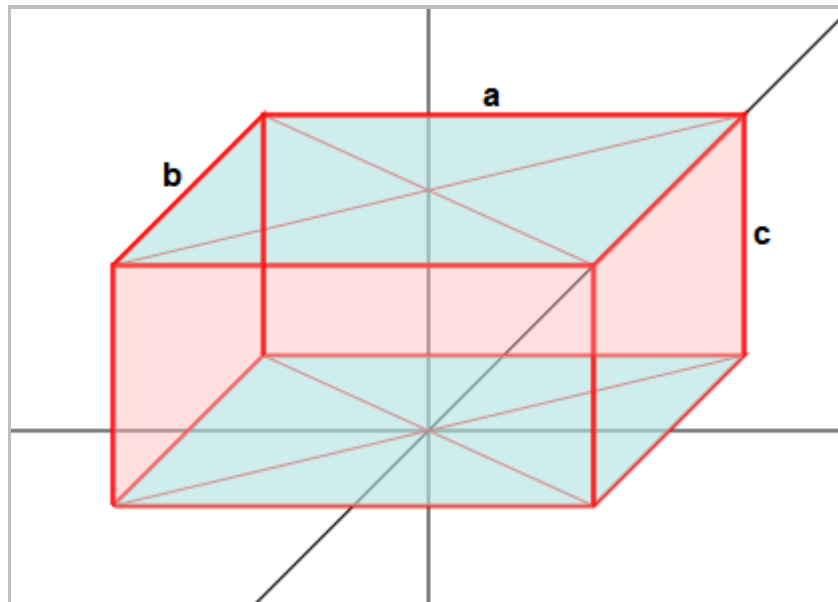


Mathematik-Aufgabenpool

> Quaderberechnung I

Einleitung: Ein Quader ist durch die Größe der Quaderkanten a , b , c bestimmt. Es gilt für die Quadergrundfläche G , die Oberfläche O und das Volumen: $G=ab$, $O=2(ab+ac+bc)$, $V=abc$.



Quader: Quaderkanten a , b , c

Formelsammlung:

| | | | |
|-------------------|------------------------------|------------------------------|------------------------------|
| Grund-/Deckfläche | $G = ab$ | $a = \frac{G}{b}$ | $b = \frac{G}{a}$ |
| Quaderumfang | $u = 2a+2b$ | $a = \frac{u}{2} - b$ | $b = \frac{u}{2} - a$ |
| Mantelfläche | $M = uc$ | $u = \frac{M}{c}$ | $c = \frac{M}{u}$ |
| Oberfläche | $O = 2G + M$ | $M = O - 2G$ | $G = \frac{O - M}{2}$ |
| | $O = 2(ab + ac + bc)$ | | |
| | $a = \frac{O - 2bc}{2(b+c)}$ | $b = \frac{O - 2ac}{2(a+c)}$ | $c = \frac{O - 2ab}{2(a+b)}$ |
| Volumen | $V = G \cdot c = abc$ | $G = \frac{V}{c}$ | |
| | $a = \frac{V}{bc}$ | $b = \frac{V}{ac}$ | $c = \frac{V}{ab}$ |

Aufgabe 1: Berechne die jeweils fehlenden Größen des Quaders (Kanten a, b, c; Oberfläche $O=2(ab+ac+bc)$, Volumen $V=abc$).

| Nr. | Gegeben: | Gesucht: |
|-----|------------------------------------|----------|
| 1 | a = 5.3 cm, b = 6.1 cm, c = 2.1 cm | O, V |
| 2 | a = 6.9 cm, b = 1.1 cm, c = 7.1 cm | O, V |
| 3 | a = 2.8 cm, b = 7.8 cm, c = 5.7 cm | O, V |
| 4 | a = 1.2 cm, b = 7.9 cm, c = 3.9 cm | O, V |
| 5 | a = 6.3 cm, b = 6.2 cm, c = 7.3 cm | O, V |
| 6 | a = 7.2 cm, b = 1.7 cm, c = 1.5 cm | O, V |
| 7 | a = 3.1 cm, b = 6.5 cm, c = 1.1 cm | O, V |
| 8 | a = 5.8 cm, b = 3.3 cm, c = 7.2 cm | O, V |
| 9 | a = 3.3 cm, b = 9.1 cm, c = 7.1 cm | O, V |
| 10 | a = 8.1 cm, b = 8.8 cm, c = 8.0 cm | O, V |
| 11 | a = 6.8 cm, b = 2.2 cm, c = 3.2 cm | O, V |
| 12 | a = 2.4 cm, b = 2.6 cm, c = 7.6 cm | O, V |
| 13 | a = 8.1 cm, b = 4.5 cm, c = 6.7 cm | O, V |
| 14 | a = 7.4 cm, b = 7.3 cm, c = 8.8 cm | O, V |
| 15 | a = 5.5 cm, b = 4.8 cm, c = 6.9 cm | O, V |
| 16 | a = 3.6 cm, b = 9.2 cm, c = 3.5 cm | O, V |
| 17 | a = 3.7 cm, b = 9.6 cm, c = 7.0 cm | O, V |
| 18 | a = 7.9 cm, b = 1.4 cm, c = 4.0 cm | O, V |
| 19 | a = 7.6 cm, b = 3.6 cm, c = 1.5 cm | O, V |
| 20 | a = 4.4 cm, b = 5.1 cm, c = 8.7 cm | O, V |

Vorgehensweise: Zur Ermittlung der fehlenden Größen beim Quader ist die obige Formelsammlung anzuwenden.

Lösungen:

| Nr. | Kante a= | Kante b= | Kante c= | Oberfläche O= | Volumen V= |
|-----|----------|----------|----------|-----------------------|-----------------------|
| 1 | 5.3 cm | 6.1 cm | 2.1 cm | 112.5 cm ² | 67.9 cm ³ |
| 2 | 6.9 cm | 1.1 cm | 7.1 cm | 128.8 cm ² | 53.9 cm ³ |
| 3 | 2.8 cm | 7.8 cm | 5.7 cm | 164.5 cm ² | 124.5 cm ³ |
| 4 | 1.2 cm | 7.9 cm | 3.9 cm | 89.9 cm ² | 37.0 cm ³ |
| 5 | 6.3 cm | 6.2 cm | 7.3 cm | 260.6 cm ² | 285.1 cm ³ |
| 6 | 7.2 cm | 1.7 cm | 1.5 cm | 51.2 cm ² | 18.4 cm ³ |
| 7 | 3.1 cm | 6.5 cm | 1.1 cm | 61.4 cm ² | 22.2 cm ³ |
| 8 | 5.8 cm | 3.3 cm | 7.2 cm | 169.3 cm ² | 137.8 cm ³ |
| 9 | 3.3 cm | 9.1 cm | 7.1 cm | 236.1 cm ² | 213.2 cm ³ |
| 10 | 8.1 cm | 8.8 cm | 8.0 cm | 413.0 cm ² | 570.2 cm ³ |
| 11 | 6.8 cm | 2.2 cm | 3.2 cm | 87.5 cm ² | 47.9 cm ³ |
| 12 | 2.4 cm | 2.6 cm | 7.6 cm | 88.5 cm ² | 47.4 cm ³ |
| 13 | 8.1 cm | 4.5 cm | 6.7 cm | 241.7 cm ² | 244.2 cm ³ |
| 14 | 7.4 cm | 7.3 cm | 8.8 cm | 366.8 cm ² | 475.4 cm ³ |
| 15 | 5.5 cm | 4.8 cm | 6.9 cm | 194.9 cm ² | 182.2 cm ³ |
| 16 | 3.6 cm | 9.2 cm | 3.5 cm | 155.8 cm ² | 115.9 cm ³ |
| 17 | 3.7 cm | 9.6 cm | 7.0 cm | 257.2 cm ² | 248.6 cm ³ |
| 18 | 7.9 cm | 1.4 cm | 4.0 cm | 96.5 cm ² | 44.2 cm ³ |
| 19 | 7.6 cm | 3.6 cm | 1.5 cm | 88.3 cm ² | 41.0 cm ³ |
| 20 | 4.4 cm | 5.1 cm | 8.7 cm | 210.2 cm ² | 195.2 cm ³ |

Aufgabe 2: Berechne die jeweils fehlenden Größen des Quaders (Kanten a, b, c; Oberfläche $O=2(ab+ac+bc)$, Volumen $V=abc$).

| Nr. | Gegeben: | Gesucht: |
|-----|---------------------------------------|----------|
| 1 | a = 12.3 mm, b = 16.6 mm, c = 5.8 mm | O, V |
| 2 | a = 24.2 cm, b = 12.7 cm, c = 16.7 cm | O, V |
| 3 | a = 16.6 m, b = 12.0 m, c = 5.1 m | O, V |
| 4 | a = 6.7 cm, b = 16.6 cm, c = 14.7 cm | O, V |
| 5 | a = 19.0 mm, b = 18.6 mm, c = 5.8 mm | O, V |
| 6 | a = 21.2 m, b = 11.9 m, c = 16.4 m | O, V |
| 7 | a = 11.5 dm, b = 11.3 dm, c = 12.2 dm | O, V |
| 8 | a = 22.2 mm, b = 13.7 mm, c = 9.3 mm | O, V |
| 9 | a = 11.2 dm, b = 16.0 dm, c = 10.0 dm | O, V |
| 10 | a = 10.5 mm, b = 12.6 mm, c = 13.9 mm | O, V |
| 11 | a = 14.2 mm, b = 13.5 mm, c = 7.0 mm | O, V |
| 12 | a = 15.8 m, b = 14.4 m, c = 18.2 m | O, V |
| 13 | a = 19.8 mm, b = 11.7 mm, c = 17.7 mm | O, V |
| 14 | a = 14.8 m, b = 18.0 m, c = 9.1 m | O, V |
| 15 | a = 5.0 cm, b = 18.8 cm, c = 19.0 cm | O, V |
| 16 | a = 16.2 dm, b = 17.9 dm, c = 16.5 dm | O, V |
| 17 | a = 26.7 m, b = 13.1 m, c = 14.0 m | O, V |
| 18 | a = 14.0 mm, b = 12.9 mm, c = 19.0 mm | O, V |
| 19 | a = 5.6 m, b = 14.2 m, c = 10.2 m | O, V |
| 20 | a = 14.9 dm, b = 11.9 dm, c = 18.8 dm | O, V |

Vorgehensweise: Zur Ermittlung der fehlenden Größen beim Quader ist die obige Formelsammlung anzuwenden.

Lösungen:

| Nr. | Kante a= | Kante b= | Kante c= | Oberfläche O= | Volumen V= |
|-----|----------|----------|----------|------------------------|------------------------|
| 1 | 12.3 mm | 16.6 mm | 5.8 mm | 743.6 mm ² | 1184.2 mm ³ |
| 2 | 24.2 cm | 12.7 cm | 16.7 cm | 1847.1 cm ² | 5132.6 cm ³ |
| 3 | 16.6 m | 12.0 m | 5.1 m | 690.1 m ² | 1015.9 m ³ |
| 4 | 6.7 cm | 16.6 cm | 14.7 cm | 907.5 cm ² | 1634.9 cm ³ |
| 5 | 19.0 mm | 18.6 mm | 5.8 mm | 1143.0 mm ² | 2049.7 mm ³ |
| 6 | 21.2 m | 11.9 m | 16.4 m | 1590.2 m ² | 4137.4 m ³ |
| 7 | 11.5 dm | 11.3 dm | 12.2 dm | 816.2 dm ² | 1585.4 dm ³ |
| 8 | 22.2 mm | 13.7 mm | 9.3 mm | 1276.0 mm ² | 2828.5 mm ³ |
| 9 | 11.2 dm | 16.0 dm | 10.0 dm | 902.4 dm ² | 1792.0 dm ³ |
| 10 | 10.5 mm | 12.6 mm | 13.9 mm | 906.8 mm ² | 1839.0 mm ³ |
| 11 | 14.2 mm | 13.5 mm | 7.0 mm | 771.2 mm ² | 1341.9 mm ³ |
| 12 | 15.8 m | 14.4 m | 18.2 m | 1554.3 m ² | 4140.9 m ³ |
| 13 | 19.8 mm | 11.7 mm | 17.7 mm | 1578.4 mm ² | 4100.4 mm ³ |
| 14 | 14.8 m | 18.0 m | 9.1 m | 1129.8 m ² | 2424.2 m ³ |
| 15 | 5.0 cm | 18.8 cm | 19.0 cm | 1092.4 cm ² | 1786.0 cm ³ |
| 16 | 16.2 dm | 17.9 dm | 16.5 dm | 1705.3 dm ² | 4784.7 dm ³ |
| 17 | 26.7 m | 13.1 m | 14.0 m | 1813.9 m ² | 4896.8 m ³ |
| 18 | 14.0 mm | 12.9 mm | 19.0 mm | 1383.4 mm ² | 3431.4 mm ³ |
| 19 | 5.6 m | 14.2 m | 10.2 m | 563.0 m ² | 811.1 m ³ |
| 20 | 14.9 dm | 11.9 dm | 18.8 dm | 1362.3 dm ² | 3333.4 dm ³ |

Aufgabe 3: Berechne die jeweils fehlenden Größen des Quaders (Kanten a, b, c; Oberfläche $O=2(ab+ac+bc)$, Volumen $V=abc$).

| Nr. | Gegeben: | Gesucht: |
|-----|--|----------|
| 1 | a = 12.4 cm, b = 14.4 cm, V = 2214.1 cm ³ | c, O |
| 2 | b = 13.9 cm, c = 5.7 cm, V = 1552.9 cm ³ | a, O |
| 3 | a = 8.0 cm, b = 5.9 cm, O = 486.4 cm ² | c, V |
| 4 | b = 9.8 cm, c = 4.8 cm, O = 389.0 cm ² | a, V |
| 5 | b = 6.1 cm, c = 14.7 cm, V = 1058.1 cm ³ | a, O |
| 6 | b = 14.8 cm, c = 4.3 cm, V = 1132.8 cm ³ | a, O |
| 7 | a = 5.4 cm, b = 12.7 cm, c = 4.8 cm | O, V |
| 8 | b = 13.2 cm, c = 8.8 cm, O = 628.3 cm ² | a, V |
| 9 | a = 11.2 cm, b = 9.0 cm, c = 12.6 cm | O, V |
| 10 | a = 11.4 cm, c = 8.9 cm, O = 880.9 cm ² | b, V |
| 11 | a = 6.8 cm, b = 8.1 cm, V = 627.9 cm ³ | c, O |
| 12 | b = 9.7 cm, c = 4.5 cm, V = 375.4 cm ³ | a, O |
| 13 | a = 19.1 cm, b = 15.8 cm, c = 8.1 cm | O, V |
| 14 | a = 11.7 cm, b = 9.5 cm, V = 1367.1 cm ³ | c, O |
| 15 | a = 19.9 cm, c = 13.0 cm, V = 1940.3 cm ³ | b, O |
| 16 | a = 18.6 cm, b = 15.0 cm, c = 4.8 cm | O, V |
| 17 | a = 16.7 cm, b = 18.7 cm, O = 1049.4 cm ² | c, V |
| 18 | a = 6.6 cm, c = 12.1 cm, V = 758.7 cm ³ | b, O |
| 19 | a = 15.9 cm, b = 9.2 cm, O = 694.2 cm ² | c, V |
| 20 | a = 8.7 cm, b = 14.4 cm, V = 563.8 cm ³ | c, O |

Vorgehensweise: Zur Ermittlung der fehlenden Größen beim Quader ist die obige Formelsammlung anzuwenden.

Lösungen:

| Nr. | Kante a= | Kante b= | Kante c= | Oberfläche O= | Volumen V= |
|-----|----------|----------|----------|------------------------|------------------------|
| 1 | 12.4 cm | 14.4 cm | 12.4 cm | 1021.8 cm ² | 2214.1 cm ³ |
| 2 | 19.6 cm | 13.9 cm | 5.7 cm | 926.8 cm ² | 1552.9 cm ³ |
| 3 | 8.0 cm | 5.9 cm | 14.1 cm | 486.4 cm ² | 665.5 cm ³ |
| 4 | 10.1 cm | 9.8 cm | 4.8 cm | 389.0 cm ² | 475.1 cm ³ |
| 5 | 11.8 cm | 6.1 cm | 14.7 cm | 670.2 cm ² | 1058.1 cm ³ |
| 6 | 17.8 cm | 14.8 cm | 4.3 cm | 807.2 cm ² | 1132.8 cm ³ |
| 7 | 5.4 cm | 12.7 cm | 4.8 cm | 310.9 cm ² | 329.2 cm ³ |
| 8 | 9.0 cm | 13.2 cm | 8.8 cm | 628.3 cm ² | 1045.4 cm ³ |
| 9 | 11.2 cm | 9.0 cm | 12.6 cm | 710.6 cm ² | 1270.1 cm ³ |
| 10 | 11.4 cm | 16.7 cm | 8.9 cm | 880.9 cm ² | 1694.4 cm ³ |
| 11 | 6.8 cm | 8.1 cm | 11.4 cm | 449.9 cm ² | 627.9 cm ³ |
| 12 | 8.6 cm | 9.7 cm | 4.5 cm | 331.5 cm ² | 375.4 cm ³ |
| 13 | 19.1 cm | 15.8 cm | 8.1 cm | 1168.9 cm ² | 2444.4 cm ³ |
| 14 | 11.7 cm | 9.5 cm | 12.3 cm | 743.8 cm ² | 1367.1 cm ³ |
| 15 | 19.9 cm | 7.5 cm | 13.0 cm | 1010.9 cm ² | 1940.3 cm ³ |
| 16 | 18.6 cm | 15.0 cm | 4.8 cm | 880.6 cm ² | 1339.2 cm ³ |
| 17 | 16.7 cm | 18.7 cm | 6.0 cm | 1049.4 cm ² | 1873.7 cm ³ |
| 18 | 6.6 cm | 9.5 cm | 12.1 cm | 515.0 cm ² | 758.7 cm ³ |
| 19 | 15.9 cm | 9.2 cm | 8.0 cm | 694.2 cm ² | 1170.2 cm ³ |
| 20 | 8.7 cm | 14.4 cm | 4.5 cm | 458.5 cm ² | 563.8 cm ³ |

Aufgabe 4: Berechne die jeweils fehlenden Größen des Quaders (Kanten a, b, c; Oberfläche $O=2(ab+ac+bc)$, Volumen $V=abc$).

| Nr. | Gegeben: | Gesucht: |
|-----|--|----------|
| 1 | a = 15.3 m, c = 7.2 m, V = 2137.1 m ³ | b, O |
| 2 | a = 24.1 cm, b = 15.5 cm, V = 7246.9 cm ³ | c, O |
| 3 | a = 15.2 dm, b = 16.6 dm, c = 6.8 dm | O, V |
| 4 | a = 16.7 cm, b = 8.2 cm, c = 7.7 cm | O, V |
| 5 | a = 6.0 cm, b = 9.0 cm, O = 564.0 cm ² | c, V |
| 6 | b = 20.3 dm, c = 7.0 dm, O = 753.8 dm ² | a, V |
| 7 | a = 11.0 cm, b = 5.4 cm, c = 13.8 cm | O, V |
| 8 | b = 7.3 dm, c = 19.5 dm, V = 3245.6 dm ³ | a, O |
| 9 | a = 6.9 dm, b = 20.9 dm, V = 2076.6 dm ³ | c, O |
| 10 | a = 11.7 mm, b = 5.0 mm, O = 437.6 mm ² | c, V |
| 11 | b = 12.7 m, c = 15.3 m, V = 3011.8 m ³ | a, O |
| 12 | a = 19.7 dm, b = 15.8 dm, V = 4077.5 dm ³ | c, O |
| 13 | a = 24.7 cm, b = 19.3 cm, O = 2616.6 cm ² | c, V |
| 14 | a = 18.4 m, b = 19.9 m, O = 2157.1 m ² | c, V |
| 15 | a = 21.9 dm, b = 9.3 dm, V = 1588.6 dm ³ | c, O |
| 16 | a = 22.2 cm, b = 11.4 cm, c = 6.3 cm | O, V |
| 17 | a = 16.1 dm, b = 19.8 dm, V = 6343.7 dm ³ | c, O |
| 18 | a = 6.2 m, c = 12.1 m, V = 1597.9 m ³ | b, O |
| 19 | a = 16.7 m, c = 14.1 m, V = 5180.3 m ³ | b, O |
| 20 | a = 15.7 m, c = 14.3 m, O = 1541.0 m ² | b, V |

Vorgehensweise: Zur Ermittlung der fehlenden Größen beim Quader ist die obige Formelsammlung anzuwenden.

Lösungen:

| Nr. | Kante a= | Kante b= | Kante c= | Oberfläche O= | Volumen V= |
|-----|----------|----------|----------|------------------------|------------------------|
| 1 | 15.3 m | 19.4 m | 7.2 m | 1093.3 m ² | 2137.1 m ³ |
| 2 | 24.1 cm | 15.5 cm | 19.4 cm | 2283.6 cm ² | 7246.9 cm ³ |
| 3 | 15.2 dm | 16.6 dm | 6.8 dm | 937.1 dm ² | 1715.8 dm ³ |
| 4 | 16.7 cm | 8.2 cm | 7.7 cm | 657.3 cm ² | 1054.4 cm ³ |
| 5 | 6.0 cm | 9.0 cm | 15.2 cm | 564.0 cm ² | 820.8 cm ³ |
| 6 | 8.6 dm | 20.3 dm | 7.0 dm | 753.8 dm ² | 1222.1 dm ³ |
| 7 | 11.0 cm | 5.4 cm | 13.8 cm | 571.4 cm ² | 819.7 cm ³ |
| 8 | 22.8 dm | 7.3 dm | 19.5 dm | 1506.8 dm ² | 3245.6 dm ³ |
| 9 | 6.9 dm | 20.9 dm | 14.4 dm | 1089.1 dm ² | 2076.6 dm ³ |
| 10 | 11.7 mm | 5.0 mm | 9.6 mm | 437.6 mm ² | 561.6 mm ³ |
| 11 | 15.5 m | 12.7 m | 15.3 m | 1256.6 m ² | 3011.8 m ³ |
| 12 | 19.7 dm | 15.8 dm | 13.1 dm | 1552.6 dm ² | 4077.5 dm ³ |
| 13 | 24.7 cm | 19.3 cm | 18.9 cm | 2616.6 cm ² | 9009.8 cm ³ |
| 14 | 18.4 m | 19.9 m | 18.6 m | 2157.1 m ² | 6810.6 m ³ |
| 15 | 21.9 dm | 9.3 dm | 7.8 dm | 894.1 dm ² | 1588.6 dm ³ |
| 16 | 22.2 cm | 11.4 cm | 6.3 cm | 929.5 cm ² | 1594.4 cm ³ |
| 17 | 16.1 dm | 19.8 dm | 19.9 dm | 2066.4 dm ² | 6343.7 dm ³ |
| 18 | 6.2 m | 21.3 m | 12.1 m | 929.6 m ² | 1597.9 m ³ |
| 19 | 16.7 m | 22.0 m | 14.1 m | 1826.1 m ² | 5180.3 m ³ |
| 20 | 15.7 m | 18.2 m | 14.3 m | 1541.0 m ² | 4086.1 m ³ |