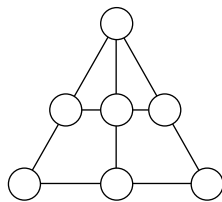T4. In triangle ABC, angle bisectors $\overline{AD}$ and $\overline{BE}$ intersect at P. If $a = 3$, $b = 5$, $c = 7$, $BP = x$, and $PE = y$, compute the ratio $x : y$, where x and y are relatively prime integers.

T5. John throws a fair 6-sided die. If it comes up greater than 3, he wins. If not, he throws again and wins if it comes up greater than 4. If not, he throws again and wins only if it comes up greater than 5. Compute the probability that John wins.

T6. The accompanying diagram contains several sets of circles that "line up" (3 circles to a line). There are five such "lines". The integers from 1 through 7 are to be inserted, one number to a circle, so that the sum of the three numbers in each line is the same (this can be done in many ways). Which number can *not* be placed in the lower left circle?

T7. [Note: A tangent line to the curve $y = x^2$ at the point (a, a^2) will have slope $2a$.]

The angle formed by the tangents to $y = x^2$ from the point (r, s) in Quadrant II is bisected by the line through (r, s) with slope 1. Compute s.

T8. Compute the length of the tangent segment from the origin to the circle that passes through the points $(3, 4)$, $(6, 8)$, and $(5, 13)$.

T9. [Note: The notation "draw $\overset{\frown}{\underline{XY}}$" means draw a circular arc with point X as center and length XY as radius.]

The arc shown is a semicircle. Point O is the midpoint of $\overline{ABC}$, $AB = 8$, and $BC = 6$. We perform the following constructions with compasses and straightedge: