7 sides

$\frac{2\pi}{7}$

b

s

a

18 sides

$\frac{2\pi}{18}$

b

s

a

$$s = r\varphi$$
$$t = (r + r^\diamond)\sin\varphi = r\,\frac{\sin\varphi}{\cos\varphi}$$

$$r^2 + t^2 = (r + r^\diamond)^2$$
$$r^\diamond = \sqrt{r^2 + t^2} - r$$

$$(r + r^\diamond)\cos\varphi = r$$
$$r\,(1 - \cos\varphi) = r^\diamond \cos\varphi$$
$$r^\diamond = \frac{r}{\cos\varphi} - r = \frac{r(1-\cos\varphi)}{\cos\varphi}$$

$$t = \sqrt{r^2 + t^2}\,\sin\varphi$$
$$t^2 = \left(r^2 + t^2\right)\sin^2\varphi$$
$$t^2\left(1 - \sin^2\varphi\right) = r^2 \sin^2\varphi$$
$$t^2 \cos^2\varphi = r^2 \sin^2\varphi$$
$$t \cos\varphi = r \sin\varphi$$
$$t = r\,\frac{\sin\varphi}{\cos\varphi}$$