YEAR 11 - MATHEMATICS

Preliminary Topic 16 - Inverse Trigonometric Functions

MATHEMATICS EXTENSION

LEARNING PLAN			
Learning Intentions Student is able to:	**Learning Experiences** Implications, considerations and implementations:	**Success Criteria** I can:	**Resources**
• define and use the inverse trigonometric functions		• define and use the inverse trigonometric functions	
(a) understand and use the notation arcsin $arcsin\, x$ and $sin^{-1}x$ for the inverse function of sin $sin\, x$ when $-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$ (and similarly for cos $cos\, x$ and tan $tan\, x$) and understand when each notation might be appropriate to avoid	▪ Students should understand the notation for inverse trigonometric functions and hence be aware for example that: $x \neq \frac{1}{\sin\sin x}$. Similarly, for inverse cosine and inverse tangent.	(a) understand and use the notation arcsin $arcsin\, x$ and $sin^{-1}x$ for the inverse function of sin $sin\, x$ when $-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$ (and similarly for cos $cos\, x$ and tan $tan\, x$) and understand when each notation might be appropriate to avoid	

confusion with the reciprocal functions.		confusion with the reciprocal functions.	
(b) use the convention of restricting the domain of sin $sin\, x$ to $-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$, so the inverse function exists. The inverse of this restricted sine function is defined by: $y = sin^{-1}x, -1 \leq x \leq 1$ and $-\frac{\pi}{2} \leq y \leq \frac{\pi}{2}$.		(b) use the convention of restricting the domain of sin $sin\, x$ to $-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$, so the inverse function exists. The inverse of this restricted sine function is defined by: $y = sin^{-1}x$, $-1 \leq x \leq 1$ and $-\frac{\pi}{2} \leq y \leq \frac{\pi}{2}$.	
(c) use the convention of restricting the domain of cos $cos\, x$ to $0 \leq x \leq \pi$, so the inverse function exists. The inverse of this restricted cosine function is defined by: $y = cos^{-1}x, -1 \leq x \leq 1$ and $0 \leq y \leq \pi$.	▪ Evaluate α if $\alpha = \left(-\frac{\sqrt{3}}{2}\right)$.	(c) use the convention of restricting the domain of cos $cos\, x$ to $0 \leq x \leq \pi$, so the inverse function exists. The inverse of this restricted cosine function is defined by: $y = cos^{-1}x$, $-1 \leq x \leq 1$ and $0 \leq y \leq \pi$.	
(e) use the convention of restricting the domain of tan $tan\, x$ to $-\frac{\pi}{2} < x < \frac{\pi}{2}$, so the inverse function exists. The		(e) use the convention of restricting the domain of tan $tan\, x$ to $-\frac{\pi}{2} < x < \frac{\pi}{2}$, so the	

inverse of this restricted tangent function is defined by: $y = tan^{-1}x$, x is a real number and $-\frac{\pi}{2} < y < \frac{\pi}{2}$.`		inverse function exists. The inverse of this restricted tangent function is defined by: $y = tan^{-1}x$, x is a real number and $-\frac{\pi}{2} < y < \frac{\pi}{2}$.	
(f) classify inverse trigonometric functions as odd, even or neither odd nor even.		(f) classify inverse trigonometric functions as odd, even or neither odd nor even.	
sketch graphs of the inverse trigonometric functions .	In Year 11 Extension 1 only the basic inverse trigonometric curves are required. ▪ For each function, state the domain and range of the function and sketch its graph: *(a)* $(x + 5)$ *(b)* $g(x) = 2x$.	sketch graphs of the inverse trigonometric functions .	
use the relationships $(x) \ = x$ and $(\sin sin\, x) \ = x,\ (x) \ = x$ and $(\cos cos\, x) \ = x,$ and $(x) \ = x$ and $(\tan tan\, x) \ = x$ where appropriate, and state the values of	▪ Determine the exact value of $\left(\frac{1}{2}\right) - \left(-\frac{1}{2}\right) - \left(-\sqrt{3}\right)$. ▪ Show that $\sin sin\, (p) \ = \sqrt{1 - p^2}$.	use the relationships $(x) \ = x$ and $(\sin sin\, x) \ = x,\ (x) \ = x$ and $(\cos cos\, x) \ = x,$ and $(x) \ = x$ and $(\tan tan\, x) \ = x$ where appropriate, and state the	

x for which these relationships are valid.		values of x for which these relationships are valid.	
prove and use the properties: $sin^{-1}(-x) = -x$, $(-x) = \pi - x$, $(-x) = -x$ and $cos^{-1}x + sin^{-1}x = \frac{\pi}{2}$.	The results $(-x) = -x$, $(-x) = \pi - x$, $(-x) = -x$, and $x + x = \frac{\pi}{2}$, can be obtained graphically. Students will not be required to reproduce formal proofs.	prove and use the properties: $sin^{-1}(-x) = -x$, $(-x) = \pi - x$, $(-x) = -x$ and $cos^{-1}x + sin^{-1}x = \frac{\pi}{2}$.	
solve problems involving inverse trigonometric functions in a variety of abstract and practical situations		solve problems involving inverse trigonometric functions in a variety of abstract and practical situations	2017-7, 2014-11c, 2013-9, 2011-1e, 2011-2d, 2007-2d