Bevel & Miter Gear Formulas

To Find	Rule	Formula
Pitch Diameter (PD)	Divide Number of Teeth (N) by Diametral Pitch (DP)	$PD = \dfrac{N}{DP}$
Tangent of Pitch Angle (Pα) of Driven	Divide Number of Teeth (N) in Driven by Number of Teeth (N) in Driver	$\tan(P\alpha\ Driven) = \dfrac{N\ Driven}{N\ Driver} = Ratio$
Pitch Angle (Pα) of Driver	Subtract Pitch Angle (Pα) of Driven from 90°	$P\alpha\ \Gamma\ Driver = 90° - \alpha\ Driven$
Pitch Cone Radius (Pr)	Divide Pitch Diameter (PD) by Twice the Sine of Pitch Angle (Pα)	$Pr = \dfrac{PD}{2\sin(P\alpha)}$
Tangent of Addendum Angle (α)	Divide Addendum (a) by Pitch Cone Radius (Cr)	$\tan(\alpha) = \dfrac{a}{Cr}$
Face Angle (Fα)	Add Addendum Angle (α) to Pitch Angle (Pα)	$F\alpha = \alpha + P\alpha$
Tangent of Dedendum Angle (dα)	Divide Dedendum (d) by Pitch Cone Radius (Cr)	$\tan(d\alpha) = \dfrac{d}{Cr}$
Root Angle (Rα)	Subtract Dedendum Angle (dα) from Pitch Angle (Pα)	$R\alpha = P\alpha - d\alpha$
Angular Addendum (aΦ)	Multiply Addendum (a) by cosine of Pitch Angle (Pα)	$a\Phi = a \times \cos(P\alpha)$
Outside Diameter (OD)	Add 2 Angular Addendum (aΦ) to Pitch Diameter (PD)	$OD = 2\ a\Phi \times PD$
Mounting Distance (MD)	Add one-half the Pitch Diameter of Mating (PDg) plus Backing to Pitch Line (BL)	$MD = \dfrac{PDg}{2} + BL$
Distance From Cone Center to Crown (Cc)	Multiply one-half Outside Diameter (OD) by cotangent of Face Angle (Fα)	$Cc = \dfrac{OD}{2} \times \cot(F\alpha)$
Backing to Crown (Bc)	Subtract Cone Center to Crown (Cc) from Mounting Distance (MD)	$Bc = MD - Cc$
Ratio	Divide Number of Teeth (N) in Driven by Number of Teeth (N) in Driver	$Ratio = \dfrac{N\ Driven}{N\ Driver}$