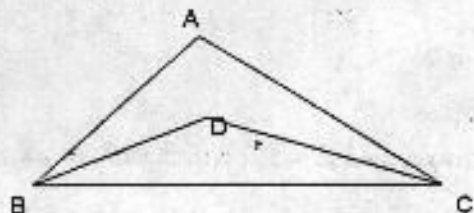


Problems 25-26. Time limit 10 minutes.

25. If (a,b) is an ordered pair of integers that solves

$$9a^2 + 16b^2 = 25, \text{ find all possible values of } a^2 + b^2$$

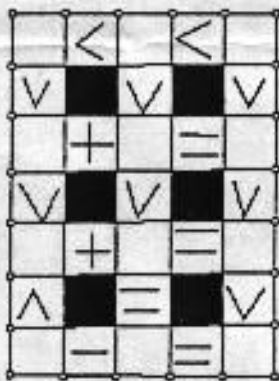
26. [a classic] In the figure, \overline{BD} bisects $\angle ABC$ and \overline{CD} bisects $\angle ACB$. If the measure of $\angle A = 102^\circ$, find the measure of $\angle BDC$



Problems 27-28 10 minutes.

27. For what values of a can the polynomial $2x^2 + ax - 3$ be factored into two polynomials with integer coefficients?

28. Fill in each blank square in the grid with a digit from the set $\{1,2,3,4,5\}$ in such a way that the equations and inequalities are all true. Give your answer as a 4x3 array of digits, as they appear in the figure. Note that the third, fifth, and seventh rows are simple arithmetic equations that must be true.



Problems 29-30 11 minutes.

29. A ball sits on a staircase as shown. If $AB = 8$ inches and $BC = 4$ inches, find (in inches) the radius of the ball. Note that the ball is tangent to the step at A and $\overline{AB} \perp \overline{BC}$

30. Points $A(-1,0)$, $B(5,8)$, and $C(h,k)$ are given, with h and k being integers. For how many points C will $\angle ACB$ be a right angle?

