Hence, $N\hat{A}B + B\hat{A}M = 90^\circ$ $\frac{1}{2}$

Thus, $\boxed{N\hat{A}B = A\hat{M}B}$ (angles having same complement)

$\frac{1}{2}$ (OR simply angles their arms mutually perpendicular)*

b) In $\triangle ABN$ we have:

$M\hat{B}A = 90^\circ$ (proved)

M, B & N are collinear

then $A\hat{B}N = 90^\circ$.

hence, $\triangle ABN$ is right at B

$(\frac{1}{4})$ So, $\tan B\hat{A}N = \frac{opp}{adj} = \frac{BN}{AB}$

In right $\triangle ABM$

$(\frac{1}{4})$ $\tan A\hat{M}B = \frac{opp}{adj} = \frac{AB}{BM}$.

but $A\hat{M}B = B\hat{A}N$ (proved)

then $\tan A\hat{M}B = \tan B\hat{A}N$.

$(\frac{1}{4})$ $\frac{AB}{BM} = \frac{BN}{AB}$.

Hence, $BM \times BN = AB^2$

but $AB = 2R$. so $AB^2 = 4R^2$

$(\frac{1}{4})$ Thus, $\boxed{BN \times BM = 4R^2}$