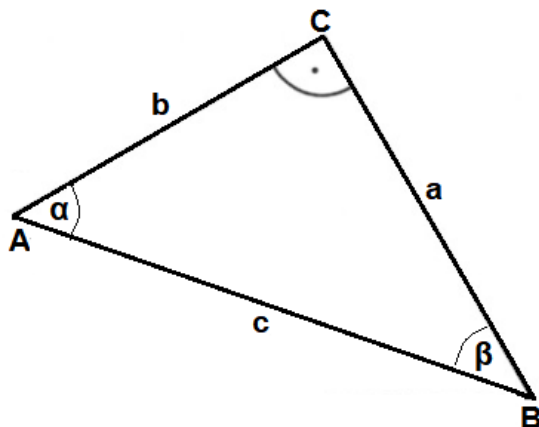


Mathematik-Aufgabenpool

> Satz des Pythagoras I

Einleitung: In einem rechtwinkligen Dreieck $\triangle ABC$ mit den Seiten a, b, c und den Winkeln α, β, γ bei $\gamma = 90^\circ$ heißen a und b Katheten, c Hypotenuse.



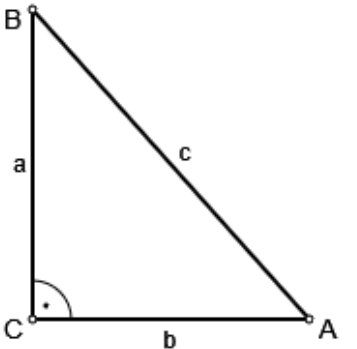
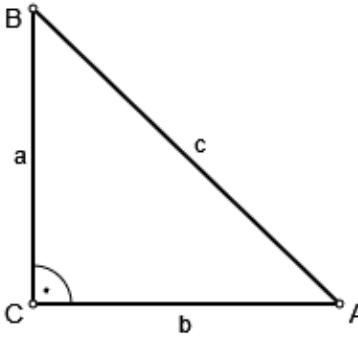
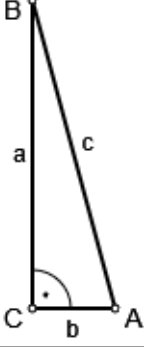
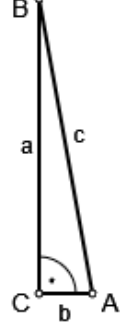
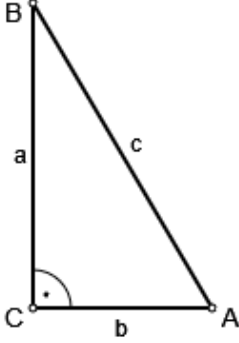
Rechtwinkliges Dreieck: Seiten a, b, c ; Winkel $\alpha, \beta, \gamma=90^\circ$

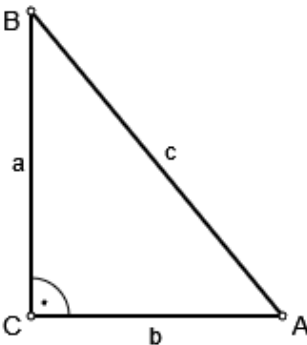
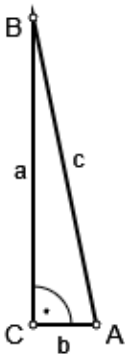
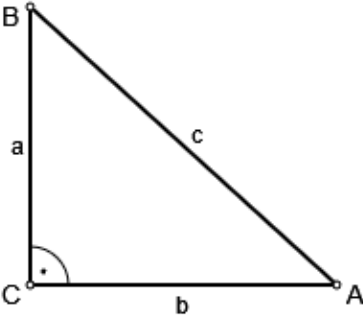
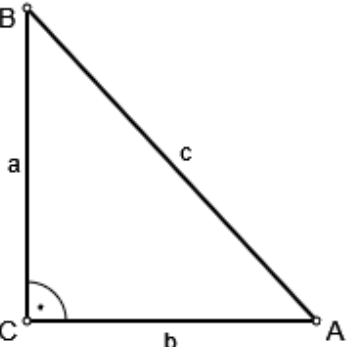
Formelsammlung:

Satz des Pythagoras	$c^2 = a^2 + b^2 \Rightarrow c = \sqrt{a^2 + b^2} \text{ (Hypotenuse)}$ $a^2 = c^2 - b^2 \Rightarrow a = \sqrt{c^2 - b^2} \text{ (Kathete)}$ $b^2 = c^2 - a^2 \Rightarrow b = \sqrt{c^2 - a^2} \text{ (Kathete)}$
Umfang	$u = a + b + c$
Fläche	$A = \frac{1}{2} ab$

Aufgabe 1: Berechne die fehlende Seitenlänge im rechtwinkligen Dreieck $\triangle ABC$ (Winkel $\gamma = 90^\circ$, a, b = Katheten, c = Hypotenuse).

Nr.	Gegeben:	Grafik:
1	$a = 1.2 \text{ cm}, c = 2.9 \text{ cm}$	

2	$a = 9.4 \text{ cm}, c = 12.6 \text{ cm}$	 <p>A right-angled triangle with vertices B at the top, C at the bottom-left, and A at the bottom-right. The right angle is at vertex C, indicated by a small square. Side BC is labeled 'a', side CA is labeled 'b', and the hypotenuse BA is labeled 'c'.</p>
3	$b = 2.5 \text{ cm}, c = 3.5 \text{ cm}$	 <p>A right-angled triangle with vertices B at the top, C at the bottom-left, and A at the bottom-right. The right angle is at vertex C, indicated by a small square. Side BC is labeled 'a', side CA is labeled 'b', and the hypotenuse BA is labeled 'c'.</p>
4	$a = 7.8 \text{ cm}, c = 8.1 \text{ cm}$	 <p>A right-angled triangle with vertices B at the top, C at the bottom-left, and A at the bottom-right. The right angle is at vertex C, indicated by a small square. Side BC is labeled 'a', side CA is labeled 'b', and the hypotenuse BA is labeled 'c'.</p>
5	$a = 6 \text{ cm}, b = 1.1 \text{ cm}$	 <p>A right-angled triangle with vertices B at the top, C at the bottom-left, and A at the bottom-right. The right angle is at vertex C, indicated by a small square. Side BC is labeled 'a', side CA is labeled 'b', and the hypotenuse BA is labeled 'c'.</p>
6	$a = 5.8 \text{ cm}, c = 6.7 \text{ cm}$	 <p>A right-angled triangle with vertices B at the top, C at the bottom-left, and A at the bottom-right. The right angle is at vertex C, indicated by a small square. Side BC is labeled 'a', side CA is labeled 'b', and the hypotenuse BA is labeled 'c'.</p>

7	$b = 5.1 \text{ cm}, c = 8 \text{ cm}$	
8	$a = 9.8 \text{ cm}, b = 2 \text{ cm}$	
9	$a = 8.5 \text{ cm}, b = 9.4 \text{ cm}$	
10	$a = 5.2 \text{ cm}, c = 7.1 \text{ cm}$	

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

Lösungen:

Nr.	Gegeben:	Lösungen:
1	$a = 1.2 \text{ cm}, c = 2.9 \text{ cm}$	$a = 1.2 \text{ cm}, b = 2.6 \text{ cm}, c = 2.9 \text{ cm}$
2	$a = 9.4 \text{ cm}, c = 12.6 \text{ cm}$	$a = 9.4 \text{ cm}, b = 8.4 \text{ cm}, c = 12.6 \text{ cm}$
3	$b = 2.5 \text{ cm}, c = 3.5 \text{ cm}$	$a = 2.4 \text{ cm}, b = 2.5 \text{ cm}, c = 3.5 \text{ cm}$
4	$a = 7.8 \text{ cm}, c = 8.1 \text{ cm}$	$a = 7.8 \text{ cm}, b = 2.1 \text{ cm}, c = 8.1 \text{ cm}$
5	$a = 6 \text{ cm}, b = 1.1 \text{ cm}$	$a = 6 \text{ cm}, b = 1.1 \text{ cm}, c = 6.1 \text{ cm}$
6	$a = 5.8 \text{ cm}, c = 6.7 \text{ cm}$	$a = 5.8 \text{ cm}, b = 3.4 \text{ cm}, c = 6.7 \text{ cm}$

7	b = 5.1 cm, c = 8 cm	a = 6.2 cm, b = 5.1 cm, c = 8 cm
8	a = 9.8 cm, b = 2 cm	a = 9.8 cm, b = 2 cm, c = 10 cm
9	a = 8.5 cm, b = 9.4 cm	a = 8.5 cm, b = 9.4 cm, c = 12.7 cm
10	a = 5.2 cm, c = 7.1 cm	a = 5.2 cm, b = 4.8 cm, c = 7.1 cm

Aufgabe 2: Berechne die fehlende Seitenlänge im rechtwinkligen Dreieck $\triangle ABC$ (Winkel $\gamma = 90^\circ$, a, b = Katheten, c = Hypotenuse).

Nr.	Seiten:
1	a = 2.7 dm, c = 4.5 dm
2	a = 0.4 dm, b = 0.09 dm
3	a = 33 cm, b = 44 cm
4	b = 0.2 dm, c = 1.01 dm
5	a = 0.44 m, b = 0.33 m
6	a = 0.15 dm, c = 0.17 dm
7	a = 0.8 mm, b = 0.6 mm
8	a = 6.5 m, b = 7.2 m
9	a = 5.1 mm, b = 6.8 mm
10	a = 4.4 m, b = 3.3 m
11	a = 3.9 dm, c = 6.5 dm
12	a = 0.6 mm, c = 1 mm
13	a = 69 dm, c = 115 dm
14	b = 20 dm, c = 101 dm
15	a = 0.35 cm, b = 0.12 cm
16	a = 11 dm, c = 61 dm
17	a = 0.96 dm, b = 0.28 dm
18	a = 10 dm, c = 26 dm
19	a = 45 mm, c = 51 mm
20	a = 77 mm, c = 85 mm

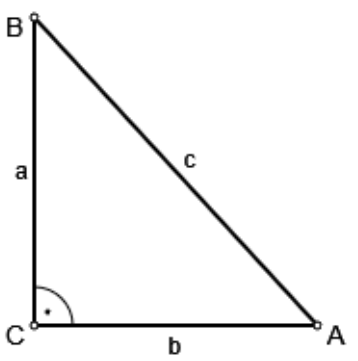
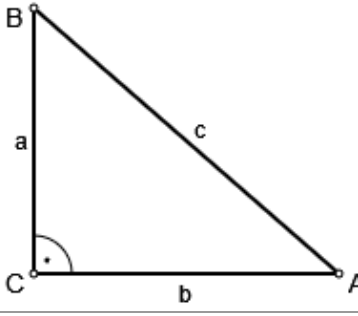
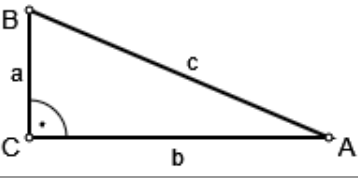
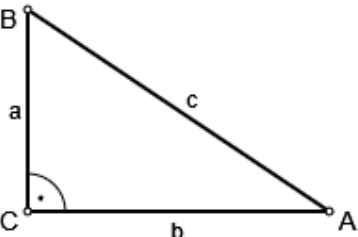
Vorgehensweise: Zur Ermittlung der fehlenden Größen beim rechtwinkligen Dreieck ist die obige Formelsammlung anzuwenden.

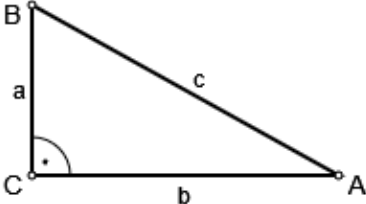
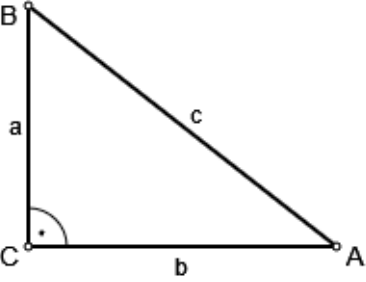
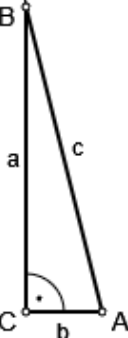
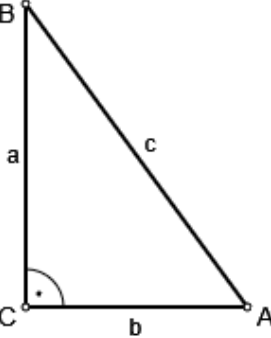
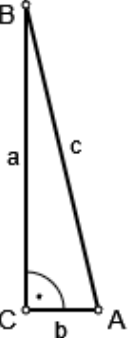
Lösungen:

Nr.	Seiten:	Lösung
1	a = 2.7 dm, c = 4.5 dm	b = 3.6 dm
2	a = 0.4 dm, b = 0.09 dm	c = 0.41 dm
3	a = 33 cm, b = 44 cm	c = 55 cm
4	b = 0.2 dm, c = 1.01 dm	a = 0.99 dm
5	a = 0.44 m, b = 0.33 m	c = 0.55 m
6	a = 0.15 dm, c = 0.17 dm	b = 0.08 dm
7	a = 0.8 mm, b = 0.6 mm	c = 1 mm
8	a = 6.5 m, b = 7.2 m	c = 9.7 m
9	a = 5.1 mm, b = 6.8 mm	c = 8.5 mm
10	a = 4.4 m, b = 3.3 m	c = 5.5 m
11	a = 3.9 dm, c = 6.5 dm	b = 5.2 dm
12	a = 0.6 mm, c = 1 mm	b = 0.8 mm
13	a = 69 dm, c = 115 dm	b = 92 dm
14	b = 20 dm, c = 101 dm	a = 99 dm
15	a = 0.35 cm, b = 0.12 cm	c = 0.37 cm

16	a = 11 dm, c = 61 dm	b = 60 dm
17	a = 0.96 dm, b = 0.28 dm	c = 1 dm
18	a = 10 dm, c = 26 dm	b = 24 dm
19	a = 45 mm, c = 51 mm	b = 24 mm
20	a = 77 mm, c = 85 mm	b = 36 mm

Aufgabe 3: Berechne die fehlenden Größen im rechtwinkligen Dreieck $\triangle ABC$ (Winkel $\gamma = 90^\circ$, a, b = Katheten, c = Hypotenuse, A = Flächeninhalt, u = Umfang).

Nr.	Gegeben:	Grafik:
1	a = 5 mm, c = 6.8 mm	
2	a = 7.8 mm, c = 11.9 mm	
3	a = 1.9 cm, c = 4.9 cm	
4	b = 9.4 cm, c = 11.3 cm	

5	$b = 9.3 \text{ dm}, c = 10.7 \text{ dm}$	
6	$a = 4 \text{ dm}, b = 5.1 \text{ dm}$	
7	$a = 8.1 \text{ cm}, b = 2 \text{ cm}$	
8	$b = 7 \text{ cm}, c = 11.9 \text{ cm}$	
9	$a = 8.1 \text{ dm}, c = 8.3 \text{ dm}$	

10	$a = 4 \text{ mm}, c = 4.5 \text{ mm}$	
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Vorgehensweise: Zur Ermittlung der fehlenden Größen beim rechtwinkligen Dreieck ist die obige Formelsammlung anzuwenden.

Lösungen:

Nr.	Gegeben:	Lösungen:
1	$a = 5 \text{ mm}, c = 6.8 \text{ mm}$	$a = 5 \text{ mm}, b = 4.6 \text{ mm}, c = 6.8 \text{ mm}, u = 16.4 \text{ mm}, A = 11.5 \text{ mm}^2$
2	$a = 7.8 \text{ mm}, c = 11.9 \text{ mm}$	$a = 7.8 \text{ mm}, b = 9 \text{ mm}, c = 11.9 \text{ mm}, u = 28.7 \text{ mm}, A = 35.1 \text{ mm}^2$
3	$a = 1.9 \text{ cm}, c = 4.9 \text{ cm}$	$a = 1.9 \text{ cm}, b = 4.5 \text{ cm}, c = 4.9 \text{ cm}, u = 11.3 \text{ cm}, A = 4.3 \text{ cm}^2$
4	$b = 9.4 \text{ cm}, c = 11.3 \text{ cm}$	$a = 6.3 \text{ cm}, b = 9.4 \text{ cm}, c = 11.3 \text{ cm}, u = 27 \text{ cm}, A = 29.6 \text{ cm}^2$
5	$b = 9.3 \text{ dm}, c = 10.7 \text{ dm}$	$a = 5.2 \text{ dm}, b = 9.3 \text{ dm}, c = 10.7 \text{ dm}, u = 25.2 \text{ dm}, A = 24.2 \text{ dm}^2$
6	$a = 4 \text{ dm}, b = 5.1 \text{ dm}$	$a = 4 \text{ dm}, b = 5.1 \text{ dm}, c = 6.5 \text{ dm}, u = 15.6 \text{ dm}, A = 10.2 \text{ dm}^2$
7	$a = 8.1 \text{ cm}, b = 2 \text{ cm}$	$a = 8.1 \text{ cm}, b = 2 \text{ cm}, c = 8.3 \text{ cm}, u = 18.4 \text{ cm}, A = 8.1 \text{ cm}^2$
8	$b = 7 \text{ cm}, c = 11.9 \text{ cm}$	$a = 9.6 \text{ cm}, b = 7 \text{ cm}, c = 11.9 \text{ cm}, u = 28.5 \text{ cm}, A = 33.6 \text{ cm}^2$
9	$a = 8.1 \text{ dm}, c = 8.3 \text{ dm}$	$a = 8.1 \text{ dm}, b = 1.9 \text{ dm}, c = 8.3 \text{ dm}, u = 18.3 \text{ dm}, A = 7.7 \text{ dm}^2$
10	$a = 4 \text{ mm}, c = 4.5 \text{ mm}$	$a = 4 \text{ mm}, b = 2.1 \text{ mm}, c = 4.5 \text{ mm}, u = 10.6 \text{ mm}, A = 4.2 \text{ mm}^2$

Aufgabe 4: Berechne die fehlenden Größen im rechtwinkligen Dreieck $\triangle ABC$ (Winkel $\gamma = 90^\circ$, a, b = Katheten, c = Hypotenuse, A = Flächeninhalt, u = Umfang).

Nr.	Gegeben:
1	$a = 4.8 \text{ cm}, c = 4.9 \text{ cm}$
2	$a = 1.5 \text{ mm}, c = 3.5 \text{ mm}$
3	$a = 8.3 \text{ dm}, b = 9.7 \text{ dm}$
4	$a = 5.8 \text{ m}, c = 6.1 \text{ m}$
5	$b = 8.8 \text{ cm}, c = 11.8 \text{ cm}$
6	$a = 4.4 \text{ dm}, c = 10 \text{ dm}$
7	$b = 4.6 \text{ cm}, c = 7.7 \text{ cm}$
8	$a = 4.7 \text{ mm}, c = 5 \text{ mm}$
9	$a = 1 \text{ mm}, c = 8.7 \text{ mm}$
10	$a = 8.4 \text{ dm}, b = 7 \text{ dm}$
11	$a = 3.7 \text{ m}, c = 5.2 \text{ m}$
12	$b = 1 \text{ cm}, c = 4.5 \text{ cm}$
13	$a = 1.9 \text{ dm}, b = 3.1 \text{ dm}$
14	$a = 3.1 \text{ m}, c = 3.3 \text{ m}$
15	$b = 8.2 \text{ cm}, c = 9 \text{ cm}$
16	$a = 2.9 \text{ cm}, b = 3.5 \text{ cm}$
17	$b = 5.8 \text{ cm}, c = 8.1 \text{ cm}$
18	$a = 4.1 \text{ dm}, c = 7.9 \text{ dm}$

19	b = 5.8 dm, c = 6.8 dm
20	b = 1.9 cm, c = 9.9 cm

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

Lösungen:

Nr.	Gegeben:	Lösungen:
1	a = 4.8 cm, c = 4.9 cm	a = 4.8 cm, b = 1.2 cm, c = 4.9 cm, u = 10.9 cm, A = 2.9 cm ²
2	a = 1.5 mm, c = 3.5 mm	a = 1.5 mm, b = 3.2 mm, c = 3.5 mm, u = 8.2 mm, A = 2.4 mm ²
3	a = 8.3 dm, b = 9.7 dm	a = 8.3 dm, b = 9.7 dm, c = 12.8 dm, u = 30.8 dm, A = 40.3 dm ²
4	a = 5.8 m, c = 6.1 m	a = 5.8 m, b = 2 m, c = 6.1 m, u = 13.9 m, A = 5.8 m ²
5	b = 8.8 cm, c = 11.8 cm	a = 7.8 cm, b = 8.8 cm, c = 11.8 cm, u = 28.4 cm, A = 34.3 cm ²
6	a = 4.4 dm, c = 10 dm	a = 4.4 dm, b = 9 dm, c = 10 dm, u = 23.4 dm, A = 19.8 dm ²
7	b = 4.6 cm, c = 7.7 cm	a = 6.2 cm, b = 4.6 cm, c = 7.7 cm, u = 18.5 cm, A = 14.3 cm ²
8	a = 4.7 mm, c = 5 mm	a = 4.7 mm, b = 1.8 mm, c = 5 mm, u = 11.5 mm, A = 4.2 mm ²
9	a = 1 mm, c = 8.7 mm	a = 1 mm, b = 8.6 mm, c = 8.7 mm, u = 18.3 mm, A = 4.3 mm ²
10	a = 8.4 dm, b = 7 dm	a = 8.4 dm, b = 7 dm, c = 10.9 dm, u = 26.3 dm, A = 29.4 dm ²
11	a = 3.7 m, c = 5.2 m	a = 3.7 m, b = 3.6 m, c = 5.2 m, u = 12.5 m, A = 6.7 m ²
12	b = 1 cm, c = 4.5 cm	a = 4.4 cm, b = 1 cm, c = 4.5 cm, u = 9.9 cm, A = 2.2 cm ²
13	a = 1.9 dm, b = 3.1 dm	a = 1.9 dm, b = 3.1 dm, c = 3.6 dm, u = 8.6 dm, A = 2.9 dm ²
14	a = 3.1 m, c = 3.3 m	a = 3.1 m, b = 1.2 m, c = 3.3 m, u = 7.6 m, A = 1.9 m ²
15	b = 8.2 cm, c = 9 cm	a = 3.6 cm, b = 8.2 cm, c = 9 cm, u = 20.8 cm, A = 14.8 cm ²
16	a = 2.9 cm, b = 3.5 cm	a = 2.9 cm, b = 3.5 cm, c = 4.5 cm, u = 10.9 cm, A = 5.1 cm ²
17	b = 5.8 cm, c = 8.1 cm	a = 5.6 cm, b = 5.8 cm, c = 8.1 cm, u = 19.5 cm, A = 16.2 cm ²
18	a = 4.1 dm, c = 7.9 dm	a = 4.1 dm, b = 6.7 dm, c = 7.9 dm, u = 18.7 dm, A = 13.7 dm ²
19	b = 5.8 dm, c = 6.8 dm	a = 3.6 dm, b = 5.8 dm, c = 6.8 dm, u = 16.2 dm, A = 10.4 dm ²
20	b = 1.9 cm, c = 9.9 cm	a = 9.7 cm, b = 1.9 cm, c = 9.9 cm, u = 21.5 cm, A = 9.2 cm ²

Aufgabe 5: Berechne die fehlenden Größen im rechtwinkligen Dreieck $\triangle ABC$ (Winkel $\gamma = 90^\circ$, a, b = Katheten, c = Hypotenuse, A = Flächeninhalt, u = Umfang).

Nr.	Gegeben:
1	a = 4.9 dm, c = 10.2 dm
2	a = 11.7 dm, c = 13.6 dm
3	a = 9.9 dm, c = 18.3 dm
4	b = 23.6 cm, c = 25.6 cm
5	a = 3.7 m, c = 20 m
6	a = 7.7 dm, c = 18.9 dm
7	a = 6 dm, c = 15 dm
8	a = 9.6 cm, c = 21.4 cm
9	b = 11.1 dm, c = 11.5 dm
10	a = 16.4 cm, c = 17.5 cm
11	a = 5.7 mm, c = 9.3 mm
12	a = 9.8 mm, c = 24.3 mm
13	b = 17.3 cm, c = 24.6 cm
14	a = 4.7 dm, c = 12.8 dm
15	a = 19.7 m, b = 7 m
16	a = 19.1 m, b = 11 m
17	a = 11.7 m, c = 14.8 m

18	$a = 15.3 \text{ cm}, c = 21 \text{ cm}$
19	$a = 7.7 \text{ m}, c = 14.5 \text{ m}$
20	$a = 5.7 \text{ cm}, c = 24.8 \text{ cm}$

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

Lösungen:

Nr.	Gegeben:	Lösungen:
1	$a = 4.9 \text{ dm}, c = 10.2 \text{ dm}$	$a = 4.9 \text{ dm}, b = 9 \text{ dm}, c = 10.2 \text{ dm}, u = 24.1 \text{ dm}, A = 22.1 \text{ dm}^2$
2	$a = 11.7 \text{ dm}, c = 13.6 \text{ dm}$	$a = 11.7 \text{ dm}, b = 7 \text{ dm}, c = 13.6 \text{ dm}, u = 32.3 \text{ dm}, A = 41 \text{ dm}^2$
3	$a = 9.9 \text{ dm}, c = 18.3 \text{ dm}$	$a = 9.9 \text{ dm}, b = 15.4 \text{ dm}, c = 18.3 \text{ dm}, u = 43.6 \text{ dm}, A = 76.2 \text{ dm}^2$
4	$b = 23.6 \text{ cm}, c = 25.6 \text{ cm}$	$a = 9.9 \text{ cm}, b = 23.6 \text{ cm}, c = 25.6 \text{ cm}, u = 59.1 \text{ cm}, A = 116.8 \text{ cm}^2$
5	$a = 3.7 \text{ m}, c = 20 \text{ m}$	$a = 3.7 \text{ m}, b = 19.7 \text{ m}, c = 20 \text{ m}, u = 43.4 \text{ m}, A = 36.4 \text{ m}^2$
6	$a = 7.7 \text{ dm}, c = 18.9 \text{ dm}$	$a = 7.7 \text{ dm}, b = 17.3 \text{ dm}, c = 18.9 \text{ dm}, u = 43.9 \text{ dm}, A = 66.6 \text{ dm}^2$
7	$a = 6 \text{ dm}, c = 15 \text{ dm}$	$a = 6 \text{ dm}, b = 13.8 \text{ dm}, c = 15 \text{ dm}, u = 34.8 \text{ dm}, A = 41.4 \text{ dm}^2$
8	$a = 9.6 \text{ cm}, c = 21.4 \text{ cm}$	$a = 9.6 \text{ cm}, b = 19.1 \text{ cm}, c = 21.4 \text{ cm}, u = 50.1 \text{ cm}, A = 91.7 \text{ cm}^2$
9	$b = 11.1 \text{ dm}, c = 11.5 \text{ dm}$	$a = 3 \text{ dm}, b = 11.1 \text{ dm}, c = 11.5 \text{ dm}, u = 25.6 \text{ dm}, A = 16.7 \text{ dm}^2$
10	$a = 16.4 \text{ cm}, c = 17.5 \text{ cm}$	$a = 16.4 \text{ cm}, b = 6 \text{ cm}, c = 17.5 \text{ cm}, u = 39.9 \text{ cm}, A = 49.2 \text{ cm}^2$
11	$a = 5.7 \text{ mm}, c = 9.3 \text{ mm}$	$a = 5.7 \text{ mm}, b = 7.3 \text{ mm}, c = 9.3 \text{ mm}, u = 22.3 \text{ mm}, A = 20.8 \text{ mm}^2$
12	$a = 9.8 \text{ mm}, c = 24.3 \text{ mm}$	$a = 9.8 \text{ mm}, b = 22.2 \text{ mm}, c = 24.3 \text{ mm}, u = 56.3 \text{ mm}, A = 108.8 \text{ mm}^2$
13	$b = 17.3 \text{ cm}, c = 24.6 \text{ cm}$	$a = 17.5 \text{ cm}, b = 17.3 \text{ cm}, c = 24.6 \text{ cm}, u = 59.4 \text{ cm}, A = 151.4 \text{ cm}^2$
14	$a = 4.7 \text{ dm}, c = 12.8 \text{ dm}$	$a = 4.7 \text{ dm}, b = 11.9 \text{ dm}, c = 12.8 \text{ dm}, u = 29.4 \text{ dm}, A = 28 \text{ dm}^2$
15	$a = 19.7 \text{ m}, b = 7 \text{ m}$	$a = 19.7 \text{ m}, b = 7 \text{ m}, c = 20.9 \text{ m}, u = 47.6 \text{ m}, A = 69 \text{ m}^2$
16	$a = 19.1 \text{ m}, b = 11 \text{ m}$	$a = 19.1 \text{ m}, b = 11 \text{ m}, c = 22 \text{ m}, u = 52.1 \text{ m}, A = 105.1 \text{ m}^2$
17	$a = 11.7 \text{ m}, c = 14.8 \text{ m}$	$a = 11.7 \text{ m}, b = 9 \text{ m}, c = 14.8 \text{ m}, u = 35.5 \text{ m}, A = 52.7 \text{ m}^2$
18	$a = 15.3 \text{ cm}, c = 21 \text{ cm}$	$a = 15.3 \text{ cm}, b = 14.4 \text{ cm}, c = 21 \text{ cm}, u = 50.7 \text{ cm}, A = 110.2 \text{ cm}^2$
19	$a = 7.7 \text{ m}, c = 14.5 \text{ m}$	$a = 7.7 \text{ m}, b = 12.3 \text{ m}, c = 14.5 \text{ m}, u = 34.5 \text{ m}, A = 47.4 \text{ m}^2$
20	$a = 5.7 \text{ cm}, c = 24.8 \text{ cm}$	$a = 5.7 \text{ cm}, b = 24.1 \text{ cm}, c = 24.8 \text{ cm}, u = 54.6 \text{ cm}, A = 68.7 \text{ cm}^2$