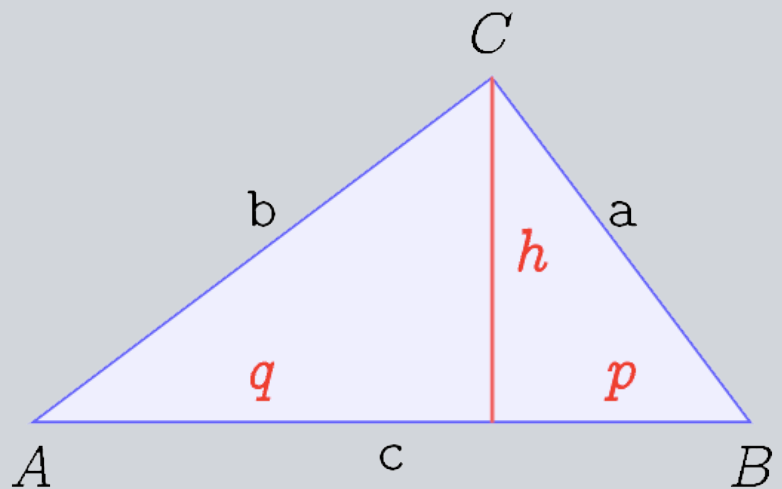


MATHEMATIK

Aufgabensammlung mit vollständigen Lösungen

Planimetrie I 50

Berechnungen am Dreieck



NEO
LERNHILFEN



licensed to:
Raphael Neuherz



Arbeitsblätter

Mathematics

(17th January 2014 11:13)

school year
2012/13

Responsible for content
Dipl.-Ing. Edgar Neuherz

Graz, 2014

Wir weisen darauf hin, dass das Kopieren zum Schulgebrauch verboten ist - § 42 Absatz(6) der Urheberrechtsgesetznovelle 2003:

„Die Befugnis zur Vervielfältigung zum eigenen Schulgebrauch gilt nicht für Werke, die ihrer Beschaffenheit und Bezeichnung nach zum Schul- oder Unterrichtsgebrauch bestimmt sind.“

© 2011-2014 DI Edgar Neuherz
Strauchergasse 23, A-8020 Graz
Alle Rechte vorbehalten.

Dieses Werk ist urheberrechtlich geschützt. Die dadurch begründeten Rechte, insbesondere das der Übersetzung, des Nachdrucks, der Entnahme von Abbildungen, der Funksendung, der Wiedergabe auf fotomechanischem oder ähnlichem Wege und der Speicherung in Datenverarbeitungsanlagen, bleiben, auch bei nur auszugsweise Verwertung, vorbehalten.

ISBN
NEO Website: mathematik.neo-lernhilfen.at

E-Mail an neo.verlag@me.com

Contents

1	Problems	1
1.1	Gleichungssysteme	3
1.1.1	Allgemeines Dreieck	3
1.1.2	Rechtwinkeliges Dreieck	3
1.1.3	Gleichschenkeliges Dreieck	3
2	Solutions	5
2.1	Gleichungssysteme	7
2.1.1	Allgemeines Dreieck	7
2.1.2	Rechtwinkeliges Dreieck	17
2.1.3	Gleichschenkeliges Dreieck	27

1

Problems

1.1 Gleichungssysteme

1.1.1 Allgemeines Dreieck

Text undefined 1 ...

1 $a = 51 \text{ mm}, b = 91 \text{ mm}, c = 79 \text{ mm}.$

2 $a = 43 \text{ mm}, b = 99 \text{ mm}, c = 78 \text{ mm}.$

3 $a = 40 \text{ mm}, b = 66 \text{ mm}, c = 40 \text{ mm}.$

4 $a = 40 \text{ mm}, b = 50 \text{ mm}, c = 47 \text{ mm}.$

5 $a = 38 \text{ mm}, b = 57 \text{ mm}, c = 43 \text{ mm}.$

6 $a = 46 \text{ mm}, b = 85 \text{ mm}, c = 60 \text{ mm}.$

7 $a = 52 \text{ mm}, b = 93 \text{ mm}, c = 77 \text{ mm}.$

8 $a = 48 \text{ mm}, b = 110 \text{ mm}, c = 81 \text{ mm}.$

9 $a = 42 \text{ mm}, b = 48 \text{ mm}, c = 63 \text{ mm}.$

10 $a = 44 \text{ mm}, b = 57 \text{ mm}, c = 68 \text{ mm}.$

11:13 **1**
17th January 2014

1.1.2 Rechtwinkeliges Dreieck

Text undefined 1 ...

11 $a = 30 \text{ mm}, b = 56 \text{ mm}.$

12 $a = 84 \text{ mm}, c = 116,7 \text{ mm}.$

13 $a = 70 \text{ mm}, h = 54,52 \text{ mm}.$

14 $a = 39 \text{ mm}, p = 25,22 \text{ mm}.$

15 $b = 54 \text{ mm}, q = 49,68 \text{ mm}.$

16 $a = 25 \text{ mm}, A = 1037,5 \text{ mm}.$

17 $b = 56 \text{ mm}, A = 868 \text{ mm}.$

18 $h = 46,07 \text{ mm}, q = 80,83 \text{ mm}.$

19 $a = 75 \text{ mm}, b = 52 \text{ mm}.$

20 $a = 67 \text{ mm}, c = 105,9 \text{ mm}.$

11:13 **2**
17th January 2014

1.1.3 Gleichschenkeliges Dreieck

Von einem gleichschenkeligem Dreieck sind nachfolgende Daten bekannt. Die fehlenden Daten von a, c, h_a, h_c, A und U sind zu berechnen!

21 $a = b = 53 \text{ mm}, c = 84 \text{ mm}.$

22 $a = b = 86 \text{ mm}, h_c = 83.14 \text{ mm}.$

23 $c = 57 \text{ mm}, h_c = 84.31 \text{ mm}.$

24 $c = 87 \text{ mm}, A = 2868.61 \text{ mm}.$

25 $a = b = 71 \text{ mm}, U = 190 \text{ mm}.$

26 $c = 88 \text{ mm}, U = 220 \text{ mm}.$

27 $h_a = 73.49 \text{ mm}, A = 2939.78 \text{ mm}.$

28 $a = b = 81 \text{ mm}, c = 59 \text{ mm}.$

29 $a = b = 59 \text{ mm}, h_c = 48.22 \text{ mm}.$

30 $c = 68 \text{ mm}, h_c = 75.72 \text{ mm}.$

11:13 **3**
17th January 2014

2

Solutions

2.1 Gleichungssysteme

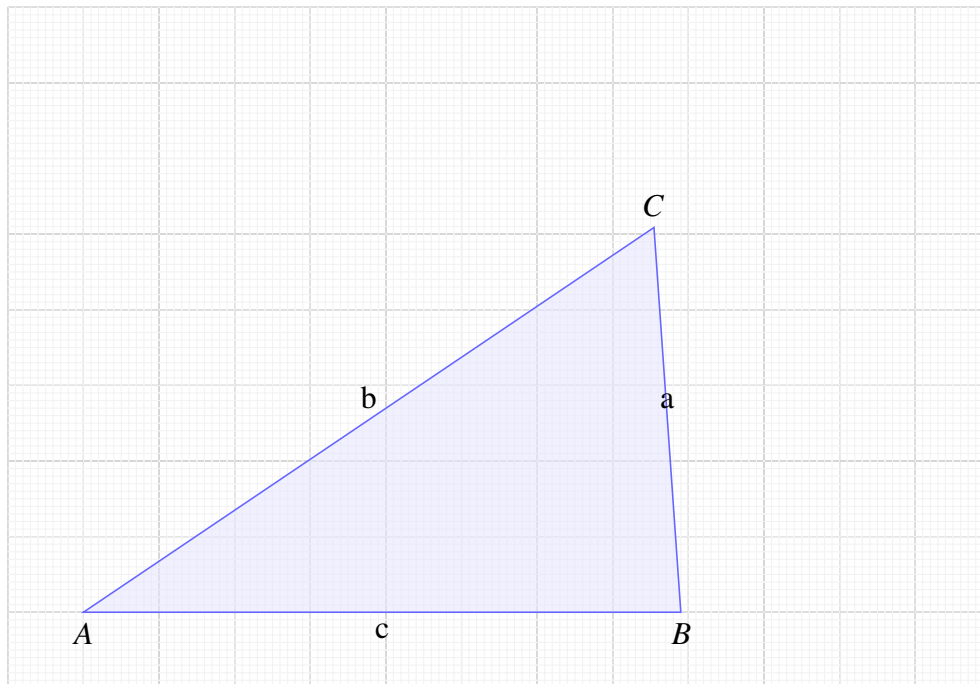
2.1.1 Allgemeines Dreieck

Text undefined 1 ...

11:13 **1**

17th January 2014

1 $a = 51 \text{ mm}$, $b = 91 \text{ mm}$, $c = 79 \text{ mm}$.



Heronsche Flächenformel

$$U = a + b + c = 51 + 91 + 79 = 221 \text{ mm}$$

$$s = \frac{U}{2} = \frac{221}{2} = 110,5$$

$$A = \sqrt{s(s-a)(s-b)(s-c)} = \sqrt{110,5(110,5-51)(110,5-91)(110,5-79)} = \\ = \sqrt{110,5 \cdot 59,5 \cdot 19,5 \cdot 31,5} = \sqrt{4038540,19} = \underline{2009,61 \text{ mm}^2}$$

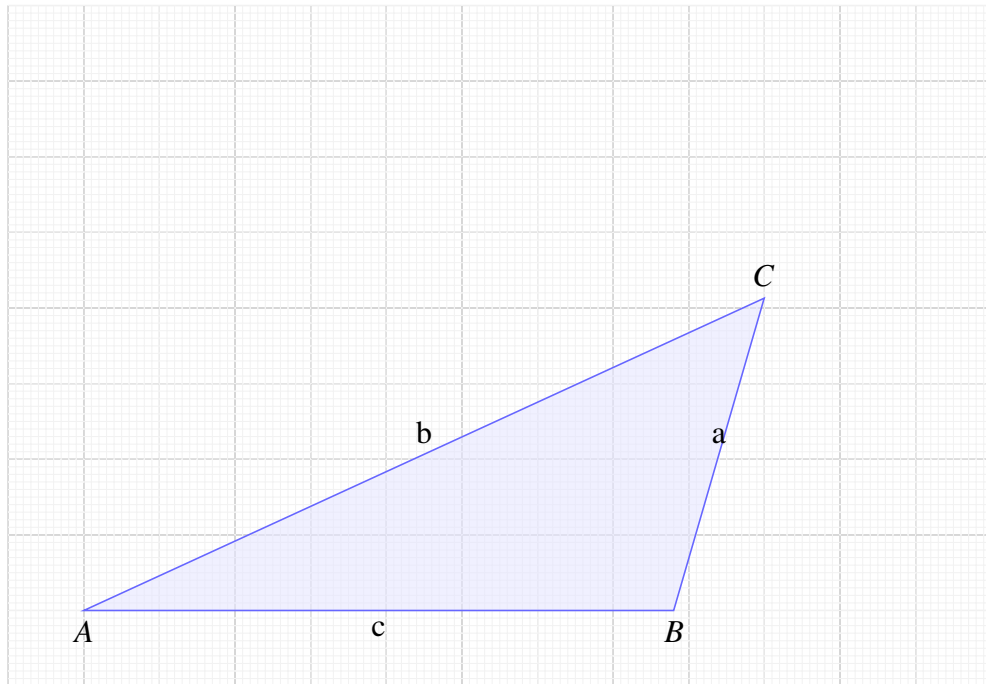
Flächenformel Dreieck

$$h_a = \frac{2 \cdot A}{a} = \frac{2 \cdot 2009,61}{51} = \underline{78,81 \text{ mm}}$$

$$h_b = \frac{2 \cdot A}{b} = \frac{2 \cdot 2009,61}{91} = \underline{44,17 \text{ mm}}$$

$$h_c = \frac{2 \cdot A}{c} = \frac{2 \cdot 2009,61}{79} = \underline{50,88 \text{ mm}}$$

2 $a = 43 \text{ mm}, b = 99 \text{ mm}, c = 78 \text{ mm}.$



Heronsche Flächenformel

$$U = a + b + c = 43 + 99 + 78 = 220 \text{ mm}$$

$$s = \frac{U}{2} = \frac{220}{2} = 110$$

$$A = \sqrt{s(s-a)(s-b)(s-c)} = \sqrt{110(110-43)(110-99)(110-78)} = \\ = \sqrt{110 \cdot 67 \cdot 11 \cdot 32} = \sqrt{2594240} = \underline{1610,66 \text{ mm}^2}$$

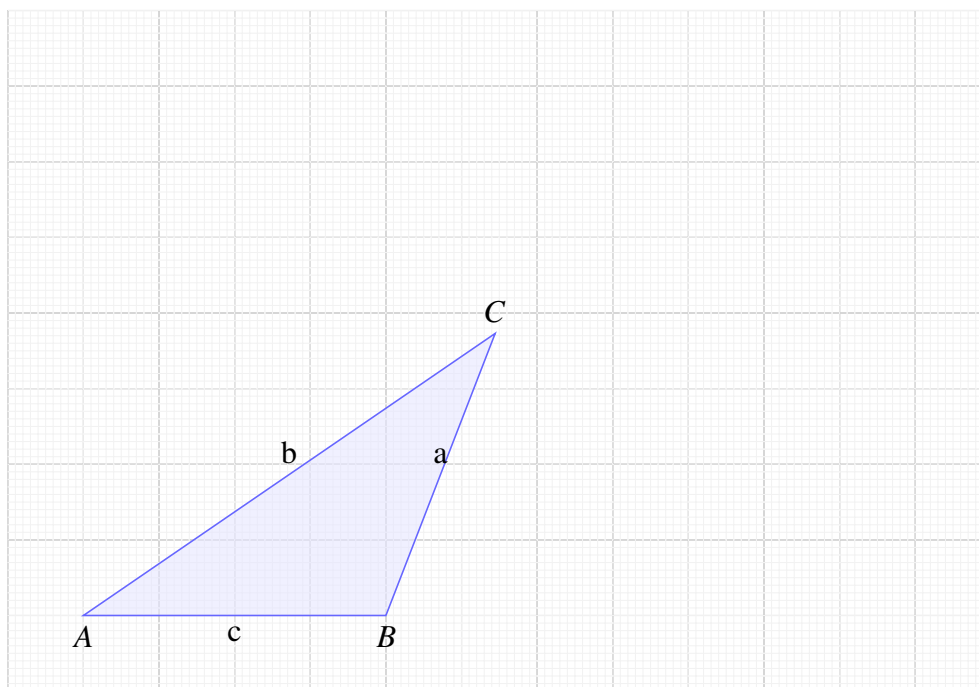
Flächenformel Dreieck

$$h_a = \frac{2 \cdot A}{a} = \frac{2 \cdot 1610,66}{43} = \underline{74,91 \text{ mm}}$$

$$h_b = \frac{2 \cdot A}{b} = \frac{2 \cdot 1610,66}{99} = \underline{32,54 \text{ mm}}$$

$$h_c = \frac{2 \cdot A}{c} = \frac{2 \cdot 1610,66}{78} = \underline{41,3 \text{ mm}}$$

3 $a = 40 \text{ mm}$, $b = 66 \text{ mm}$, $c = 40 \text{ mm}$.



Heronsche Flächenformel

$$U = a + b + c = 40 + 66 + 40 = 146 \text{ mm}$$

$$s = \frac{U}{2} = \frac{146}{2} = 73$$

$$A = \sqrt{s(s-a)(s-b)(s-c)} = \sqrt{73(73-40)(73-66)(73-40)} = \\ = \sqrt{73 \cdot 33 \cdot 7 \cdot 33} = \sqrt{556479} = \underline{745,98 \text{ mm}^2}$$

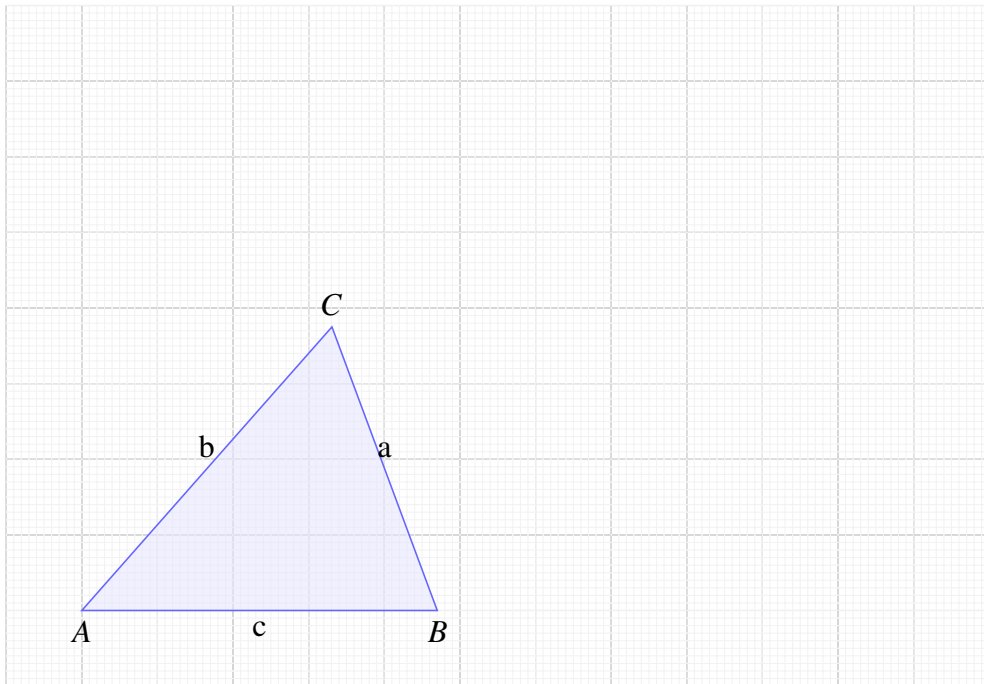
Flächenformel Dreieck

$$h_a = \frac{2 \cdot A}{a} = \frac{2 \cdot 745,98}{40} = \underline{37,3 \text{ mm}}$$

$$h_b = \frac{2 \cdot A}{b} = \frac{2 \cdot 745,98}{66} = \underline{22,61 \text{ mm}}$$

$$h_c = \frac{2 \cdot A}{c} = \frac{2 \cdot 745,98}{40} = \underline{37,3 \text{ mm}}$$

4 $a = 40 \text{ mm}, b = 50 \text{ mm}, c = 47 \text{ mm}.$



Heronsche Flächenformel

$$U = a + b + c = 40 + 50 + 47 = 137 \text{ mm}$$

$$s = \frac{U}{2} = \frac{137}{2} = 68,5$$

$$A = \sqrt{s(s-a)(s-b)(s-c)} = \sqrt{68,5(68,5-40)(68,5-50)(68,5-47)} = \\ = \sqrt{68,5 \cdot 28,5 \cdot 18,5 \cdot 21,5} = \sqrt{776507,44} = \underline{881,2 \text{ mm}^2}$$

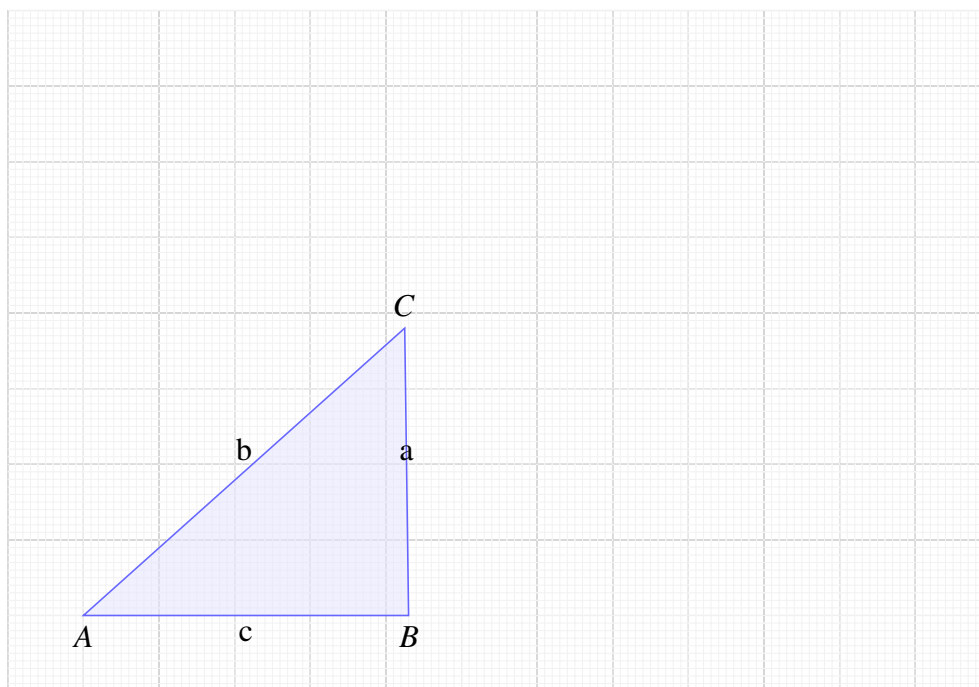
Flächenformel Dreieck

$$h_a = \frac{2 \cdot A}{a} = \frac{2 \cdot 881,2}{40} = \underline{44,06 \text{ mm}}$$

$$h_b = \frac{2 \cdot A}{b} = \frac{2 \cdot 881,2}{50} = \underline{35,25 \text{ mm}}$$

$$h_c = \frac{2 \cdot A}{c} = \frac{2 \cdot 881,2}{47} = \underline{37,5 \text{ mm}}$$

5 $a = 38 \text{ mm}$, $b = 57 \text{ mm}$, $c = 43 \text{ mm}$.



Heronsche Flächenformel

$$U = a + b + c = 38 + 57 + 43 = 138 \text{ mm}$$

$$s = \frac{U}{2} = \frac{138}{2} = 69$$

$$A = \sqrt{s(s-a)(s-b)(s-c)} = \sqrt{69(69-38)(69-57)(69-43)} = \\ = \sqrt{69 \cdot 31 \cdot 12 \cdot 26} = \sqrt{667368} = \underline{816,93 \text{ mm}^2}$$

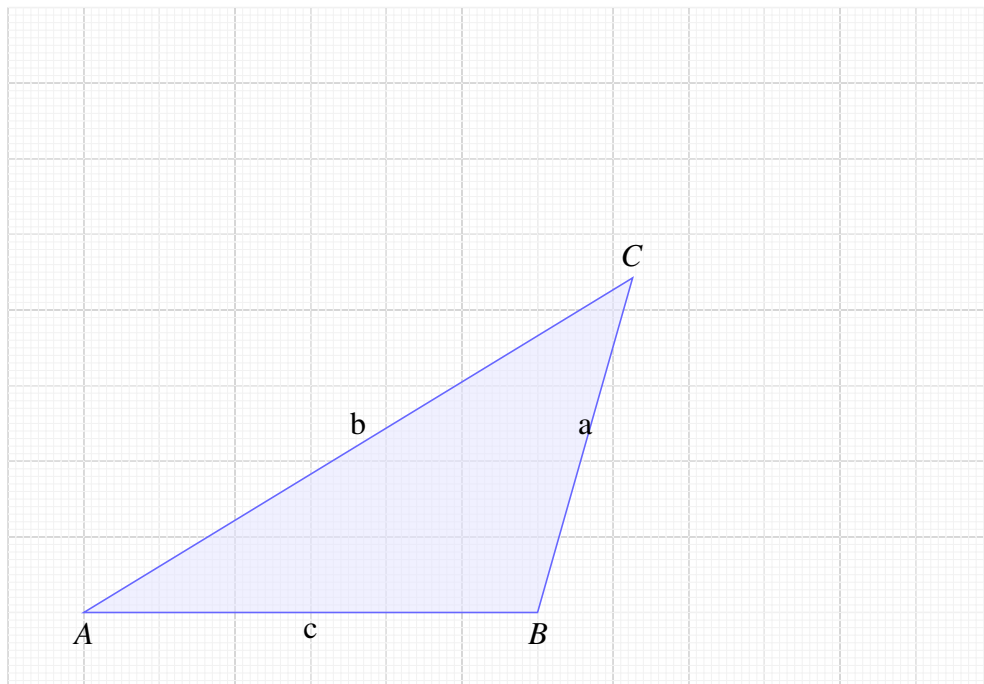
Flächenformel Dreieck

$$h_a = \frac{2 \cdot A}{a} = \frac{2 \cdot 816,93}{38} = \underline{43,0 \text{ mm}}$$

$$h_b = \frac{2 \cdot A}{b} = \frac{2 \cdot 816,93}{57} = \underline{28,66 \text{ mm}}$$

$$h_c = \frac{2 \cdot A}{c} = \frac{2 \cdot 816,93}{43} = \underline{38,0 \text{ mm}}$$

6 $a = 46 \text{ mm}, b = 85 \text{ mm}, c = 60 \text{ mm}.$



Heronsche Flächenformel

$$U = a + b + c = 46 + 85 + 60 = 191 \text{ mm}$$

$$s = \frac{U}{2} = \frac{191}{2} = 95,5$$

$$A = \sqrt{s(s-a)(s-b)(s-c)} = \sqrt{95,5(95,5-46)(95,5-85)(95,5-60)} = \\ = \sqrt{95,5 \cdot 49,5 \cdot 10,5 \cdot 35,5} = \sqrt{1762082,44} = \underline{1327,43 \text{ mm}^2}$$

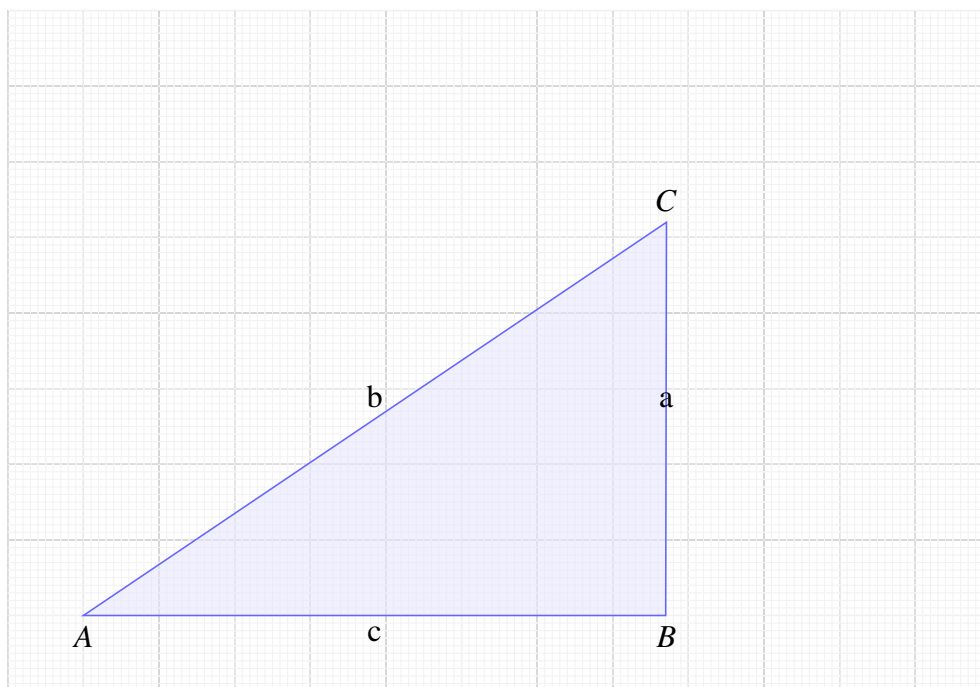
Flächenformel Dreieck

$$h_a = \frac{2 \cdot A}{a} = \frac{2 \cdot 1327,43}{46} = \underline{57,71 \text{ mm}}$$

$$h_b = \frac{2 \cdot A}{b} = \frac{2 \cdot 1327,43}{85} = \underline{31,23 \text{ mm}}$$

$$h_c = \frac{2 \cdot A}{c} = \frac{2 \cdot 1327,43}{60} = \underline{44,25 \text{ mm}}$$

7 $a = 52 \text{ mm}$, $b = 93 \text{ mm}$, $c = 77 \text{ mm}$.



Heronsche Flächenformel

$$U = a + b + c = 52 + 93 + 77 = 222 \text{ mm}$$

$$s = \frac{U}{2} = \frac{222}{2} = 111$$

$$A = \sqrt{s(s-a)(s-b)(s-c)} = \sqrt{111(111-52)(111-93)(111-77)} = \\ = \sqrt{111 \cdot 59 \cdot 18 \cdot 34} = \sqrt{4007988} = \underline{2002,0 \text{ mm}^2}$$

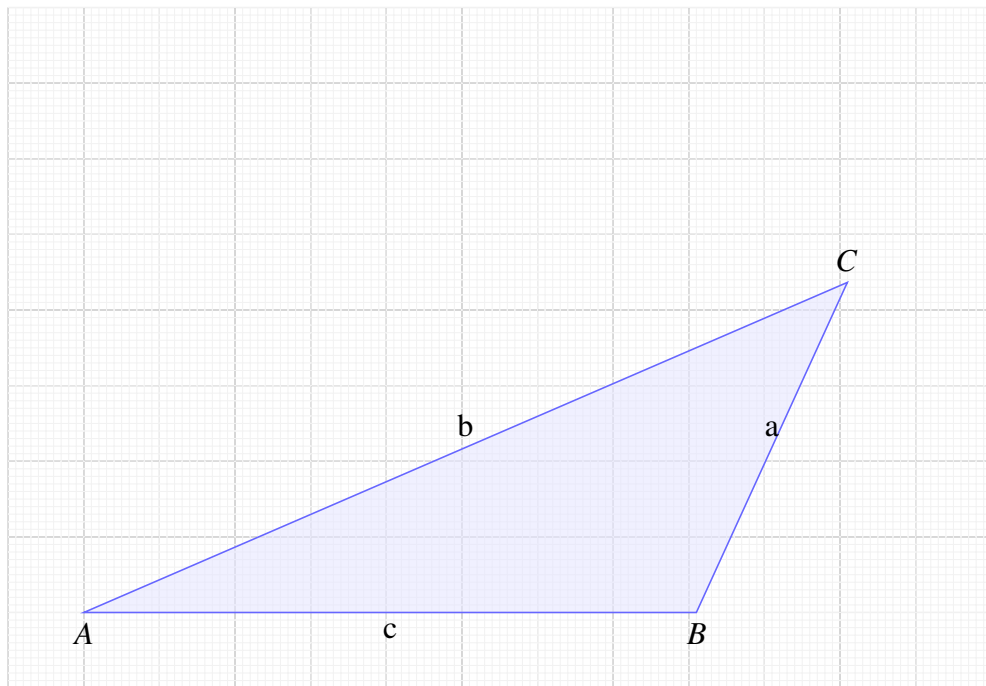
Flächenformel Dreieck

$$h_a = \frac{2 \cdot A}{a} = \frac{2 \cdot 2002,0}{52} = \underline{77,0 \text{ mm}}$$

$$h_b = \frac{2 \cdot A}{b} = \frac{2 \cdot 2002,0}{93} = \underline{43,05 \text{ mm}}$$

$$h_c = \frac{2 \cdot A}{c} = \frac{2 \cdot 2002,0}{77} = \underline{52,0 \text{ mm}}$$

8 $a = 48 \text{ mm}, b = 110 \text{ mm}, c = 81 \text{ mm}.$



Heronsche Flächenformel

$$U = a + b + c = 48 + 110 + 81 = 239 \text{ mm}$$

$$s = \frac{U}{2} = \frac{239}{2} = 119,5$$

$$\begin{aligned} A &= \sqrt{s(s-a)(s-b)(s-c)} = \sqrt{119,5(119,5-48)(119,5-110)(119,5-81)} = \\ &= \sqrt{119,5 \cdot 71,5 \cdot 9,5 \cdot 38,5} = \sqrt{3125059,44} = \underline{1767,78 \text{ mm}^2} \end{aligned}$$

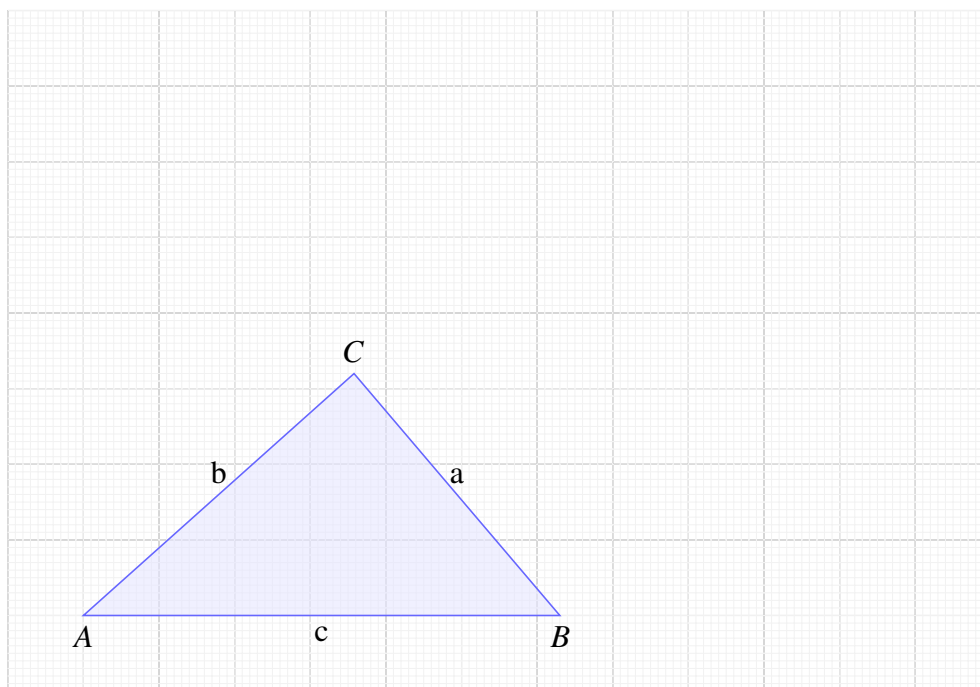
Flächenformel Dreieck

$$h_a = \frac{2 \cdot A}{a} = \frac{2 \cdot 1767,78}{48} = \underline{73,66 \text{ mm}}$$

$$h_b = \frac{2 \cdot A}{b} = \frac{2 \cdot 1767,78}{110} = \underline{32,14 \text{ mm}}$$

$$h_c = \frac{2 \cdot A}{c} = \frac{2 \cdot 1767,78}{81} = \underline{43,65 \text{ mm}}$$

9 $a = 42 \text{ mm}$, $b = 48 \text{ mm}$, $c = 63 \text{ mm}$.



Heronsche Flächenformel

$$U = a + b + c = 42 + 48 + 63 = 153 \text{ mm}$$

$$s = \frac{U}{2} = \frac{153}{2} = 76,5$$

$$A = \sqrt{s(s-a)(s-b)(s-c)} = \sqrt{76,5(76,5-42)(76,5-48)(76,5-63)} = \\ = \sqrt{76,5 \cdot 34,5 \cdot 28,5 \cdot 13,5} = \sqrt{1015451,44} = \underline{1007,7 \text{ mm}^2}$$

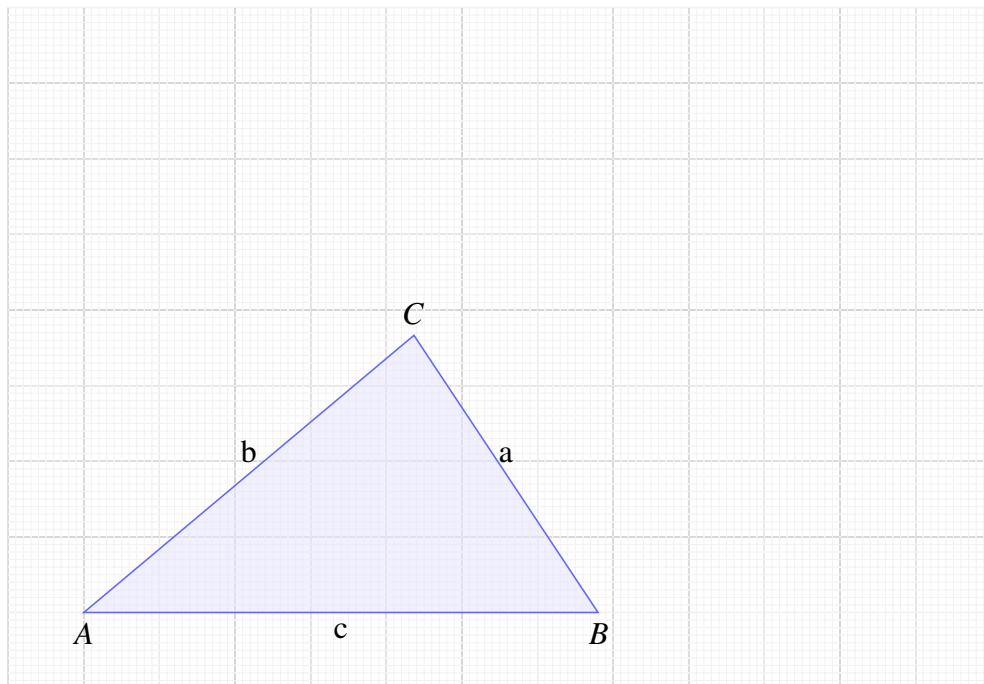
Flächenformel Dreieck

$$h_a = \frac{2 \cdot A}{a} = \frac{2 \cdot 1007,7}{42} = \underline{47,99 \text{ mm}}$$

$$h_b = \frac{2 \cdot A}{b} = \frac{2 \cdot 1007,7}{48} = \underline{41,99 \text{ mm}}$$

$$h_c = \frac{2 \cdot A}{c} = \frac{2 \cdot 1007,7}{63} = \underline{31,99 \text{ mm}}$$

10 $a = 44 \text{ mm}, b = 57 \text{ mm}, c = 68 \text{ mm}.$



Heronsche Flächenformel

$$U = a + b + c = 44 + 57 + 68 = 169 \text{ mm}$$

$$s = \frac{U}{2} = \frac{169}{2} = 84,5$$

$$A = \sqrt{s(s-a)(s-b)(s-c)} = \sqrt{84,5(84,5-44)(84,5-57)(84,5-68)} = \\ = \sqrt{84,5 \cdot 40,5 \cdot 27,5 \cdot 16,5} = \sqrt{1552845,94} = \underline{1246,13 \text{ mm}^2}$$

Flächenformel Dreieck

$$h_a = \frac{2 \cdot A}{a} = \frac{2 \cdot 1246,13}{44} = \underline{56,64 \text{ mm}}$$

$$h_b = \frac{2 \cdot A}{b} = \frac{2 \cdot 1246,13}{57} = \underline{43,72 \text{ mm}}$$

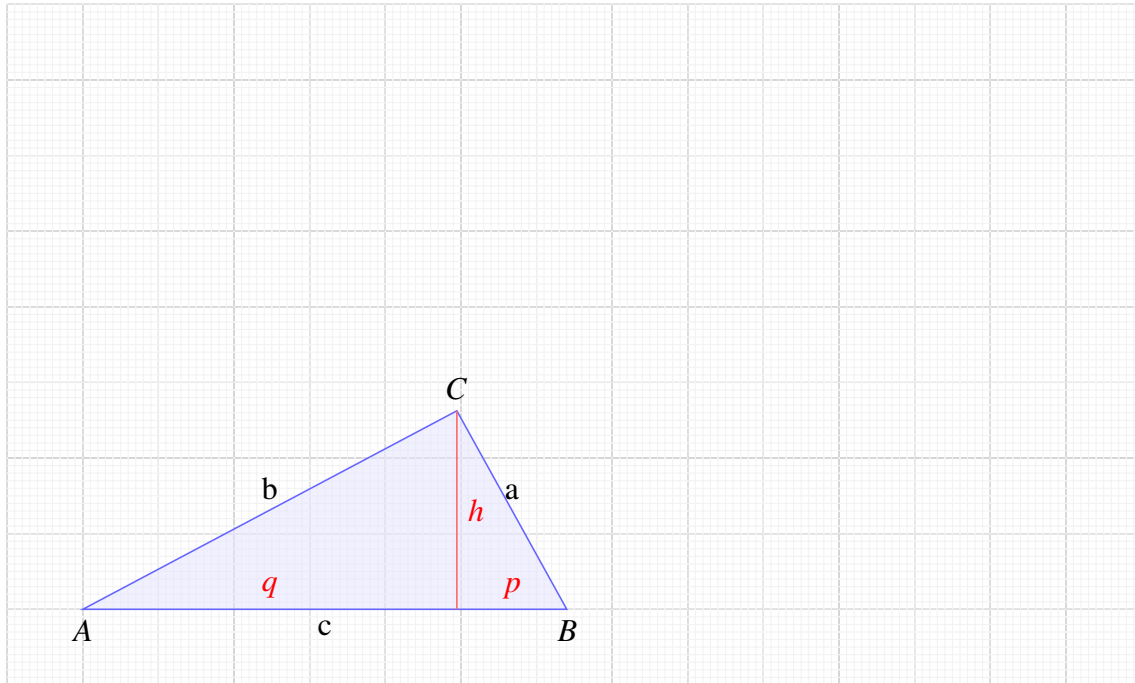
$$h_c = \frac{2 \cdot A}{c} = \frac{2 \cdot 1246,13}{68} = \underline{36,65 \text{ mm}}$$

2.1.2 Rechtwinkeliges Dreieck

Text undefined 1 ...

11:13 **2**

17th January 2014

11 $a = 30 \text{ mm}, b = 56 \text{ mm}.$ 

Phytagoras

$$c = \sqrt{a^2 + b^2} = \sqrt{30^2 + 56^2} = \sqrt{4036} = \underline{63,5 \text{ mm}}$$

Kathetensatz

$$a^2 = p \cdot c \Rightarrow p = \frac{a^2}{c} = \frac{30^2}{63,5} = \underline{14,17 \text{ mm}}$$

Kathetensatz

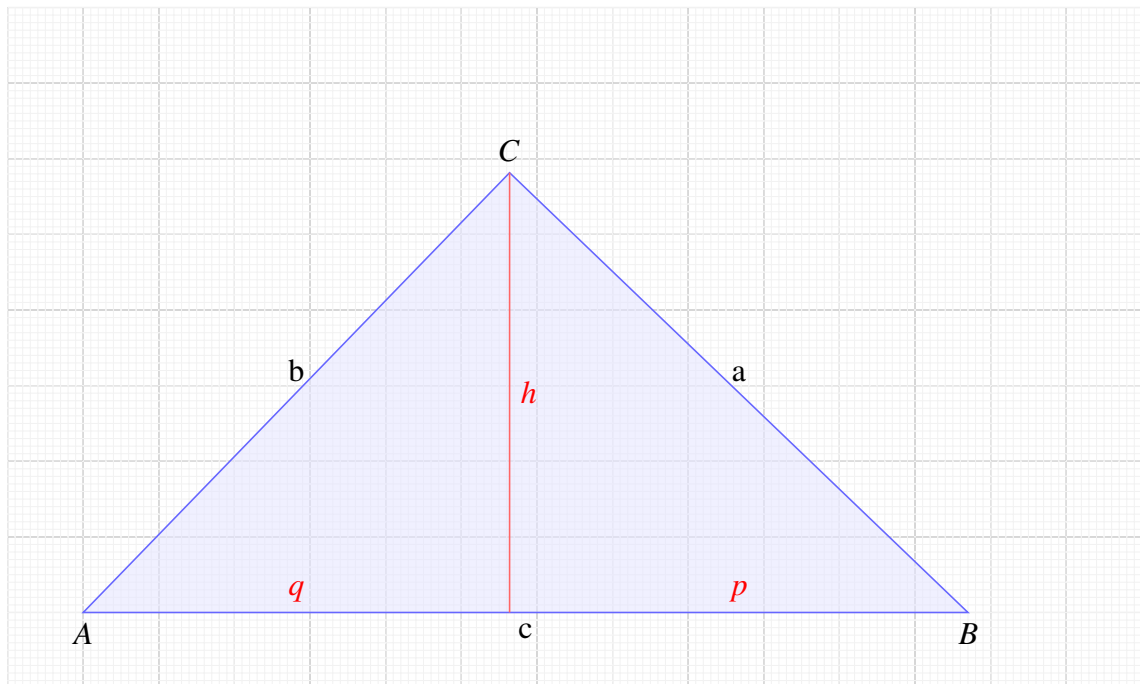
$$b^2 = q \cdot c \Rightarrow q = \frac{b^2}{c} = \frac{56^2}{63,5} = \underline{49,39 \text{ mm}}$$

$$A = \frac{a \cdot b}{2} = \frac{30 \cdot 56}{2} = \underline{840 \text{ mm}^2}$$

$$A = \frac{c \cdot h}{2} \Rightarrow h = \frac{2 \cdot A}{c} = \frac{2 \cdot 840}{63,5} = \underline{26,46 \text{ mm}}$$

$$U = a + b + c = 30 + 56 + 63,5 = \underline{149,5 \text{ mm}}$$

12 $a = 84 \text{ mm}, c = 116,7 \text{ mm}.$



Phytagoras

$$b = \sqrt{c^2 - a^2} = \sqrt{116,7^2 - 84^2} = \sqrt{6633} = \underline{81 \text{ mm}}$$

Kathetensatz

$$a^2 = p \cdot c \Rightarrow p = \frac{a^2}{c} = \frac{84^2}{116,7} = \underline{60,46 \text{ mm}}$$

Kathetensatz

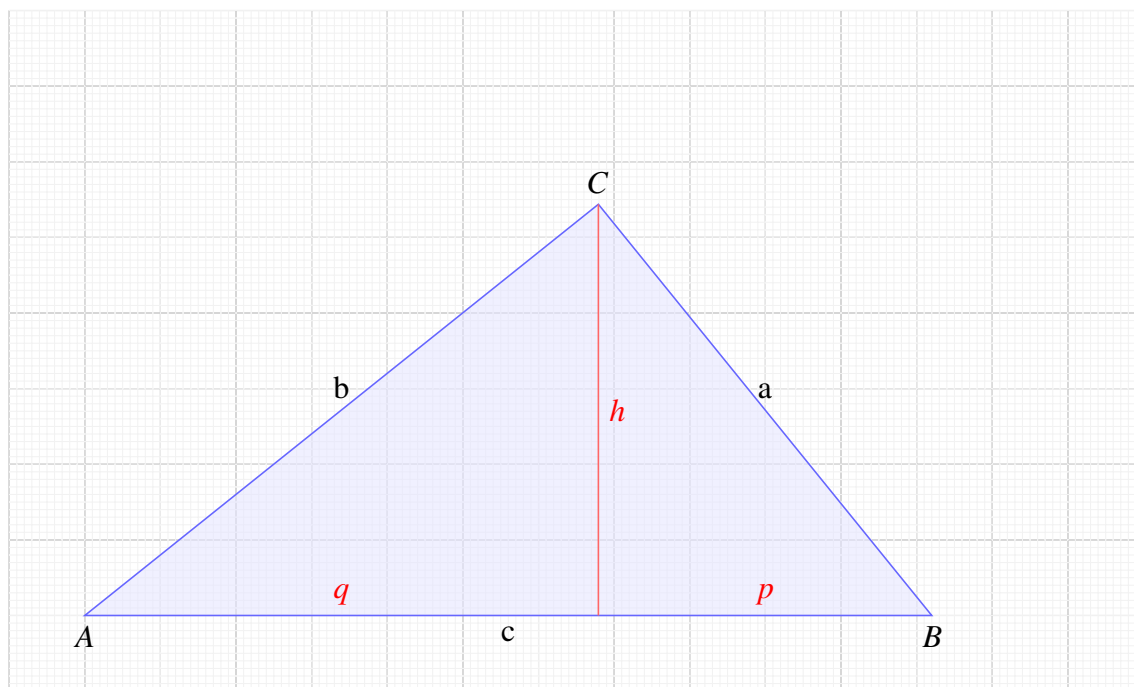
$$b^2 = q \cdot c \Rightarrow q = \frac{b^2}{c} = \frac{81^2}{116,7} = \underline{56,22 \text{ mm}}$$

$$A = \frac{a \cdot b}{2} = \frac{84 \cdot 81}{2} = \underline{3402 \text{ mm}^2}$$

$$A = \frac{c \cdot h}{2} \Rightarrow h = \frac{2 \cdot A}{c} = \frac{2 \cdot 3402}{116,7} = \underline{58,3 \text{ mm}}$$

$$U = a + b + c = 84 + 81 + 116,7 = \underline{281,7 \text{ mm}}$$

13 $a = 70 \text{ mm}, h = 54,52 \text{ mm}.$



Pythagoras

$$a^2 = p^2 + h^2 \Rightarrow p = \sqrt{a^2 - h^2} = \sqrt{70^2 - 54,52^2} = \underline{43,87 \text{ mm}}$$

Kathetensatz

$$c \cdot p = a^2 \Rightarrow c = \frac{a^2}{p} = \frac{70^2}{43,87} = \underline{111,7 \text{ mm}}$$

Pythagoras

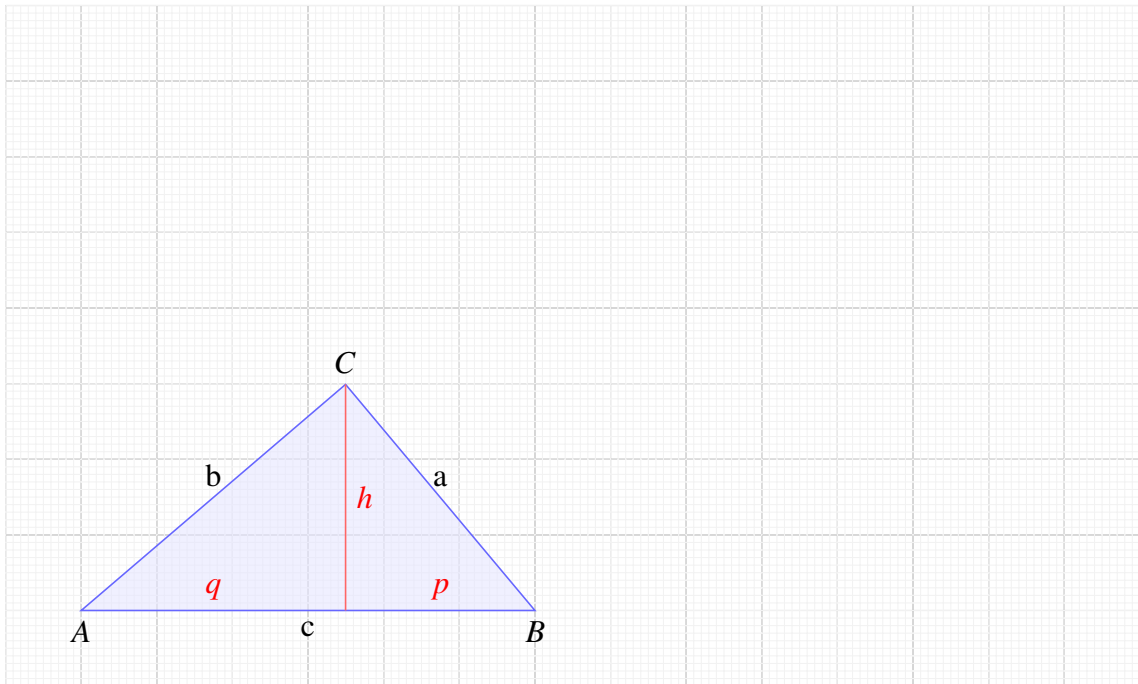
$$b = \sqrt{c^2 - a^2} = \sqrt{111,7^2 - 70^2} = \sqrt{7644} = \underline{87 \text{ mm}}$$

$$c = p + q \Rightarrow q = c - p = 111,7 - 43,87 = \underline{67,76 \text{ mm}}$$

$$A = \frac{a \cdot b}{2} = \frac{70 \cdot 87}{2} = \underline{3045 \text{ mm}^2}$$

$$U = a + b + c = 70 + 87 + 111,7 = \underline{268,7 \text{ mm}}$$

14 $a = 39 \text{ mm}, p = 25,22 \text{ mm}.$



Phytagoras

$$a^2 = p^2 + h^2 \Rightarrow h = \sqrt{a^2 - p^2} = \sqrt{39^2 - 25,22^2} = \underline{29,75 \text{ mm}}$$

Kathetensatz

$$c \cdot p = a^2 \Rightarrow c = \frac{a^2}{p} = \frac{39^2}{25,22} = \underline{60,3 \text{ mm}}$$

Phytagoras

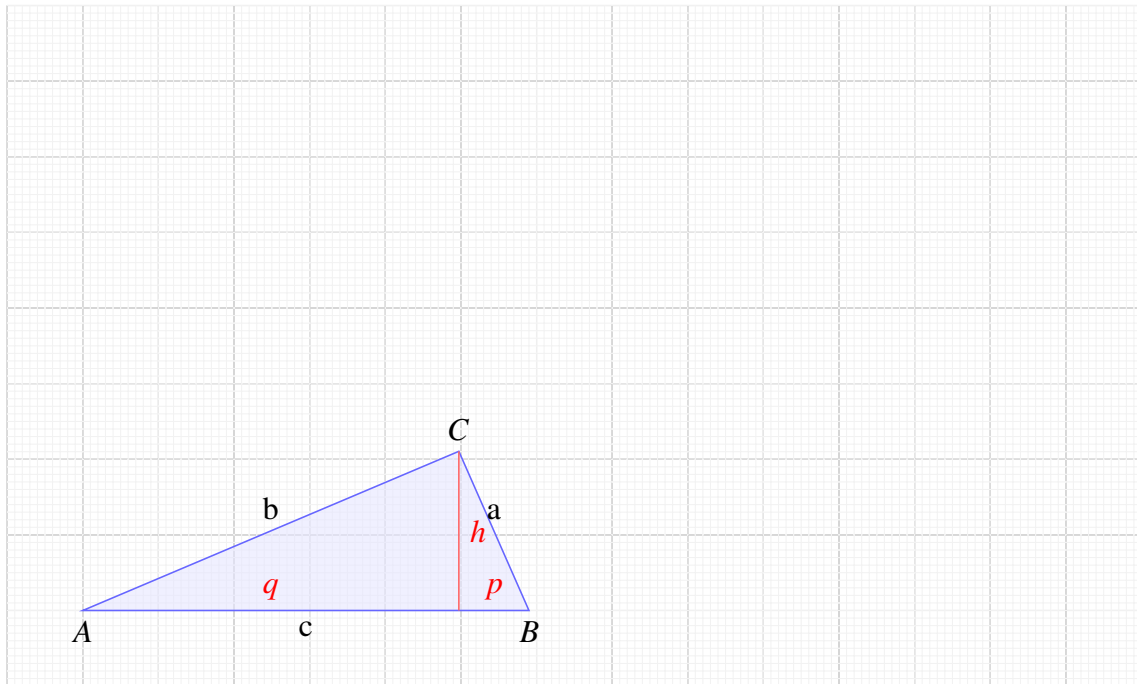
$$b = \sqrt{c^2 - a^2} = \sqrt{60,3^2 - 39^2} = \sqrt{2079} = \underline{46 \text{ mm}}$$

$$c = p + q \Rightarrow q = c - p = 60,3 - 25,22 = \underline{35,09 \text{ mm}}$$

$$A = \frac{a \cdot b}{2} = \frac{39 \cdot 46}{2} = \underline{897 \text{ mm}^2}$$

$$U = a + b + c = 39 + 46 + 60,3 = \underline{145,3 \text{ mm}}$$

15 $b = 54 \text{ mm}, q = 49,68 \text{ mm}.$



Phytagoras

$$b^2 = q^2 + h^2 \Rightarrow h = \sqrt{b^2 - q^2} = \sqrt{54^2 - 49,68^2} = \underline{21,16 \text{ mm}}$$

Kathetensatz

$$c \cdot q = b^2 \Rightarrow c = \frac{b^2}{q} = \frac{54^2}{49,68} = \underline{58,7 \text{ mm}}$$

Phytagoras

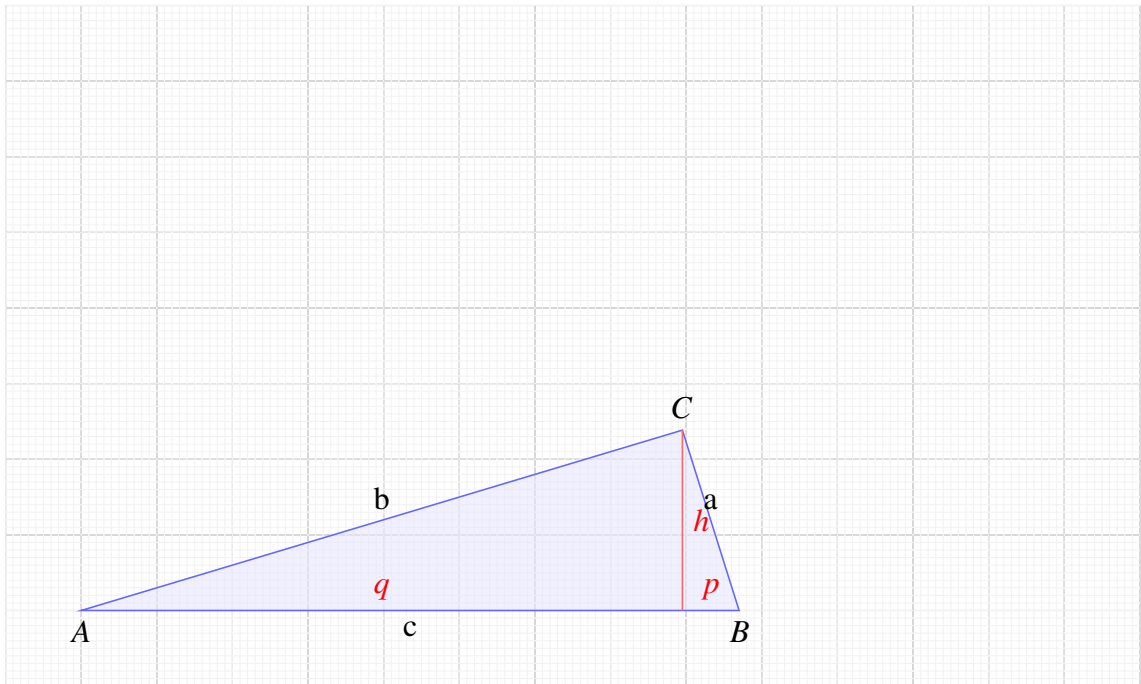
$$a = \sqrt{c^2 - b^2} = \sqrt{58,7^2 - 54^2} = \sqrt{565} = \underline{23 \text{ mm}}$$

$$c = p + q \Rightarrow p = c - q = 58,7 - 49,68 = \underline{9,01 \text{ mm}}$$

$$A = \frac{a \cdot b}{2} = \frac{23 \cdot 54}{2} = \underline{621 \text{ mm}^2}$$

$$U = a + b + c = 23 + 54 + 58,7 = \underline{135,7 \text{ mm}}$$

16 $a = 25 \text{ mm}, A = 1037,5 \text{ mm}.$



$$A = \frac{a \cdot b}{2} \Rightarrow b = \frac{2 \cdot A}{a} = \frac{2 \cdot 1037,5}{25} = \underline{83 \text{ mm}}$$

Pythagoras

$$c = \sqrt{a^2 + b^2} = \sqrt{25^2 + 83^2} = \sqrt{7514} = \underline{86,7 \text{ mm}}$$

$$A = \frac{c \cdot h}{2} \Rightarrow h = \frac{2 \cdot A}{c} = \frac{2 \cdot 1037,5}{86,7} = \underline{23,93 \text{ mm}}$$

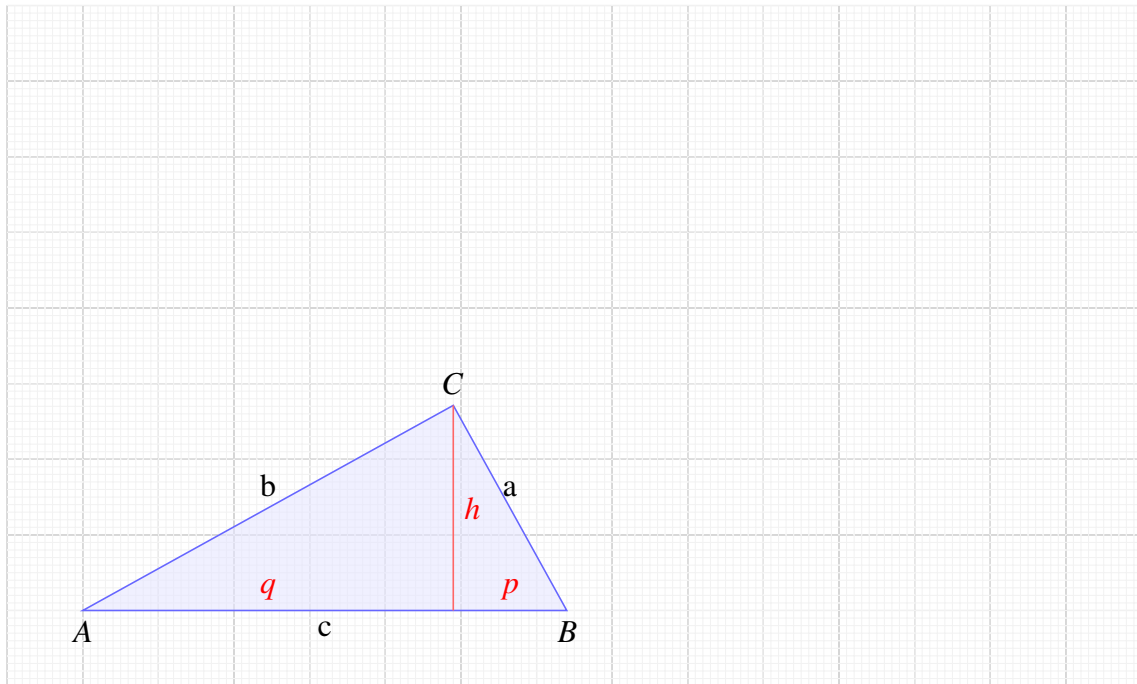
Pythagoras

$$a^2 = p^2 + h^2 \Rightarrow p = \sqrt{a^2 - h^2} = \sqrt{25^2 - 23,93^2} = \underline{7,21 \text{ mm}}$$

$$c = p + q \Rightarrow q = c - p = 86,7 - 7,21 = \underline{79,46 \text{ mm}}$$

$$U = a + b + c = 25 + 83 + 86,7 = \underline{194,7 \text{ mm}}$$

17 $b = 56 \text{ mm}, A = 868 \text{ mm}.$



$$A = \frac{a \cdot b}{2} \Rightarrow a = \frac{2 \cdot A}{b} = \frac{2 \cdot 868}{56} = \underline{31 \text{ mm}}$$

Pythagoras

$$c = \sqrt{a^2 + b^2} = \sqrt{31^2 + 56^2} = \sqrt{4097} = \underline{64 \text{ mm}}$$

$$A = \frac{c \cdot h}{2} \Rightarrow h = \frac{2 \cdot A}{c} = \frac{2 \cdot 868}{64} = \underline{27,13 \text{ mm}}$$

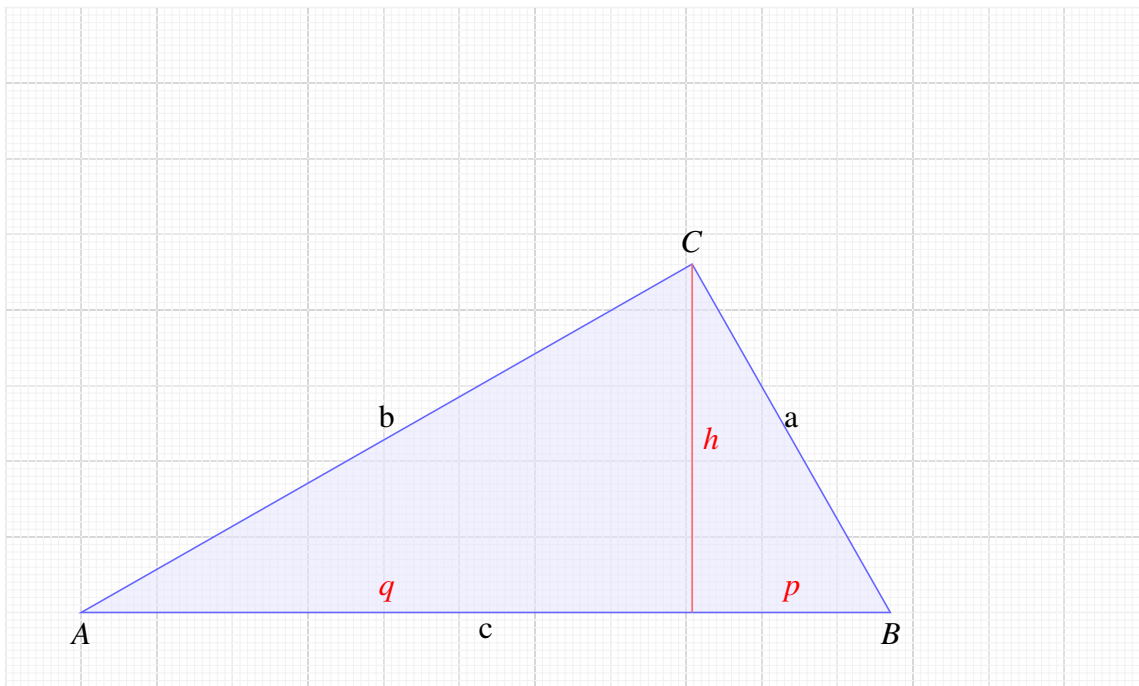
Pythagoras

$$a^2 = p^2 + h^2 \Rightarrow p = \sqrt{a^2 - h^2} = \sqrt{31^2 - 27,13^2} = \underline{15,02 \text{ mm}}$$

$$c = p + q \Rightarrow q = c - p = 64 - 15,02 = \underline{49 \text{ mm}}$$

$$U = a + b + c = 31 + 56 + 64 = \underline{151 \text{ mm}}$$

18 $h = 46,07 \text{ mm}, q = 80,83 \text{ mm}.$



Höhensatz

$$h^2 = p \cdot q \Rightarrow p = \frac{h^2}{q} = \frac{46,07^2}{80,83} = \underline{26,25 \text{ mm}}$$

Kathetensatz

$$a^2 = p \cdot c \Rightarrow a = \sqrt{p \cdot c} = \sqrt{26,25 \cdot 107} = \underline{53 \text{ mm}}$$

Kathetensatz

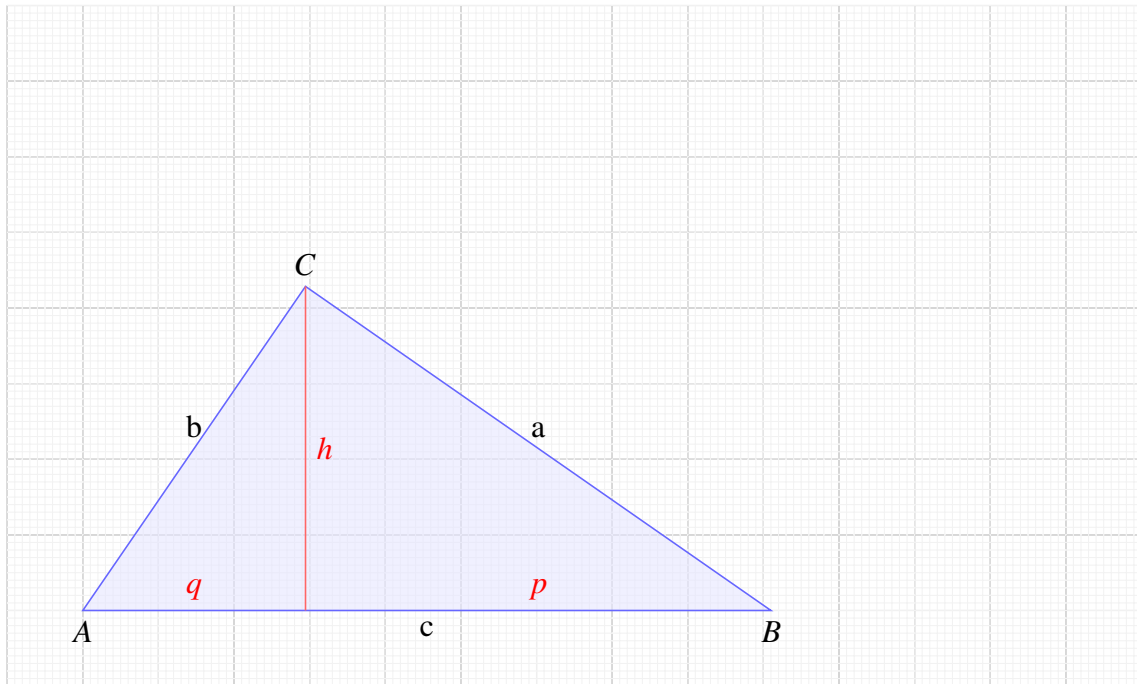
$$b^2 = q \cdot c \Rightarrow b = \sqrt{q \cdot c} = \sqrt{80,83 \cdot 107} = \underline{93 \text{ mm}}$$

$$c = p + q = 26,25 + 80,83 = \underline{107 \text{ mm}}$$

$$A = \frac{a \cdot b}{2} = \frac{53 \cdot 93}{2} = \underline{2464,5 \text{ mm}^2}$$

$$U = a + b + c = 53 + 93 + 107 = \underline{253 \text{ mm}}$$

19 $a = 75 \text{ mm}, b = 52 \text{ mm}.$



Phytagoras

$$c = \sqrt{a^2 + b^2} = \sqrt{75^2 + 52^2} = \sqrt{8329} = \underline{91,3 \text{ mm}}$$

Kathetensatz

$$a^2 = p \cdot c \Rightarrow p = \frac{a^2}{c} = \frac{75^2}{91,3} = \underline{61,61 \text{ mm}}$$

Kathetensatz

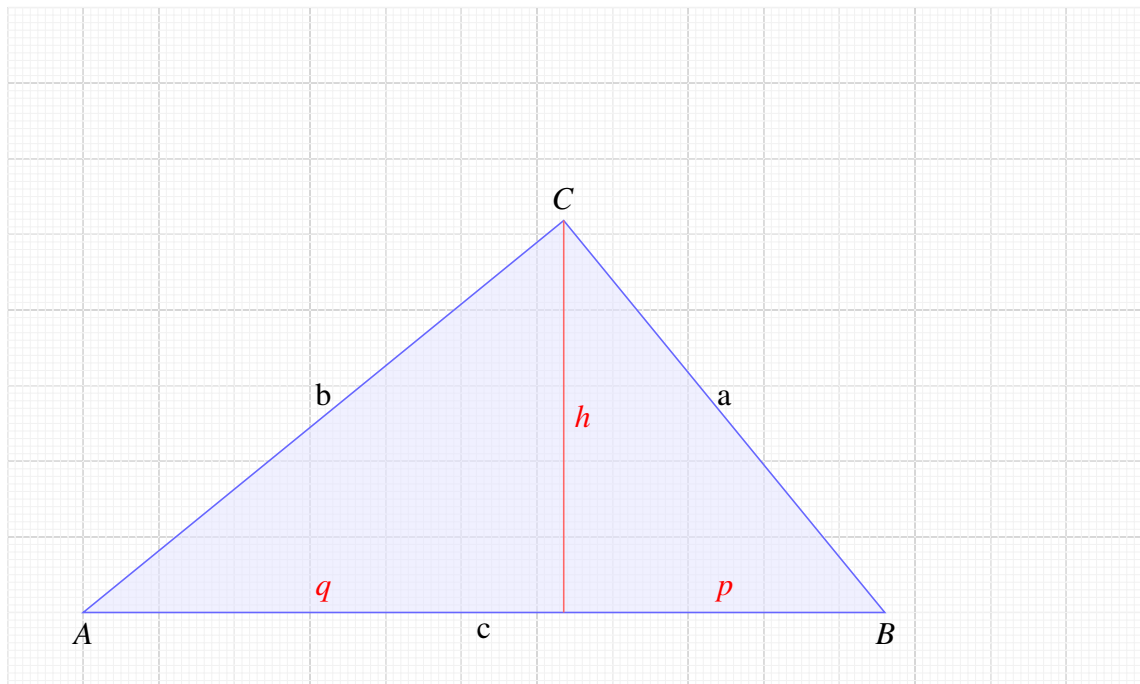
$$b^2 = q \cdot c \Rightarrow q = \frac{b^2}{c} = \frac{52^2}{91,3} = \underline{29,62 \text{ mm}}$$

$$A = \frac{a \cdot b}{2} = \frac{75 \cdot 52}{2} = \underline{1950 \text{ mm}^2}$$

$$A = \frac{c \cdot h}{2} \Rightarrow h = \frac{2 \cdot A}{c} = \frac{2 \cdot 1950}{91,3} = \underline{42,72 \text{ mm}}$$

$$U = a + b + c = 75 + 52 + 91,3 = \underline{218,3 \text{ mm}}$$

20 $a = 67 \text{ mm}, c = 105,9 \text{ mm}.$



Phytagoras

$$b = \sqrt{c^2 - a^2} = \sqrt{105,9^2 - 67^2} = \sqrt{6747} = \underline{82 \text{ mm}}$$

Kathetensatz

$$a^2 = p \cdot c \Rightarrow p = \frac{a^2}{c} = \frac{67^2}{105,9} = \underline{42,39 \text{ mm}}$$

Kathetensatz

$$b^2 = q \cdot c \Rightarrow q = \frac{b^2}{c} = \frac{82^2}{105,9} = \underline{63,49 \text{ mm}}$$

$$A = \frac{a \cdot b}{2} = \frac{67 \cdot 82}{2} = \underline{2747 \text{ mm}^2}$$

$$A = \frac{c \cdot h}{2} \Rightarrow h = \frac{2 \cdot A}{c} = \frac{2 \cdot 2747}{105,9} = \underline{51,88 \text{ mm}}$$

$$U = a + b + c = 67 + 82 + 105,9 = \underline{254,9 \text{ mm}}$$

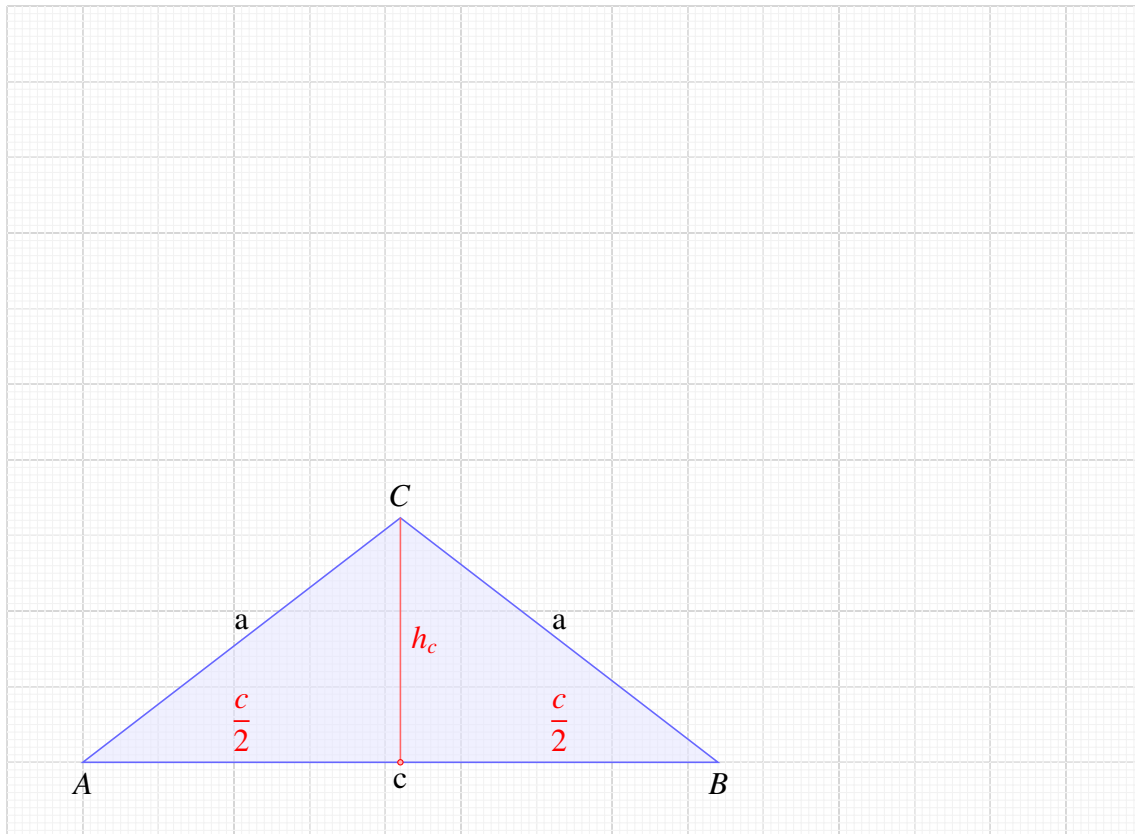
2.1.3 Gleichschenkeliges Dreieck

Von einem gleichschenkeligem Dreieck sind nachfolgende Daten bekannt. Die fehlenden Daten von a , c , h_a , h_c , A und U sind zu berechnen!

11:13 **3**

17th January 2014

21 $a = b = 53 \text{ mm}$, $c = 84 \text{ mm}$.



Phytagoras

$$a^2 = h_c^2 + \left(\frac{c}{2}\right)^2 \Rightarrow h_c = \sqrt{a^2 - \left(\frac{c}{2}\right)^2} = \sqrt{53^2 - \left(\frac{84}{2}\right)^2} = \underline{32.33 \text{ mm}}$$

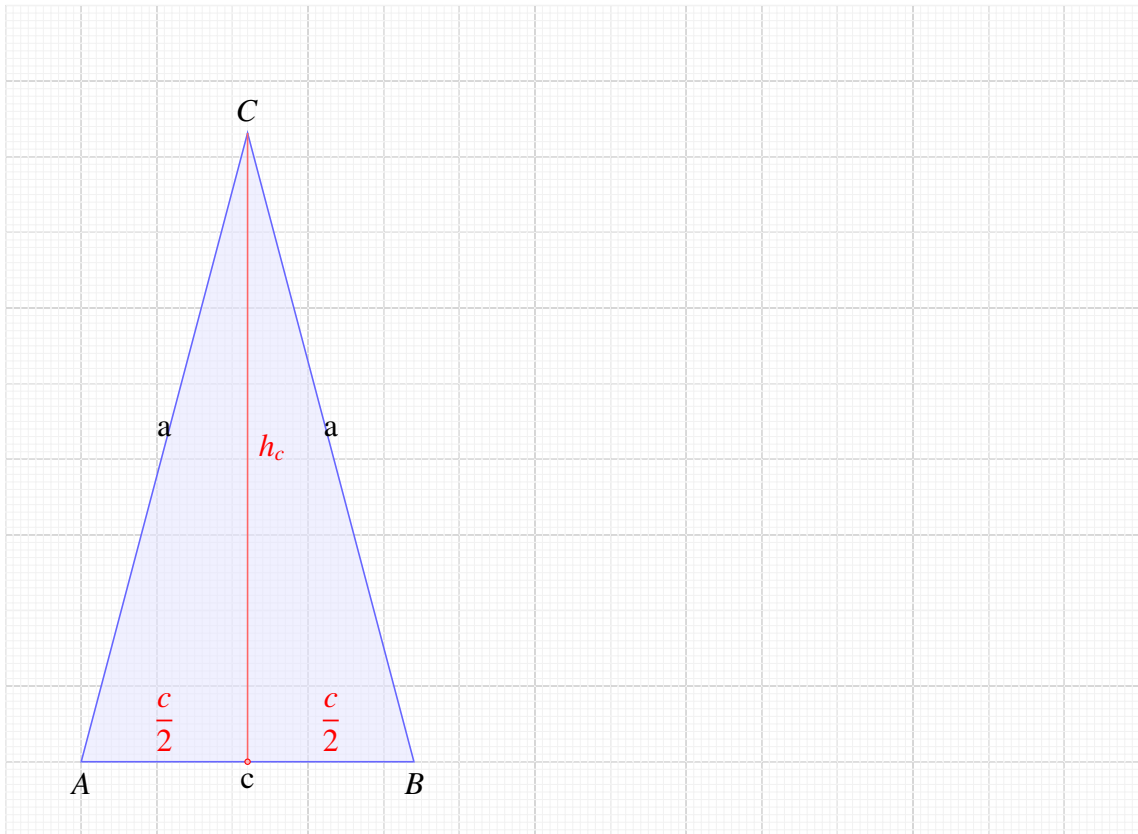
Fläche

$$A = \frac{c \cdot h_c}{2} = \frac{84 \cdot 32.33}{2} = \underline{1357.71 \text{ mm}^2}$$

$$A = \frac{a \cdot h_a}{2} \Rightarrow h_a = \frac{2 \cdot A}{a} = \frac{2 \cdot 1357.71}{53} = \underline{51.23 \text{ mm}}$$

$$U = 2 \cdot a + c = 2 \cdot 53 + 84 = \underline{190 \text{ mm}}$$

22 $a = b = 86 \text{ mm}, h_c = 83.14 \text{ mm}.$



Phytagoras

$$a^2 = h_c^2 + \left(\frac{c}{2}\right)^2 \Rightarrow \left(\frac{c}{2}\right) = \sqrt{a^2 - h_c^2}$$

$$c = 2 \cdot \sqrt{a^2 - h_c^2} = 2 \cdot \sqrt{86^2 - 83.14^2} = \underline{44 \text{ mm}}$$

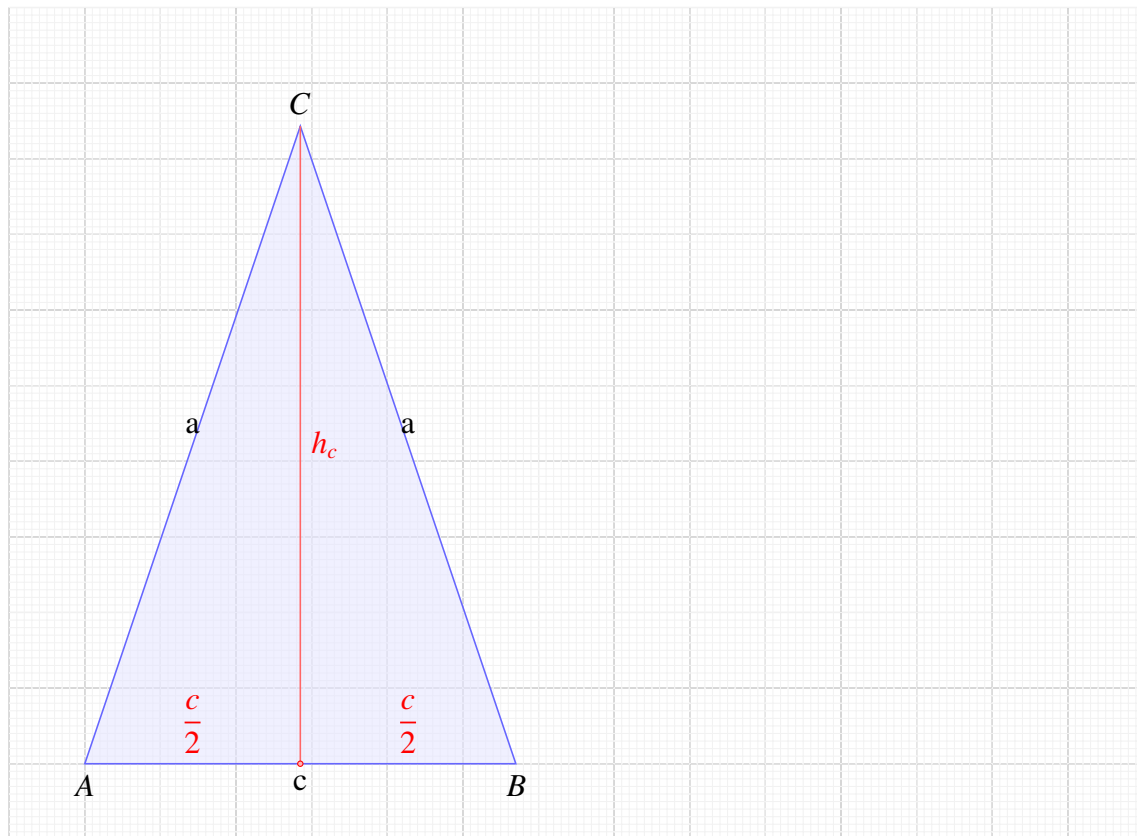
Fläche

$$A = \frac{c \cdot h_c}{2} = \frac{44 \cdot 83.14}{2} = \underline{1829.05 \text{ mm}^2}$$

$$A = \frac{a \cdot h_a}{2} \Rightarrow h_a = \frac{2 \cdot A}{a} = \frac{2 \cdot 1829.05}{86} = \underline{42.54 \text{ mm}}$$

$$U = 2 \cdot a + c = 2 \cdot 86 + 44 = \underline{216 \text{ mm}}$$

23 $c = 57 \text{ mm}, h_c = 84.31 \text{ mm}.$



Phytagoras

$$a^2 = h_c^2 + \left(\frac{c}{2}\right)^2 \Rightarrow a = \sqrt{h_c^2 + \left(\frac{c}{2}\right)^2} = \sqrt{84.31^2 + \left(\frac{57}{2}\right)^2} = \underline{89 \text{ mm}}$$

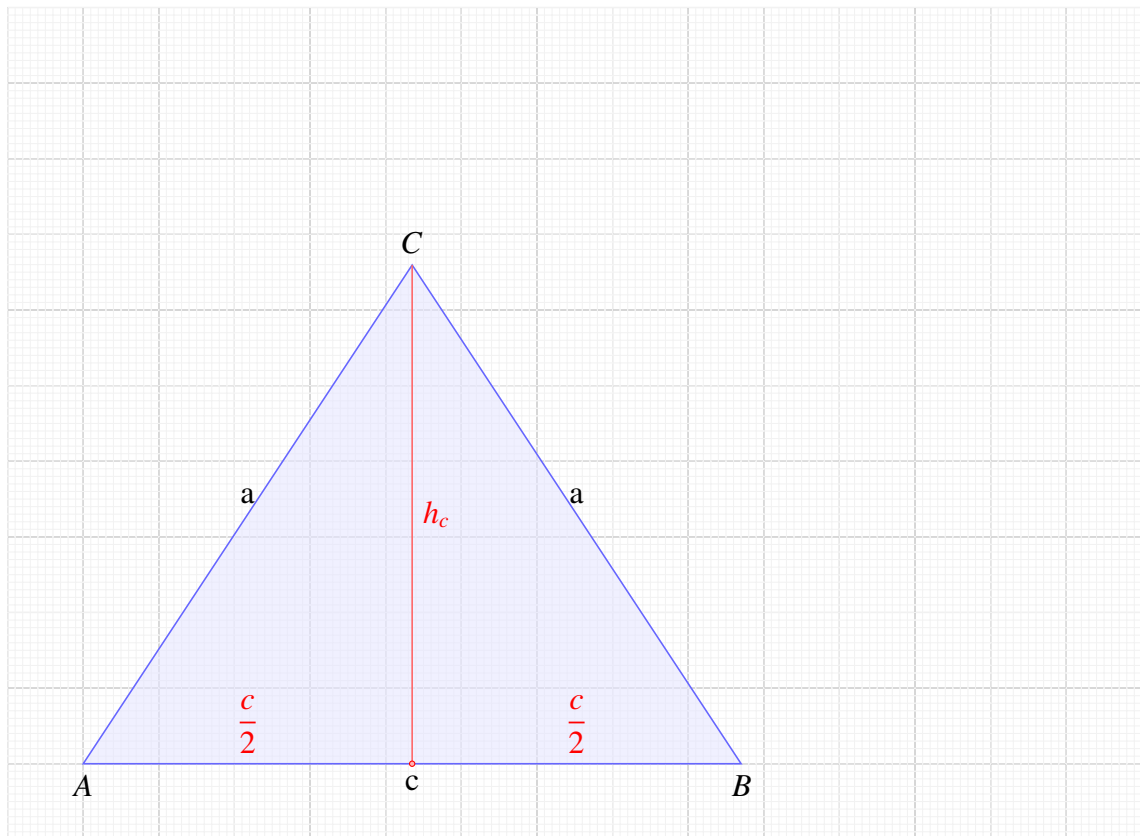
Fläche

$$A = \frac{c \cdot h_c}{2} = \frac{57 \cdot 84.31}{2} = \underline{2402.93 \text{ mm}^2}$$

$$A = \frac{a \cdot h_a}{2} \Rightarrow h_a = \frac{2 \cdot A}{a} = \frac{2 \cdot 2402.93}{89} = \underline{54.0 \text{ mm}}$$

$$U = 2 \cdot a + c = 2 \cdot 89 + 57 = \underline{235 \text{ mm}}$$

24 $c = 87 \text{ mm}$, $A = 2868.61 \text{ mm}$.



$$A = \frac{c \cdot h_c}{2} \Rightarrow h_c = \frac{2 \cdot A}{c} = \frac{2 \cdot 2868.61}{87} = \underline{65.95 \text{ mm}}$$

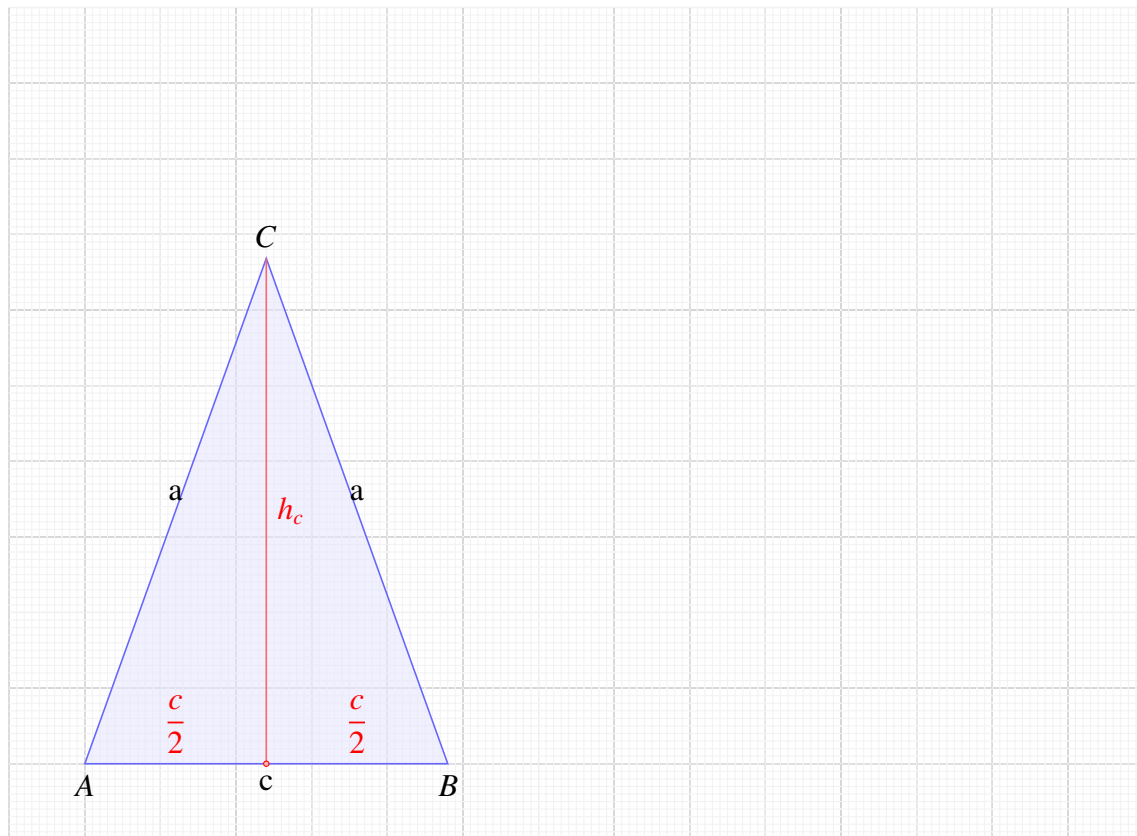
Phytagoras

$$a^2 = h_c^2 + \left(\frac{c}{2}\right)^2 \Rightarrow a = \sqrt{h_c^2 + \left(\frac{c}{2}\right)^2} = \sqrt{65.95^2 + \left(\frac{87}{2}\right)^2} = \underline{79 \text{ mm}}$$

$$A = \frac{a \cdot h_a}{2} \Rightarrow h_a = \frac{2 \cdot A}{a} = \frac{2 \cdot 2868.61}{79} = \underline{72.62 \text{ mm}}$$

$$U = 2 \cdot a + c = 2 \cdot 79 + 87 = \underline{245 \text{ mm}}$$

25 $a = b = 71 \text{ mm}$, $U = 190 \text{ mm}$.



$$U = 2 \cdot a + c \Rightarrow c = U - 2 \cdot a = 190 - 2 \cdot 71 = \underline{48 \text{ mm}}$$

Phytagoras

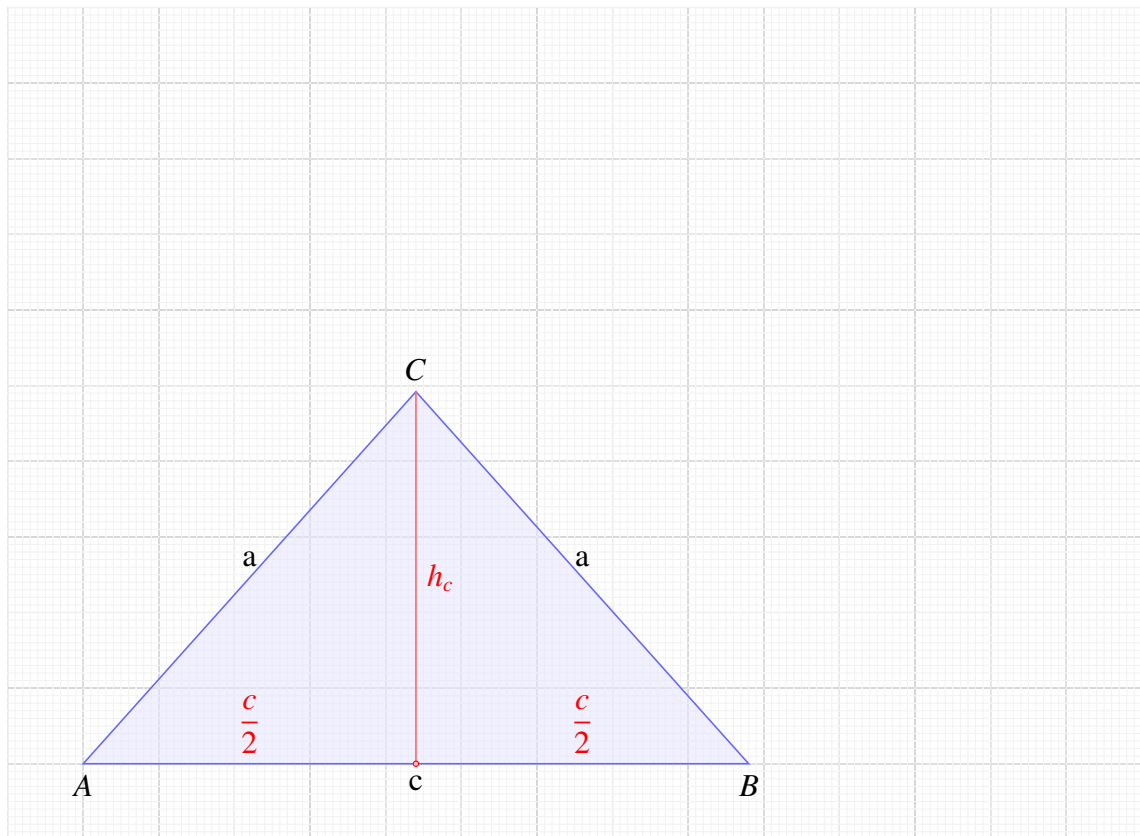
$$a^2 = h_c^2 + \left(\frac{c}{2}\right)^2 \Rightarrow h_c = \sqrt{a^2 - \left(\frac{c}{2}\right)^2} = \sqrt{71^2 - \left(\frac{48}{2}\right)^2} = \underline{66.82 \text{ mm}}$$

Fläche

$$A = \frac{c \cdot h_c}{2} = \frac{48 \cdot 66.82}{2} = \underline{1603.7 \text{ mm}^2}$$

$$A = \frac{a \cdot h_a}{2} \Rightarrow h_a = \frac{2 \cdot A}{a} = \frac{2 \cdot 1603.7}{71} = \underline{45.17 \text{ mm}}$$

26 $c = 88 \text{ mm}, U = 220 \text{ mm}.$



$$U = 2 \cdot a + c \Rightarrow a = \frac{U - c}{2} = \frac{220 - 88}{2} = \underline{66 \text{ mm}}$$

Phytagoras

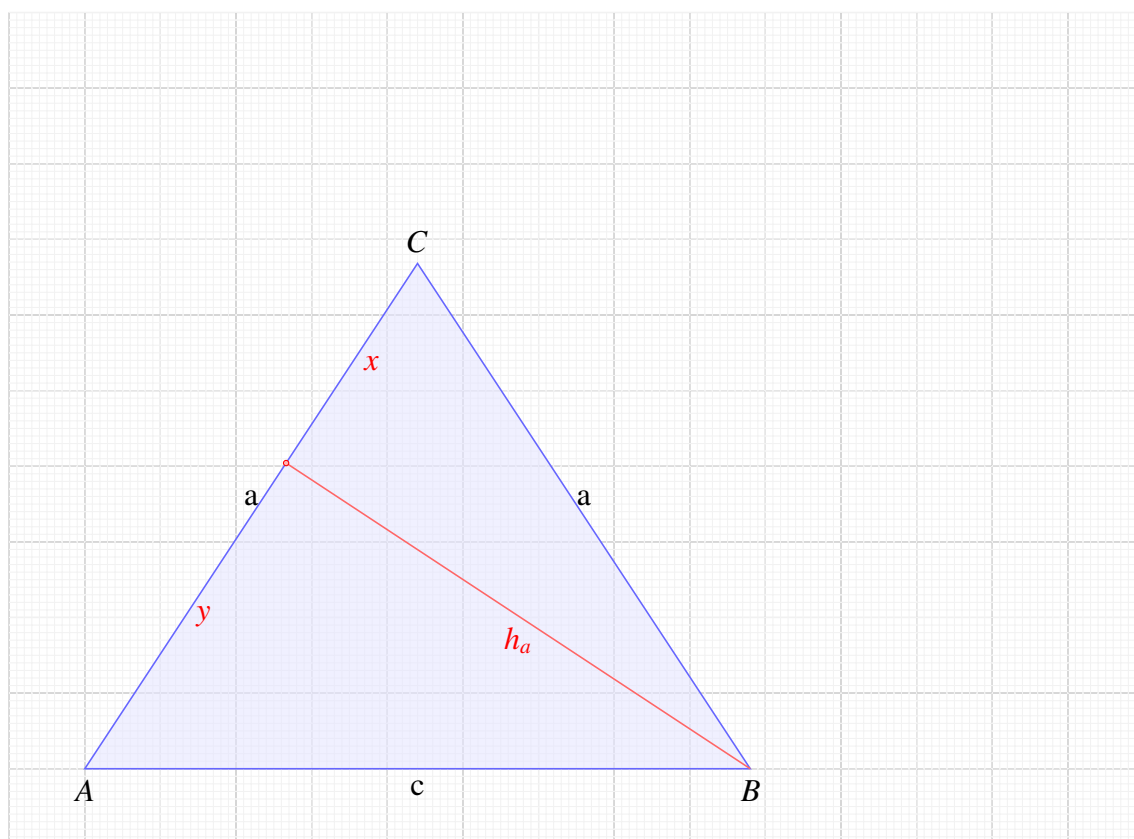
$$a^2 = h_c^2 + \left(\frac{c}{2}\right)^2 \Rightarrow h_c = \sqrt{a^2 - \left(\frac{c}{2}\right)^2} = \sqrt{66^2 - \left(\frac{88}{2}\right)^2} = \underline{49.19 \text{ mm}}$$

Fläche

$$A = \frac{c \cdot h_c}{2} = \frac{88 \cdot 49.19}{2} = \underline{2164.51 \text{ mm}^2}$$

$$A = \frac{a \cdot h_a}{2} \Rightarrow h_a = \frac{2 \cdot A}{a} = \frac{2 \cdot 2164.51}{66} = \underline{65.59 \text{ mm}}$$

27 $h_a = 73.49 \text{ mm}$, $A = 2939.78 \text{ mm}$.



$$A = \frac{a \cdot h_a}{2} \Rightarrow a = \frac{2 \cdot A}{h_a} = \frac{2 \cdot 2939.78}{73.49} = \underline{80 \text{ mm}}$$

Phytgoras

$$a^2 = x^2 + h_a^2 \Rightarrow x = \sqrt{a^2 - h_a^2} = \sqrt{80^2 - 73.49^2} = 31.61$$

$$a = x + y \Rightarrow y = a - x = 80 - 31.61 = 48.39$$

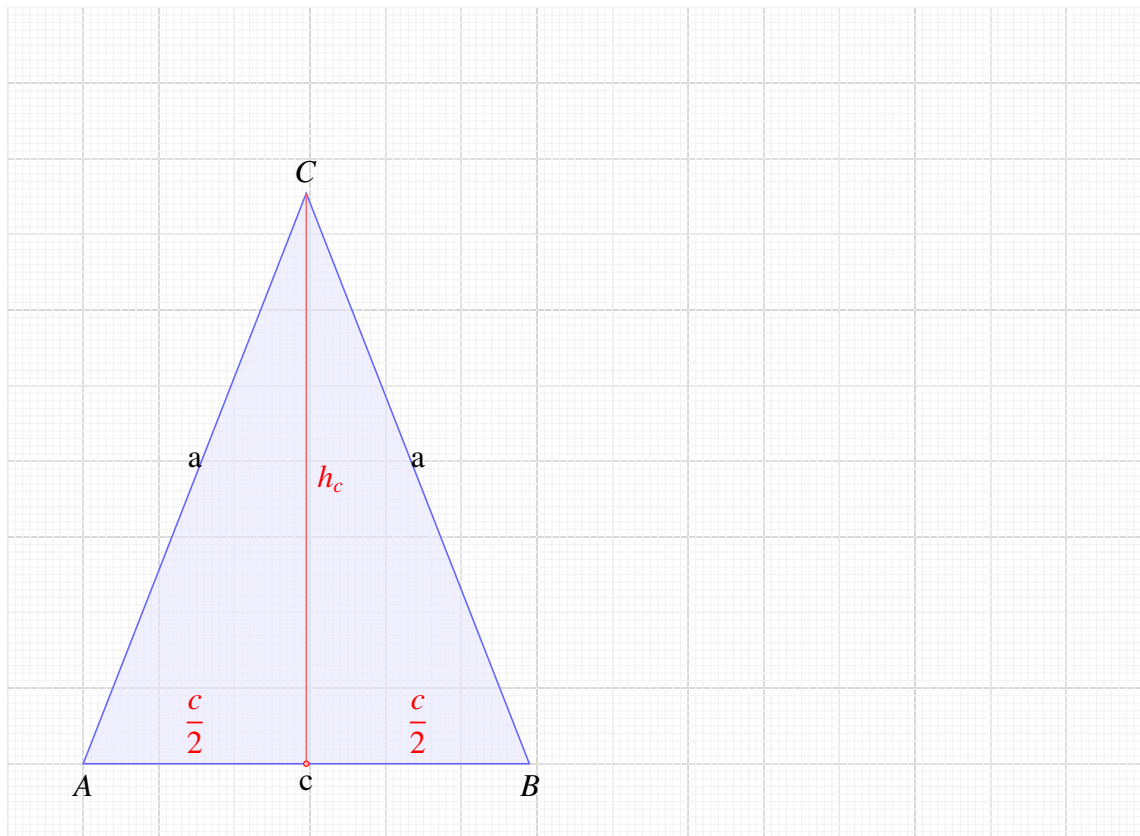
Phytgoras

$$c^2 = y^2 + h_a^2 \Rightarrow c = \sqrt{y^2 + h_a^2} = \sqrt{48.39^2 + 73.49^2} = \underline{88 \text{ mm}}$$

$$A = \frac{c \cdot h_c}{2} \Rightarrow h_c = \frac{2 \cdot A}{c} = \frac{2 \cdot 2939.78}{88} = \underline{66.81 \text{ mm}}$$

$$U = 2 \cdot a + c = 2 \cdot 80 + 88 = \underline{248 \text{ mm}}$$

28 $a = b = 81 \text{ mm}, c = 59 \text{ mm}.$



Phytagoras

$$a^2 = h_c^2 + \left(\frac{c}{2}\right)^2 \Rightarrow h_c = \sqrt{a^2 - \left(\frac{c}{2}\right)^2} = \sqrt{81^2 - \left(\frac{59}{2}\right)^2} = \underline{75.44 \text{ mm}}$$

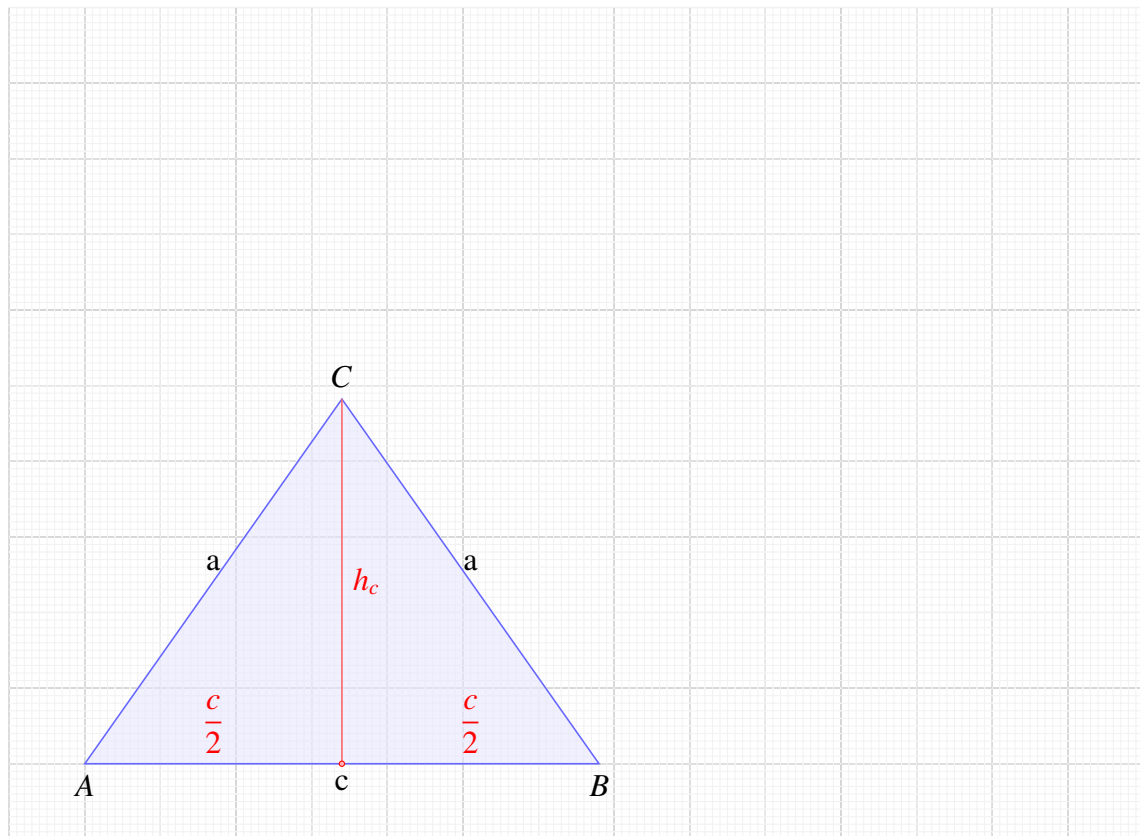
Fläche

$$A = \frac{c \cdot h_c}{2} = \frac{59 \cdot 75.44}{2} = \underline{2225.39 \text{ mm}^2}$$

$$A = \frac{a \cdot h_a}{2} \Rightarrow h_a = \frac{2 \cdot A}{a} = \frac{2 \cdot 2225.39}{81} = \underline{54.95 \text{ mm}}$$

$$U = 2 \cdot a + c = 2 \cdot 81 + 59 = \underline{221 \text{ mm}}$$

29 $a = b = 59 \text{ mm}$, $h_c = 48.22 \text{ mm}$.



Pythagoras

$$a^2 = h_c^2 + \left(\frac{c}{2}\right)^2 \Rightarrow \left(\frac{c}{2}\right) = \sqrt{a^2 - h_c^2}$$

$$c = 2 \cdot \sqrt{a^2 - h_c^2} = 2 \cdot \sqrt{59^2 - 48.22^2} = \underline{68 \text{ mm}}$$

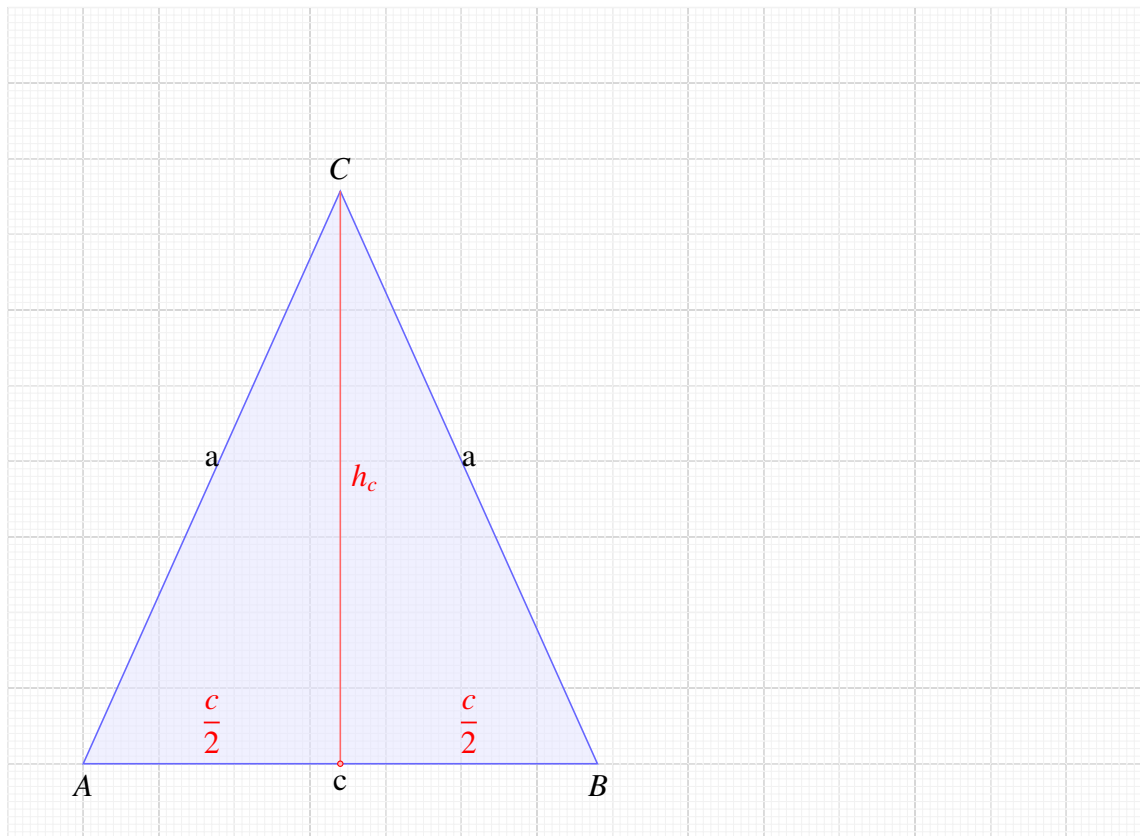
Fläche

$$A = \frac{c \cdot h_c}{2} = \frac{68 \cdot 48.22}{2} = \underline{1639.42 \text{ mm}^2}$$

$$A = \frac{a \cdot h_a}{2} \Rightarrow h_a = \frac{2 \cdot A}{a} = \frac{2 \cdot 1639.42}{59} = \underline{55.57 \text{ mm}}$$

$$U = 2 \cdot a + c = 2 \cdot 59 + 68 = \underline{186 \text{ mm}}$$

$$30 \quad c = 68 \text{ mm}, h_c = 75.72 \text{ mm}.$$



Phytagoras

$$a^2 = h_c^2 + \left(\frac{c}{2}\right)^2 \Rightarrow a = \sqrt{h_c^2 + \left(\frac{c}{2}\right)^2} = \sqrt{75.72^2 + \left(\frac{68}{2}\right)^2} = \underline{83 \text{ mm}}$$

Fläche

$$A = \frac{c \cdot h_c}{2} = \frac{68 \cdot 75.72}{2} = \underline{2574.36 \text{ mm}^2}$$

$$A = \frac{a \cdot h_a}{2} \Rightarrow h_a = \frac{2 \cdot A}{a} = \frac{2 \cdot 2574.36}{83} = \underline{62.03 \text{ mm}}$$

$$U = 2 \cdot a + c = 2 \cdot 83 + 68 = \underline{234 \text{ mm}}$$