Bulletin 02.3 English summary
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Declination: although the puzzle did not ask for it, fig. 3 gives a construction to find the declination of the sun. Let T be the gnomon top, K the intersection of the hour line through III and the east-west line through E. We intend to rotate triangle T III K into the horizontal by rotating about the hour line through III.
Draw the perpendicular on G III and circle T1 around G to T2. Draw the arc about III through T2, and the arc about S through T1. The arcs intersect in T3. T3 is the gnomon top T rotated into the horizontal by rotation about the hour line through III. The angle K T3 III is equal to the declination of the sun.
Remark 1: The construction shows that the declination for III can be found without using V and vice versa. It follows that III and V need not have been measured on the same day.
Remark 2: I find φ=52, GT (gnomon height)=15, declination=21º or about 25 May.

13 Utrecht, Sundial City J.A.F. de Rijk

There are 928 registered sundials in The Netherlands, of which 84 are in the province of Utrecht. The town itself has 20, outnumbered only by Amsterdam with 34. Utrecht has two very special dials: the oldest pole style dial, and the analemmatic in the pavement in front of St.Johns.
"De Zonnewijzerkring" (The Sundial Society, commonly referred to nowadays as The Dutch Sundial Society) was founded in Utrecht in 1978 and today counts about 200 members.
At their first Lustrum, the Society presented the St.Johns dial to the town of Utrecht, and held four public exhibitions. Schools carried the project Build your own Sundial, and *"The Sun as Clock"* was published.
2003 is the Society's 25th anniversary. It will be the year of Utrecht, Sundial City. Plans include several exhibitions and a book *"Sundialling for everyone"* . Quite special is the planned new sundial for Dom Tower, and the sundial for the Botanical Gardens of the University Museum, for which a fine 18th-century pedestal will be used.

14 Solution to the puzzle from last Bulletin F.J. de Vries

Draw the equinox through E, perpendicular to the north-south line. Draw a line through the hour points for 15 and 17 and find the intersection with the equinox. This is an hour point, X, for 10, which is the mean of 15 and 17 minus 6. The hour angle for 10 o'clock is –30, therefore construct a line through this point making an angle of 30º with the meridian. Call the intersection D. Draw the circle around D with radius DE, and divide it sectors of 15º. This is the well known starting figure for hour line construction, fig. 3. Because we know not only these hour points but also the two originally given, we can draw two hour lines, for 15 and 17. They intersect in C, the centre of the sundial. Finally, fig. 5 shows the construction of the style triangle. Draw the circle around E with radius ED and the tangent EF. CFE is 90º. FG, at right angles to the meridian, gives the gnomon footpoint and CGF is the style triangle. CF is the pole style, and GCF is equal to the latitude, in this puzzle52º.
The property that was hinted at in the problem is: *The extension of a straight line through two hour points on the same date line – except the equinox – intersects the equinox in a point on the hour line six hours from the mean of the hours of the first two hour points.* This is illustrated in fig. 6. The line through 6 and 10 on 21º cuts the equinox on the hour line for (6+10)/2 +6 = 14 o'clock. Likewise, 10 and 11 on -21º give 16½.
The proof of this property is the subject of the rest of the article.
The Italian note that prompted the puzzle mentions another interesting property: *a line through an hour point on the equinox and one x hours ahead on a line for positive declination y, also passes through the hour point x hours behind on the line for negative declination y.* This property enables one to construct several points of declination line for –y if a point on the declination line for +y is known. Fig. 11 shows an example.

19 Encyclopaedia Groningana, entry 'Sundial' E.L.H. Roebroeck

The sundial entry in this encyclopaedia gives a good overview of the many types in existence, and explains the difference between apparent and mean time, and their variants.

21 Three-dimensional example F.J. de Vries

Another picture illustrating the property on which the puzzle in last Bulletin was based. Fer finds it surprising that no modern texts exist about a fact that was known four centuries ago.

22 Town council sundials of 1625 and 1626 J.A.F. de Rijk

In 1625, the Utrecht town council ordered sundials to be placed on four churches to regulate the tower clocks to. A 1626 resolution shows that five dials were ready but not installed. The churches found them too expensive and the council decided to contribute in the cost, on the condition that the dials be installed within a fortnight.
Two dials are still in place, on Jacobi Church and on Nicolaas Church.
Bills from the time show that Nicolaas Church had a sundial in 1586. Probably two, one on the wall and one for the organist "To regulate the Clock by". By 1625, the dial was in such a bad state that it needed replacement. This 'new' dial was quite weathered by 1981, and a newspaper paid to have it restored to its present state.
The 1463 dial on Jacobi Church was quite serviceable in 1625, but may have been judged too small. The 1626 dial bears the number 1722, which is the year of its restoration.

23 Rotterdam 9 H.C. Wagenaar

The drawing is an impression of the sundial the author discovered on Willemskade 23, part of the World Museum, in Rotterdam. Built in 1904, the building front is Jugendstil with yellow and blue tiling, depicting mediaeval castles and scenes from merchant shipping and fishery. The sundial is above the middle of five windows on the third floor. The style is missing.

24 An Introduction to Gnomonics, part 1 F.J. de Vries

Fer de Vries has undertaken to write a basic course in sundialling. The first part starts accordingly with celestial mechanics. The year and the difference between solar and sidereal day lead to the concept of the sun moving along the ecliptic, divided into twelve parts of 30º each. Because of the slanted polar axis, the ecliptic and the equator are not parallel but for an angle of 23.5º , causing the sun to be higher or lower in the sky according to season. It also follows that sunrise and sunset are not, in general, in the east and the west. In summer, sunrise is in the northeast in our region and sunset in the northwest; in winter, southeast and southwest.

A famous formula is $\cos T = -\tan\varphi \cdot \tan\delta$ where **T** is the half day arc, φ is your latitude, and δ is the solar declination on that day. Sunrise is at time –T°, or (12 – T/15) hours; sunset is at +T°, or (12 + T/15) hours.

The photograph shows, surprisingly perhaps, not a sundial. It is a demonstration instrument for celestial mechanics. Many sundials are derived from it.

28 The Eenrum Analemma E.L.H Roebroeck

A monumental horizontal sundial, 8m in diameter, was unveiled on 21June 2002. It has an analemma for 12 o'clock with a standard and a daylight saving time part.

28 "The Sun as Clock" in Rotterdam H.C. Wagenaar

Sundials and sundialling are among the "extra" courses of which students choose two every year. After a slow start, this year 18 students took part in the sundial course. The course included calculations and cardboard model making, as well as an excursion to the vertical west dial on the Pilgrim Fathers church in Delfshaven. Many demonstration models by Fer de Vries were used. By kind permission of Hans de Rijk, the material included parts of his book "25 Centuries of Time".

29 A 1564 polyhedron sundial excavated F.J. de Vries

Mr. Van Capelleveen sent photographs and sketches of the recently found multifaced sundial. The 30x36x12cm slab is sand stone from Bentheim. It is heavily damaged, but much of the patterns still shows.

The large east and west faces each carry two dials; the west face is more difficult to judge but is apparently the mirror image of the east face (with appropriate numbering). The top dials read apparent solar time, the bottom ones read antique hours and have seven date lines. They are therefore point dials. The holes for the gnomons are clearly visible. – The narrower rim of the stone carries a number of other dial types, as fig. 2 shows. The north face polar dial shows initials GG and the year 1564.

32 Sundials in Nürnberg A. van der Hoeven

An account of the annual meeting of the Arbeitskreis Sonnenuhren.

34 Spherical gnomon for Italian and Babylonian hour lines F.J. de Vries

Picture and short description of how the cone gnomon on a Babylonian/Italian hours sundial can be replaced with a spherical one.

35 Again: "True" time H.W. van der Wyck

Where it is argued that MET, GMT, UT and such acronyms are best left to scientists, while they leave the true solar time to us. They have our permission to regulate their artificial time to our real time once or twice a year.

36 Literature 1436 - 1445 D.L.J.M. Verschuuren

46 The ball on the church spire B.P.U Holman

This ball contained a backup set of the church plans. Should there be a fire, the ball stood a good chance of falling and rolling away, so saving the plans.

47 Equation of Time and Declination for 2003 Th.J. de Vries

Tables for the new year.