = \frac{3}{4}x + \frac{1}{3}$ |
| | | |

13. Kreuzen Sie die richtige Lösung an.

| | | | |
|----------------------------------|---|--|-----------------------------|
| $5(x - 3) = 0$ | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 0 |
| $x + 5 = 4 - x$ | <input type="checkbox"/> -1 | <input type="checkbox"/> -0,5 | <input type="checkbox"/> -2 |
| $7x - 3 = 3(x - 1)$ | <input type="checkbox"/> 0 | <input type="checkbox"/> -1 | <input type="checkbox"/> 1 |
| $\frac{1}{7}x - \frac{3}{7} = 0$ | <input type="checkbox"/> $-\frac{3}{7}$ | <input type="checkbox"/> $\frac{3}{7}$ | <input type="checkbox"/> 3 |

Basiswissen

Terme und Gleichungen

1. Vereinfachen Sie den Term.

| | |
|--|--|
| $x - 3x - 8(x + 1)$ | $= x - 3x - 8x - 8 = -10x - 8$ |
| $x + 5(x - y + 2) - 6x - 2y$ | $= x + 5x - 5y + 10 - 6x - 2y = -7y + 10$ |
| $7(x - 2) + 3(x - 5)$ | $= 7x - 14 + 3x - 15 = 10x - 29$ |
| $12x - 6(x - 1) + 12$ | $= 12x - 6x + 6 + 12 = 6x + 18$ |
| $2 \cdot 4a \cdot 3b + 5a \cdot 2b - 18ab$ | $= 24ab + 10ab - 18ab = 16ab$ |
| $2(x^2 - x) + (x^2 - x - 3) \cdot (-5)$ | $= 2x^2 - 2x - 5x^2 + 5x + 15 = -3x^2 + 3x + 15$ |
| $8a - 3x + 6a - (x + a) - 5(a - 2x)$ | $= 8a - 3x + 6a - x - a - 5a + 10x = 8a + 6x$ |

2. Multiplizieren Sie aus.

| | |
|-----------------------------|--|
| $2x(1 + 6y) + x(3 - 2y)$ | $= 2x + 12xy + 3x - 2xy = 5x + 10xy$ |
| $4(x + 2y - 3z) + 4$ | $= 4x + 8y - 12z + 4$ |
| $(x - 7)(x - 2)$ | $= x^2 - 7x - 2x + 14 = x^2 - 9x + 14$ |
| $\frac{1}{4}(x - 2)(x + 6)$ | $= \frac{1}{4}(x^2 - 2x + 6x - 12) = \frac{1}{4}x^2 + x - 3$ |
| $4(x - 6y) - 8(x - 6y)$ | $= 4x - 24y - 8x + 48y = -4x + 24y$ |

3. Klammern Sie aus.

| | |
|-------------------------|--|
| $24x + 16y - 12$ | $= 4 \cdot 6x + 4 \cdot 4y - 4 \cdot 3 = 4(6x + 4y - 3)$ |
| $4x + 8y - 12z$ | $= 4(x + 2y - 3z)$ |
| $tx - 3tx + t$ | $= t(x - 3x + 1) = t(-2x + 1) = -t(2x - 1)$ |
| $24a + 16ab - 12ac$ | $= 4a(6 + 4b - 3c)$ |
| $4(x - 6y) - 8(x - 6y)$ | $= (4 - 8)(x - 6y) = -4(x - 6y)$ |

4

8. Lösen Sie nach x bzw t auf.

| | | | |
|-------------------------------------|-----------------------------------|--|-------------------------------------|
| $A = \frac{1}{2}xy$ | $U = 2(a + x)$ | $V = \frac{G}{3} \cdot (5x)$ | $v = a \cdot t + v_0$ |
| $A = \frac{1}{2}xy \quad \cdot 2$ | $U = 2(a + x) \quad : 2$ | $V = \frac{G}{3} \cdot (5x) \quad \cdot \frac{3}{G}$ | $v = a \cdot t + v_0 \quad - v_0$ |
| $2A = xy \quad : y$ | $\frac{U}{2} = a + x \quad - a$ | $\frac{3V}{G} = 5x \quad : 5$ | $v - v_0 = a \cdot t \quad : a$ |
| $x = \frac{2A}{y}$ | $x = \frac{U}{2} - a$ | $x = \frac{3V}{5G}$ | $t = \frac{v - v_0}{a}$ |

9. Stellen Sie als eine Potenz dar.

| | | | |
|-------------------------|-------------------------|---------------------|-------------------------|
| $12 \cdot 12 \cdot 12$ | $= 12^3$ | $4^6 \cdot 2^6$ | $= (4 \cdot 2)^6 = 8^6$ |
| $36 \cdot 6$ | $= 6^2 \cdot 6 = 6^3$ | $9^3 \cdot 9^2$ | $= 9^5$ |
| 144 | $= 12^2$ | $2^3 + 2^3$ | $= 2 \cdot 2^3 = 2^4$ |
| $2^2 \cdot 8$ | $= 2^2 \cdot 2^3 = 2^5$ | $2^4 - 2^3$ | $= 2^3(2 - 1) = 2^3$ |
| $(5 - 7) \cdot (5 - 7)$ | $= (-2)^2 = 4$ | $(9 - 2) \cdot 7^3$ | $= 7 \cdot 7^3 = 7^4$ |

10. Berechnen Sie.

| | | | |
|---------------------------|-------------------------|-----------------|----------------------------|
| $6^2 + 3^2 - 2^3$ | $= 36 + 9 - 8 = 37$ | $2^4 - 1$ | $= 16 - 1 = 15$ |
| $a^2 \cdot a$ | $= a^2 \cdot a^1 = a^3$ | $3^3 \cdot 2$ | $= 54$ |
| $x^4 - 4x^4 - 5x^4$ | $= -8x^4$ | $4^3 \cdot 4^2$ | $= 4^5 = 1024$ |
| $c^3 \cdot c^3 \cdot c^4$ | $= c^{3+3+4} = c^{10}$ | $1^5 + 1^{18}$ | $= 2$ |
| 10^5 | $= 100000$ | $-(-1-2)^{13}$ | $= -(-1)^{13} = -(-1) = 1$ |

11. Vereinfachen Sie, wenn möglich.

| | | | |
|---|---------------------------------------|--------------------------|---|
| $\sqrt{4} \cdot \sqrt{3}$ | $= \sqrt{4 \cdot 3} = \sqrt{12}$ | $(\sqrt{2,5})^2$ | $= 2,5$ |
| $3 \cdot \sqrt{6} - \sqrt{6}$ | $= 2 \cdot \sqrt{6}$ | $(\sqrt{\frac{1}{2}})^4$ | $= (\sqrt{\frac{1}{2}})^2 \cdot (\sqrt{\frac{1}{2}})^2 = (\frac{1}{2})^2 = \frac{1}{4}$ |
| $\sqrt{2} \cdot \sqrt{18}$ | $= \sqrt{36} = 6$ | $(\sqrt{5})^3$ | $= (\sqrt{5})^2 \cdot \sqrt{5} = 5\sqrt{5}$ |
| $\sqrt{\frac{16}{9}} + 6 \cdot \frac{8}{9}$ | $= \sqrt{\frac{64}{9}} = \frac{8}{3}$ | $\sqrt{5} \sqrt{20}$ | $= \sqrt{100} = 10$ |
| $\sqrt{-1}$ | nicht möglich | $\sqrt{3} + \sqrt{12}$ | $= \sqrt{3} + 2\sqrt{3} = 3\sqrt{3}$ |

6

4. Berechnen Sie ohne Hilfsmittel.

| | | | |
|---|--|---|--|
| $1 - \frac{1}{7}$ | $= \frac{7}{7} - \frac{1}{7} = \frac{6}{7}$ | $-2 \cdot (-\frac{2}{9}) \cdot (-\frac{2}{5})$ | $= \frac{4}{9} \cdot (-\frac{2}{5}) = -\frac{8}{45}$ |
| $-\frac{2}{5} + \frac{6}{5}$ | $= \frac{4}{5}$ | $\frac{1}{9} \cdot (-7)$ | $= -\frac{7}{9} = -\frac{7}{9}$ |
| $-\frac{24}{5} - 5$ | $= -\frac{24}{5} - \frac{25}{5} = -\frac{49}{5}$ | $-\frac{2}{5} \cdot \frac{5}{6}$ | $= -\frac{2}{6} = -\frac{1}{3}$ (kürzen) |
| $\frac{2}{9} - 1 - \frac{5}{9}$ | $= \frac{2}{9} - \frac{9}{9} - \frac{5}{9} = -\frac{12}{9} = -\frac{4}{3}$ | $-\frac{5+3}{9} \cdot (-4)$ | $= 8$ (kürzen) |
| $-\frac{(5+3)}{6} - \frac{4}{6}$ | $= -\frac{8}{6} - \frac{4}{6} = -\frac{12}{6} = -2$ | $\frac{9}{2} \cdot (-\frac{4}{9})$ | $= -\frac{4}{2} = -2$ |
| $\frac{9-2}{-7}$ | $= -\frac{7}{7} = -1$ | $(\frac{2}{3})^2 - \frac{4}{3} \cdot \frac{2}{3}$ | $= \frac{4}{9} - \frac{8}{9} = -\frac{4}{9}$ |
| $\frac{3}{2} - \frac{4}{5} - \frac{6}{4} - \frac{4}{5}$ | $= \frac{3}{2} - \frac{2}{5} - \frac{3}{2} - \frac{4}{5} = -\frac{8}{5}$ | $5 - \frac{7}{3} - \frac{1+3}{6}$ | $= \frac{15}{3} - \frac{7}{3} - \frac{2}{3} = \frac{6}{3} = 2$ |
| $-\frac{5+7}{12} + \frac{5-7}{12}$ | $= -\frac{12}{12} - \frac{2}{12} = -\frac{14}{12} = -\frac{7}{6}$ | $-\frac{1}{a} \cdot \frac{3}{5} + \frac{1}{a}$ | $= \frac{1}{a}(-\frac{3}{5} + 1) = \frac{1}{a} \cdot \frac{2}{5} = \frac{2}{5a}$ |

5. Formulieren Sie einen Term für den Text.

| | |
|---|--------------|
| Summe aus dem fünffachen einer Zahl und 13 | $5x + 13$ |
| Subtrahiere von 46 das Doppelte einer Zahl | $46 - 2x$ |
| Gesamtkosten aus: Fixkosten 20 €, Kosten pro Stück 0,75 € | $0,75x + 20$ |

6. Wenden Sie eine binomische Formel an.

| | | | |
|-------------------------|-------------------------|-------------------|---------------------|
| $(x + 1)^2$ | $= x^2 + 2x + 1$ | $x^2 - 12x + 36$ | $= (x - 6)^2$ |
| $x^2 + 8x + 16$ | $= (x + 4)^2$ | $(x - 5)^2$ | $= x^2 - 10x + 25$ |
| $(x - 3t)^2$ | $= x^2 - 6tx + 9t^2$ | $(x - a)^2$ | $= x^2 - 2ax + a^2$ |
| $4(x - 6y)(x + 6y)$ | $= 4x^2 - 144y^2$ | $(2x - 1)^2$ | $= 4x^2 - 4x + 1$ |
| $x^2 - x + \frac{1}{4}$ | $= (x - \frac{1}{2})^2$ | $x^2 + 20x + 100$ | $= (x + 10)^2$ |

7. Ergänzen Sie den Term.

| | |
|--|--|
| $(x + \underline{\quad})^2 = x^2 + \underline{\quad} \cdot 5x + \underline{\quad}$ | $(x + 5)^2 = x^2 + 2 \cdot 5x + 25$ |
| $\frac{5}{4}a - \frac{3}{4}b = \frac{1}{4} \cdot (5a - 3b)$ | $49 - 14a + a^2 = (7 - a) \cdot (7 - a)$ |
| $(x - 3t)^2 = x^2 - 6tx + 9t^2$ | $x^2 + 7x + 10 = (x + 5)(x + 2)$ |
| $(x - 2y)(x + 2y) = x^2 - 4y^2$ | $2x^2 - 5x = x(2x - 5)$ |

5

12. Lösen Sie die Gleichungen.

| | | |
|--|---|---|
| $x = -3x - 8$ | $x + 5 = 2 - 6x$ | $7(x - 2) = 3(x - 5)$ |
| $x = -3x - 8 \quad + 3x$ Sortieren: $4x = -8 \quad : 4$ $x = -2$ | $x + 5 = 2 - 6x \quad + 6x$ $7x + 5 = 2 \quad - 5$ $7x = -3 \quad : 7$ $x = -\frac{3}{7}$ | $7x - 14 = 3x - 15 \quad - 3x$ $4x - 14 = -15 \quad + 14$ $4x = -1 \quad : 4$ $x = -\frac{1}{4}$ |
| $12x - 12(x + 1) + 12 = 0$ | $\frac{1}{2}x - \frac{3}{2} = 1 - 2x$ | $3(6x - 14) = 12x + 6(x - 3)$ |
| $12x - 12x - 12 + 12 = 0$ $0 = 0$ wahre Aussage für alle x $L = \mathbb{R}$ | $\frac{1}{2}x - \frac{3}{2} = 1 - 2x \quad + 2x$ $\frac{5}{2}x - \frac{3}{2} = 1 \quad + \frac{3}{2}$ $\frac{5}{2}x = \frac{5}{2} \quad : \frac{5}{2}$ $x = 1$ | $18x - 42 = 12x + 6x - 18$ $18x - 42 = 18x - 18 \quad - 18x$ $-42 = -18$ falsche Aussage für alle x keine Lösung: $L = \emptyset$ |
| $\frac{7}{2}x - 1 = -\frac{7}{3}x$ | $\frac{3}{2}(6 - 3x) = 6 - 3x$ | $x(2x - 1) = 1 + 2x^2 + 6x$ |
| $\frac{7}{2}x - 1 = -\frac{7}{3}x \quad + \frac{7}{3}x + 1$ $\frac{7}{2}x + \frac{7}{3}x = 1 \Leftrightarrow \frac{21}{6}x + \frac{14}{6}x = 1$ $\frac{35}{6}x = 1 \quad \cdot (\frac{6}{35})$ $x = \frac{6}{35}$ | $9 - \frac{9}{2}x = 6 - 3x \quad + 3x$ $9 - \frac{3}{2}x = 6 \quad - 9$ $-\frac{3}{2}x = -3 \quad \cdot (-\frac{2}{3})$ $x = 2$ | $2x^2 - x = 1 + 2x^2 + 6x$ $-x = 1 + 6x \quad - 6x$ $-7x = 1 \quad : (-7)$ $x = -\frac{1}{7}$ |
| $4 - \frac{x}{5} - \frac{x}{3} = -1$ | $\frac{2x}{3} - 4 = -\frac{5}{6}x - 1$ | $1 - 2x = \frac{3}{4}x + \frac{1}{3}$ |
| $4 - \frac{3x}{15} - \frac{5x}{15} = -1$ | $\frac{4x}{6} - 4 = -\frac{5}{6}x - 1 \quad + \frac{5}{6}x$ | $1 - 2x = \frac{3}{4}x + \frac{1}{3} \quad + 2x$ $1 = \frac{11}{4}x + \frac{1}{3} \quad - \frac{1}{3}$ $\frac{2}{3} = \frac{11}{4}x \quad \cdot \frac{4}{11}$ $x = \frac{8}{33}$ |
| $4 - \frac{8x}{15} = -1 \quad - 4$ | $\frac{3}{2}x - 4 = -1 \quad + 4$ | |
| $-\frac{8x}{15} = -5 \quad \cdot (-\frac{15}{8})$ | $\frac{3}{2}x = 3 \quad \cdot \frac{2}{3}$ | |
| $x = \frac{75}{8}$ | $x = 2$ | |

13. Kreuzen Sie die richtige Lösung an.

| | | | |
|----------------------------------|---------------------------------------|--|---------------------------------------|
| $5(x - 3) = 0$ | <input type="checkbox"/> 2 | <input checked="" type="checkbox"/> 3 | <input type="checkbox"/> 0 |
| $x + 5 = 4 - x$ | <input type="checkbox"/> -1 | <input checked="" type="checkbox"/> -0,5 | <input type="checkbox"/> -2 |
| $7x - 3 = 3(x - 1)$ | <input checked="" type="checkbox"/> 0 | <input type="checkbox"/> -1 | <input type="checkbox"/> 1 |
| $\frac{1}{7}x - \frac{3}{7} = 0$ | <input type="checkbox"/> -\frac{3}{7} | <input type="checkbox"/> \frac{3}{7} | <input checked="" type="checkbox"/> 3 |

7