Construction Portfolio Part 2

Carry out these constructions, each one on a separate side of paper.

13. **External Tangents.**
Draw any circle \( c \); label the center \( O \) and the radius \( r \). Then draw a point \( E \) outside the circle. Construct two points \( S \) and \( T \) on the circle so that \( ES \) and \( ET \) are tangent to \( c \). Construct \( F \) as the intersection of \( ST \) and \( OE \).

Answer this: Let \(OE = d\) and let the radius of the circle be \(r\). At the bottom of the page, compute the length \(OF\) as an expression in \(d\) and \(r\).
14. **Right Triangle from Hypotenuse.** Draw a segment AB and a point D on AB. Construct a point C so that ABC is a right triangle with hypotenuse AB, and D is the foot of the altitude through C.

Let $x = |AD|$ and $y = |BD|$, then if $h = |CD|$, write $h$ as an expression in $x$ and $y$.
15. Geometric Mean. Draw a segment of unit length. Then construct a segment of length sqrt 7, using Construction 14 as the method.
16. **Half-Area.** Draw a triangle ABC. Construct points E on AB and F on AC so that EF is parallel to BC and area AEF = (1/2) area ABC.