T1. The vertices of a parallelogram are A(1, 3), B(4, 8), C(6, 2) and D(x, y). Compute the area of parallelogram ABCD

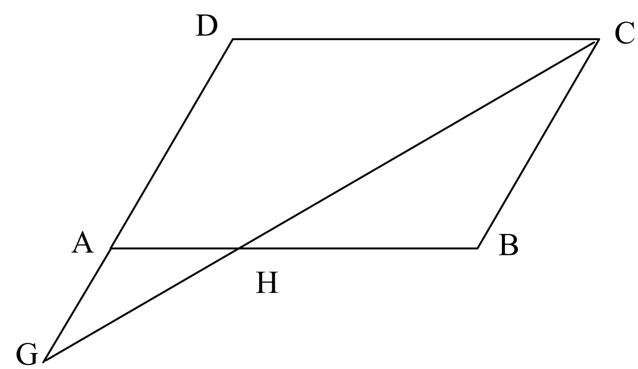
T2. A rectangular picture whose inch length and width are *both integers* is enclosed by a 1 inch border. There are two different possible rectangular pictures for which the area of the picture is exactly equal to the area of the border. Find the dimensions of the **picture** having the larger area.

T3. Find the sum, *in degrees*, of all A , where $0° < A° < 360°$, such that $\sin A = -.2013$

T4. Side AD of parallelogram ABCD is extended to point G and line segment CG is drawn, intersecting AB at H, as shown.

The area of triangle CBH is 27.
The area of triangle AGH is 3.

Compute the area of parallelogram ABCD.



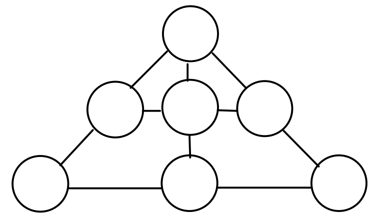
T5. Let n be a positive integer such that $1 \le n \le 9$. Consider the sequence

$$n,\ 10n+7,\ 10(10n+7)+7,\ 10(10(10n+7)+7)+7,\ \dots ,$$

where each term, after the first, is 7 more than 10 times the previous term. For what value of n will the 50^{th} term of this sequence be a multiple of 9 ?

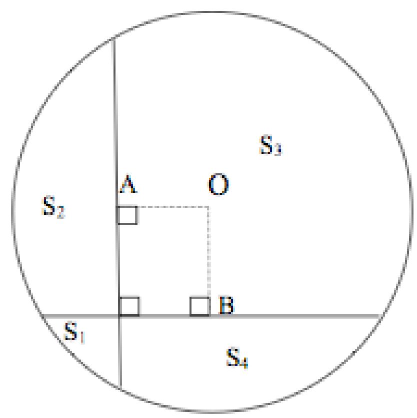
T6. In right triangle ABC, points D and E are on hypotenuse AB with D closer to A. AD = DE = EB and CD = CE = 5. If the length of hypotenuse AB is $\sqrt{N}$, find the integer N.

T7. The accompanying diagram contains several sets of circles that "line up" – three circles to a line. There are five such "lines." All of the integers 1 through 7 are to be inserted, one integer to each circle, so that the sum of the three numbers in each line is the same (this can be done in many ways). Which one of these integers can ***not*** be placed in the lower left circle?



T8. The altitudes to sides *a*, *b*, and *c* of triangle *ABC* are represented as h_a, h_b, and h_c respectively. If $h_a : h_b : h_c = 6 : 4 : 3$, compute Cos C.

T9. In Circle O, two perpendicular chords divide the circle into four regions whose areas are S_1, S_2, S_3, and S_4 as shown. The two chords are 2 and 3 units from the center of the circle, specifically OA = 2 and OB = 3. Compute the numerical value of $(S_1 + S_3) - (S_2 + S_4)$.



T10. Every day Winnie walks from point A to point B at a constant rate. If she walked at 4 ***miles per hour***, she would arrive 7½ ***minutes*** *earlier* than usual. If she walked at 3½ ***miles per hour***, she would arrive 3¾ ***minutes*** *later* than usual. If Winnie's usual rate in ***miles per hour*** is expressed as F/G , where F and G are *positive integers having no common factor other than 1*, compute the fraction F/G.
