the race of runners A, B, C takes place on a plane on parallel straight tracks named A, B and C. It is now assumed that the race started from a common starting line (perpendicular to the tracks) and that the runners are now "on the move". The observation of the ongoing race begins at the time after the start at a time t = 0 and is also carried out at t = 5.

The task is to calculate a forecast for the time t = 10.

The speeds of the runners on the tracks for A, B and C are vA, vB and vC (all are positive) and the distances of the parallel runner tracks are u between tracks A and B and v between tracks B and C. At the
time t = 0, runner A has already run x from the starting line in his track. Accordingly, runners B and C are y and z away from the starting line respectively. The observed initial state t = 0 is represented in the wire model by ordinates on the runner tracks and perpendicular to the plane as the gable of a house. In the wire model, the distance increases due to positive runner speed for increasing t are shown as rising straight lines, similar to the gutter/eaves and ridge/crest on the roof of a house.

The given area of triangle ABC at time t=0 is the result of the balance of partial areas (trapezoid, triangle) according to the assumption of 2 area units and at time t = 5 of 3 area units.

In the present variant, it is assumed that in the wire model the gable tip/ridge point points upwards for t=0: e.g. y > max(x;z)

#1: $$\frac{x + y}{2}\cdot u + \frac{y + z}{2}\cdot v - \frac{x + z}{2}\cdot (u + v)$$

vereinfacht: (simplified:)

#2: $$-\frac{v\cdot x - y\cdot (u + v) + u\cdot z}{2}$$

Fläche für t = 0: (Area for t = 0:)

#3: $$-\frac{v\cdot x - y\cdot (u + v) + u\cdot z}{2} = 2$$

Zum **Zeitpunkt t=5** haben die Läufer bezogen auf t=0 die Strecken 5*vA, 5*vB und 5*vC zurückgelegt. Berechnung der Dreiecksfläche von ABC=3 im Grahtmodell nun mit den Ordinaten/Wandhöhen x+5*vA, y+5*vB und z+5*vC:
(At time t=5, the runners have covered distances of 5*vA, 5*vB and 5*vC relative to t=0. Calculate the triangular area of ABC=3 in the wire model now with the ordinates/wall heights x+5*vA, y+5*vB and z+5*vC:)

#4: CaseMode := Sensitive

#5: InputMode := Word

#6: $$\frac{x + 5\cdot vA + y + 5\cdot vB}{2}\cdot u + \frac{y + 5\cdot vB + z + 5\cdot vC}{2}\cdot v - \frac{x + 5\cdot vA + z + 5\cdot vC}{2}\cdot (u + v)$$

vereinfacht: (simplified:)

$$\#15: \quad -\frac{v\cdot x - y\cdot(u + v) + u\cdot z - 10\cdot(u\cdot(vB - vC) + v\cdot(vB - vA))}{2} - -\frac{v\cdot x - y\cdot(u + v) + u\cdot z - 5\cdot(u\cdot(vB - vC) + v\cdot(vB - vA))}{2}$$

Vereinfacht: (simplified:)

$$\#16: \quad \frac{5\cdot(u\cdot(vB - vC) + v\cdot(vB - vA))}{2}$$

#14 und #16 werden mit #10 verglichen. Der Zuwachs von t = 0 auf t = 10 beträgt 2 und demnach der Flächeninhalt ABC zum Zeitpunkt t = 10: 2 + 2 = 4. Bezüglich t = 5 beträgt der Flächenzuwachs auf t = 10: 1 und daher die Gesamtfläche 3 + 1 = 4. **Unter der Voraussetzung y > max(x;z) ist für t = 10 der Flächeninhalt 4 einzige Lösung.**

Unter der geänderten Voraussetzung, daß für t=0 die Giebelspitze nach unten zeigt (z. B. y < min(x;z)) erhält man eine weitere Lösung. (Datei "Drei Läufer1.dfw")

#14 and #16 are compared with #10. The increase from t = 0 to t = 10 is 2 and therefore the area of ABC at time t = 10 is 2 + 2 = 4. With respect to t = 5, the increase in area to t = 10 is 1 and therefore the total area is 3 + 1 = 4. Under the condition y > max(x;z), the area of 4 is the only solution for t = 10.

Under the modified condition that the gable point points downwards for t=0 (e.g. y < min(x;z)), another solution is obtained. (File "Drei Läufer1.dfw")