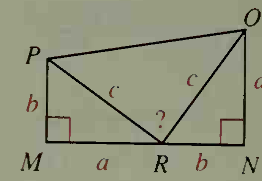
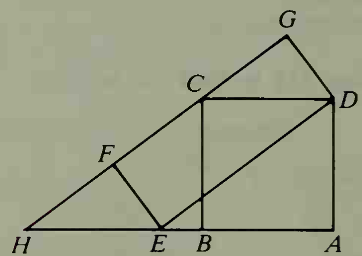
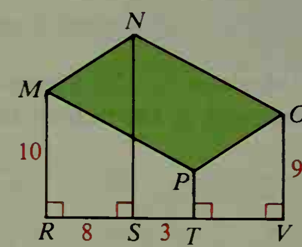
32. President James Garfield discovered a proof of the Pythagorean Theorem in 1876 that used a diagram like the one at the right. Refer to the diagram and write your own proof of the Pythagorean Theorem. (*Hint*: Express the area of quad. $MNOP$ in two ways.)



33. Show that the area of square $ABCD$ equals the area of rectangle $EFGD$.



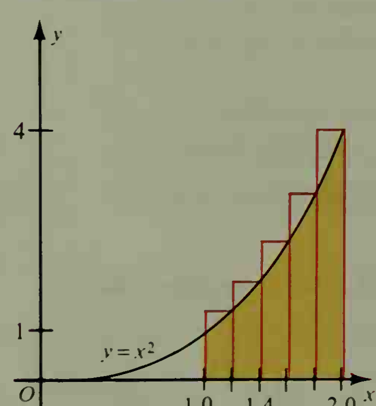
★ **34.** If $NS = 16$, find the area of ▱$MNOP$.

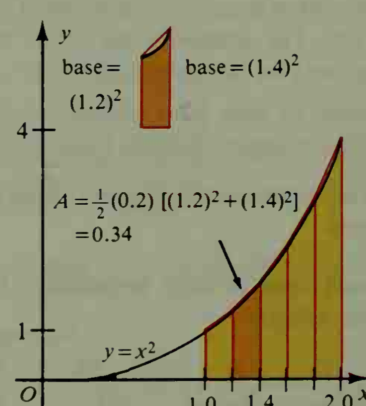


♦ Computer Key-In

The shaded region shown below is bounded by the graph of $y = x^2$, the x-axis, and the vertical lines $x = 1$ and $x = 2$. The area of this region can be approximated by drawing rectangles. (See the Computer Key-In, page 428.) This area can also be approximated by drawing trapezoids. The curve $y = x^2$ has been exaggerated slightly to better show the trapezoids. The diagrams below suggest that you can obtain a closer approximation for the area by using trapezoids than by using rectangles.

Let us approximate the area using five rectangles and five trapezoids. The base of each rectangle is 0.2 and the height is given by $y = x^2$.





For each trapezoid in the diagram at the right above, the parallel bases are vertical segments from the x-axis to the curve $y = x^2$. The altitude is a horizontal segment with length 0.2. For example, in the second trapezoid, the bases are $(1.2)^2$ and $(1.4)^2$, respectively, and the height is 0.2.