Saw Filer Level 1, Certificate of Qualification, and Benchperson Endorsement

FORMULAS

General Formulas	
Pulley speeds	$S \times D = s \times d$
Surface feet per minute	$sfpm = \dfrac{diameter\ in\ inches\ \times\ 3.14\ \times\ rpm}{12}$
Revolutions per minute	$rpm = \dfrac{sfpm\ \times\ 12}{3.14\ \times\ diameter\ in\ inches}$
Circumference	Diameter in inches X 3.14

Band Saw Formulas	
Band Saw Maximum Tooth Bite	

10 inches wide
*Where: TB = Tooth Bite
     PT = Plate Thickness
     SW = Saw Width*
	TB = PT

More than 10 inches wide	*TB = PT + (SW -10) (.04 x PT)*
Less than 10 inches wide	*TB = PT - (IO-SW) (.04 x PT)*
Alternate Method for calculating Maximum Tooth Bite: • Start with 1.00 • Add 0.04 for every 1 inch of saw width over 10 inch • or • Subtract 0.04 for every 1 inch of saw width under 10 inch • Multiply answer by the plate thickness	
More than 10 inches wide	*TB =(Add 0.04 to 1.00 for every 1 inch of saw width) X Plate thickness*
Less than 10 inches wide	*TB = (Subtract 0.04 from 1.00 for every 1 inch of saw width) X Plate thickness*
Band Saw Tooth Bite (actual)	$Tooth\ bite = \dfrac{tooth\ pitch\ \times\ feed\ speed\ in\ ft/\ min}{sfpm}$

Saw Filer: Level 1, CofQ, and Benchperson Endorsement Formulas   *January 1, 2023*

Key number for calculating band saw feet speed	$Key\ number = \dfrac{sfpm\ \div\ sawlength\ in\ feet}{12}$
Band saw feed speed (key number method)	$Feed\ speed = Key\ number\ \times\ Distance\ between\ scratch\ marks$
Minimum tooth bite	$Tooth\ bite\ =\ \dfrac{kerf\ -\ saw\ plate\ thickness}{2}$
Band saw teeth per minute	$Teeth\ per\ minute\ =\ \dfrac{sfpm\ \times\ 12}{tooth\ pitch}$
Gullet size (area)	$Gullet\ area\ =\ \dfrac{tooth\ pitch\ \times\ gullet\ depth}{1.75}$
Gullet feed index (GFI)	$GFI\ =\ \dfrac{Tooth\ bite\ \times\ Cutting\ depth}{gullet\ area}$
Band saw plate thickness	$Band\ saw\ plate\ thickness =\ .001\ \times\ Wheel\ diameter\ in\ inches$
Band saw kerf	$Band\ saw\ kerf\ =\ plate\ thickness\ +\ (saw\ plate\ width\ \times\ standard\ clearance)$ <u>standard clearances</u>= 0.006" dry wood, 0.007" frozen wood, and 0.008" green wood
Band saw feed speed	$Band\ saw\ feed\ speed\ =\ \dfrac{\underline{Teeth\ per\ minute\ X\ Tooth\ bite}}{12}$
Strain	
Strain (headsaw)	$Strain = Width\ in\ inches\ \times\ Thickness\ in\ thousands\ \times 10$
Strain (resaw)	$Strain = Width\ in\ inches\ \times\ Thickness\ in\ thousands\ \times\ 8$
Weight required for given strain	$Weight = \dfrac{Strain}{Long\ arm\ \div\ Short\ arm}$
Weight required for given strain including top wheel	$Weight = \dfrac{Strain + Weight\ of\ top\ wheel\ assembly}{Long\ arm\ \div\ Short\ arm}$
Strain to weight ratio	$Ratio = \dfrac{Long\ arm}{Short\ arm}$
Compound strain	$\left(\dfrac{length\ of\ 1st\ long\ arm}{Length\ of\ 1st\ short\ arm}\right) X \left(\dfrac{Overall\ length\ of\ 2nd\ arm}{Length\ of\ 2nd\ short\ arm}\right)$

Circular Saw Formulas	
Tooth bite	$Tooth\ bite\ =\ \dfrac{Feed\ speed\ in\ inches}{rpm\ \times\ Number\ of\ teeth}$
Key number	$Key\ number\ =\ \dfrac{rpm}{12}$
Feed speed (key number method)	$Feed\ speed = Key\ number\ \times\ Distance\ between\ tooth\ marks$
Feed speed (tooth bite method)	$Feed\ speed = \dfrac{rpm \times number\ of\ teeth \times tooth\ bite}{12}$
Number of teeth required	$number\ of\ teeth\ required = \dfrac{feed\ speed \times 12}{desired\ tooth\ bite \times rpm}$
Horsepower required per saw	$horsepower\ required\ per\ saw \\ =\ \dfrac{Depth\ of\ cut\ \times\ Feed\ speed\ \times\ Kerf\ \times\ Energy\ factor}{144}$
Saw kerf	$Saw\ kerf\ =\ plate\ thickness\ +\ left\ clearance\ +\ right\ clearance$
Gullet feed index (GFI)	$GFI\ =\ \dfrac{Tooth\ bite\ \times\ Cutting\ depth}{gullet\ area}$
Tooth pitch	$Tooth\ pitch\ =\ \dfrac{saw\ diameter\ \times\ 3.14}{number\ of\ teeth}$
Gullet size (area)	$Gullet\ size\ =\ \dfrac{tooth\ pitch\ \times\ gullet\ depth}{1.75}$

NOTE   Do **not** bring this document to your exam.
These formulas will be included in the exam reference materials.