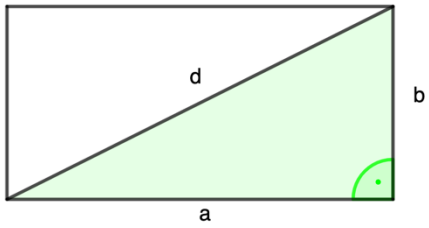
2. Bez Pythagoras Lösungen AB 1

1. Berechne die Länge der Diagonalen in einem Rechteck mit den Seitenlängen:



$d = \sqrt{a^2 + b^2}$

a) $d = \sqrt{6^2 + 4^2} = \underline{\underline{7{,}2cm}}$

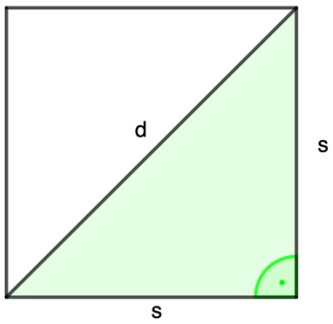
b) $d = \sqrt{5{,}4^2 + 7{,}2^2} = \underline{\underline{9cm}}$

c) $d = \sqrt{43{,}8^2 + 27{,}6^2} = \underline{\underline{51{,}8cm}}$

d) $d = \sqrt{\left(x\sqrt{3}\right)^2 + x^2} = \sqrt{3x^2+x^2} = \sqrt{4x^2} = \underline{\underline{2x}}$

e) $d = \sqrt{(4s)^2 + \left(2s\sqrt{5}\right)^2} = \sqrt{16s^2+4s^2 \cdot 5} = \sqrt{16s^2+20s^2} = \sqrt{36s^2} = \underline{\underline{6s}}$

2. Berechne die Länge der Diagonalen d des Quadrates mit der Seitenlänge s:



$d = \sqrt{s^2 + s^2}$

a) $d = \sqrt{7^2 + 7^2} = \underline{\underline{9{,}9cm}}$

b) $d = \sqrt{2{,}3^2 + 2{,}3^2} = \underline{\underline{3{,}3cm}}$

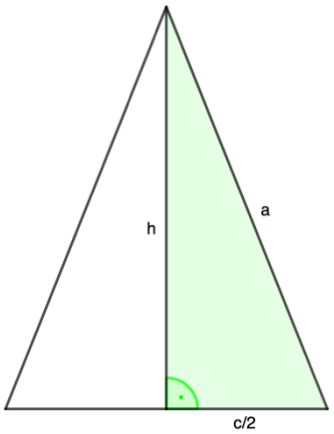
c) $d = \sqrt{10^2 + 10^2} = \underline{\underline{14{,}1m}}$

d) $d = \sqrt{1{,}4^2 + 1{,}4^2} = \underline{\underline{1{,}98m}}$

e) $d = \sqrt{(2x)^2 + (2x)^2} = \sqrt{4x^2 + 4x^2} = \sqrt{8x^2} = \sqrt{4x^2 \cdot 2} = \underline{\underline{2x\sqrt{2}}}$

f) $d = \sqrt{\left(\sqrt{a}\right)^2 + \left(\sqrt{a}\right)^2} = \sqrt{a + a} = \underline{\underline{\sqrt{2a}}}$

3. Berechne die Höhe und die Fläche eines gleichschenkligen Dreiecks mit der Schenkellänge a = b und c:



$$h = \sqrt{a^2 + \left(\frac{c}{2}\right)^2} \qquad A = \frac{h \cdot c}{2}$$

a) $h = \sqrt{5^2 - 4^2} = \underline{3cm}$ $\qquad A = \frac{h \cdot 8}{2} = \frac{3 \cdot 8}{2} = \underline{\underline{12cm^2}}$

b) $h = \sqrt{11^2 - 5^2} = \underline{9{,}8cm}$ $\qquad A = \frac{h \cdot 10}{2} = \frac{9{,}8 \cdot 10}{2} = \underline{\underline{49cm^2}}$

c) $h = \sqrt{64{,}5^2 - 19{,}6^2} = \underline{61{,}4cm}$ $\qquad A = \frac{h \cdot 39{,}2}{2} = \frac{61{,}4 \cdot 39{,}2}{2} = \underline{\underline{1204cm^2}}$

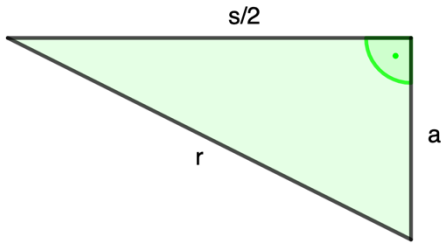
d) $h = \sqrt{\left(4\sqrt{5}\right)^2 - \left(2\sqrt{11}\right)^2} = \sqrt{16 \cdot 5 - 4 \cdot 11} = \sqrt{80 - 44} = \sqrt{36} = \underline{6}$

$$A = \frac{h \cdot 4\sqrt{11}}{2} = \frac{6 \cdot 4\sqrt{11}}{2} = \underline{\underline{12\sqrt{11}}}$$

e) $h = \sqrt{(6x)^2 - \left(x\sqrt{11}\right)^2} = \sqrt{36x^2 - 11x^2} = \sqrt{25x^2} = \underline{5x}$

$$A = \frac{h \cdot 2x\sqrt{11}}{2} = \frac{5x \cdot 2x\sqrt{11}}{2} = \underline{\underline{5x^2\sqrt{11}}}$$

4. Berechne den Abstand a einer Sehne s vom Mittelpunkt M in einem Kreis mit dem Radius r.



$$a = \sqrt{r^2 - \left(\frac{s}{2}\right)^2}$$

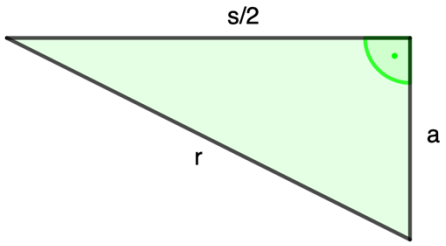
a) $a = \sqrt{6^2 - 2^2} = \underline{5{,}7cm}$

b) $a = \sqrt{18{,}4^2 - 6{,}8^2} = \underline{17{,}1cm}$

c) $a = \sqrt{\left(2\sqrt{3}\right)^2 - \left(\sqrt{2}\right)^2} = \sqrt{4 \cdot 3 - 2} = \underline{\sqrt{10}}$

d) $a = \sqrt{\left(0{,}5\sqrt{6}\right)^2 - \left(0{,}5\sqrt{5}\right)^2} = \sqrt{0{,}25 \cdot 6 - 0{,}25 \cdot 5} = \sqrt{1{,}5 - 1{,}25} = \sqrt{0{,}25} = \underline{0{,}5}$

5. Berechne die fehlende der drei Grössen r, s, a aus der Figur in Aufgabe 4.

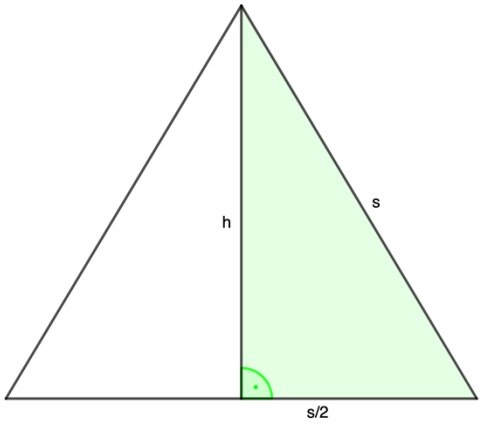


a) $a = \sqrt{3^2 - 2{,}4^2} = \underline{1{,}8cm}$

b) $\frac{s}{2} = \sqrt{4^2 - 2^2} = \underline{3{,}46cm}$ $\qquad s = \underline{6{,}9cm}$

c) $r = \sqrt{2{,}5^2 + 3^2} = \underline{3{,}9cm}$

6. Berechne die Höhe in einem gleichseitigen Dreieck mit der Seitenlänge s:



$$h = \sqrt{s^2 - \left(\frac{s}{2}\right)^2}$$

a) $h = \sqrt{5^2 - 2{,}5^2} = \underline{\underline{4{,}3cm}}$

b) $h = \sqrt{2{,}3^2 - 1{,}15^2} = \underline{\underline{2m}}$

c) $h = \sqrt{73{,}6^2 - 36{,}8^2} = \underline{\underline{63{,}7cm}}$

d) $h = \sqrt{\left(8\sqrt{2}\right)^2 - \left(4\sqrt{2}\right)^2} = \sqrt{64 \cdot 2 - 16 \cdot 2} = \sqrt{128 - 32} = \sqrt{96} = \sqrt{16 \cdot 6} = \underline{\underline{4\sqrt{6}}}$

e) $h = \sqrt{\left(2a\sqrt{3}\right)^2 - \left(a\sqrt{3}\right)^2} = \sqrt{4a^2 \cdot 3 - a^2 \cdot 3} = \sqrt{12a^2 - 3a^2} = \sqrt{9a^2} = \underline{\underline{3a}}$