

Calculus II

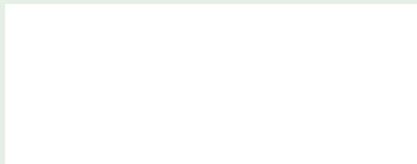
Simplify basic trigonometric functions evaluated on basic inverse trigonometric functions

Todor Milev

2019

Example

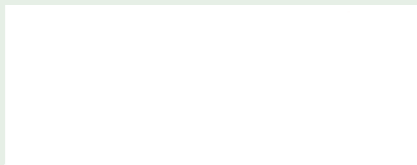
Find $\tan \left(\arcsin \left(\frac{1}{3} \right) \right)$.



Example

Find $\tan \left(\arcsin \left(\frac{1}{3} \right) \right)$.

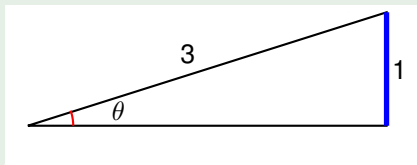
- Let $\theta = \arcsin \left(\frac{1}{3} \right)$, so $\sin \theta = \frac{1}{3}$.



Example

Find $\tan \left(\arcsin \left(\frac{1}{3} \right) \right)$.

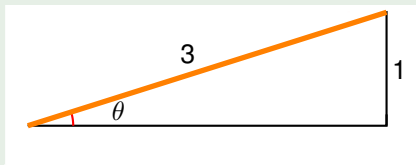
- Let $\theta = \arcsin \left(\frac{1}{3} \right)$, so $\sin \theta = \frac{1}{3}$.
- Draw a right triangle with **opposite side 1** and hypotenuse 3.



Example

Find $\tan \left(\arcsin \left(\frac{1}{3} \right) \right)$.

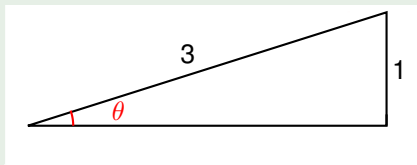
- Let $\theta = \arcsin \left(\frac{1}{3} \right)$, so $\sin \theta = \frac{1}{3}$.
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Example

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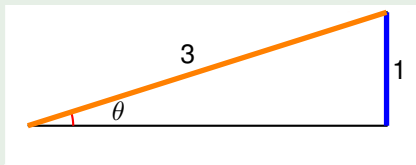
- Let $\theta = \arcsin \left(\frac{1}{3} \right)$, so $\sin \theta = \frac{1}{3}$.
- Draw a right triangle with opposite side 1 and hypotenuse 3.
- Let the angle θ be as labeled.



Example

Find $\tan \left(\arcsin \left(\frac{1}{3} \right) \right)$.

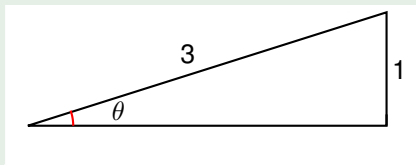
- Let $\theta = \arcsin \left(\frac{1}{3} \right)$, so $\sin \theta = \frac{1}{3}$.
- Draw a right triangle with opposite side 1 and hypotenuse 3.
- Let the angle θ be as labeled. Then $\sin \theta = \frac{1}{3}$



Example

Find $\tan \left(\arcsin \left(\frac{1}{3} \right) \right)$.

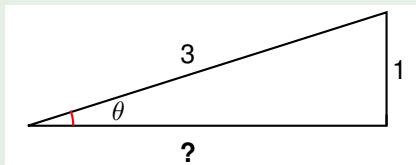
- Let $\theta = \arcsin \left(\frac{1}{3} \right)$, so $\sin \theta = \frac{1}{3}$.
- Draw a right triangle with opposite side 1 and hypotenuse 3.
- Let the angle θ be as labeled. Then $\sin \theta = \frac{1}{3}$ and so $\theta = \arcsin \left(\frac{1}{3} \right)$.



Example

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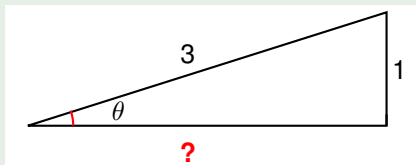
- Let $\theta = \arcsin \left(\frac{1}{3} \right)$, so $\sin \theta = \frac{1}{3}$.
- Draw a right triangle with opposite side 1 and hypotenuse 3.
- Let the angle θ be as labeled. Then $\sin \theta = \frac{1}{3}$ and so $\theta = \arcsin \left(\frac{1}{3} \right)$.
- Length of adjacent side = ?



Example

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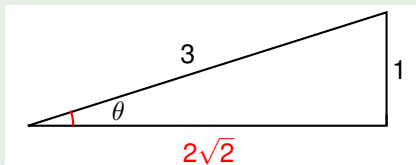
- Let $\theta = \arcsin \left(\frac{1}{3} \right)$, so $\sin \theta = \frac{1}{3}$.
- Draw a right triangle with opposite side 1 and hypotenuse 3.
- Let the angle θ be as labeled. Then $\sin \theta = \frac{1}{3}$ and so $\theta = \arcsin \left(\frac{1}{3} \right)$.
- Length of adjacent side = $\sqrt{3^2 - 1^2}$



Example

Find $\tan \left(\arcsin \left(\frac{1}{3} \right) \right)$.

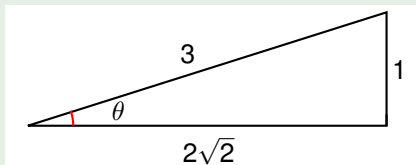
- Let $\theta = \arcsin \left(\frac{1}{3} \right)$, so $\sin \theta = \frac{1}{3}$.
- Draw a right triangle with opposite side 1 and hypotenuse 3.
- Let the angle θ be as labeled. Then $\sin \theta = \frac{1}{3}$ and so $\theta = \arcsin \left(\frac{1}{3} \right)$.
- Length of adjacent side $= \sqrt{3^2 - 1^2} = \sqrt{8} = 2\sqrt{2}$.



Example

Find $\tan \left(\arcsin \left(\frac{1}{3} \right) \right)$.

- Let $\theta = \arcsin \left(\frac{1}{3} \right)$, so $\sin \theta = \frac{1}{3}$.
- Draw a right triangle with opposite side 1 and hypotenuse 3.
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- Length of adjacent side $= \sqrt{3^2 - 1^2} = \sqrt{8} = 2\sqrt{2}$.
- Then $\tan \left(\arcsin \left(\frac{1}{3} \right) \right) = ?$



Example

Find $\tan \left(\arcsin \left(\frac{1}{3} \right) \right)$.

- Let $\theta = \arcsin \left(\frac{1}{3} \right)$, so $\sin \theta = \frac{1}{3}$.
- Draw a right triangle with opposite side 1 and hypotenuse 3.
- Let the angle θ be as labeled. Then $\sin \theta = \frac{1}{3}$ and so $\theta = \arcsin \left(\frac{1}{3} \right)$.
- Length of adjacent side $= \sqrt{3^2 - 1^2} = \sqrt{8} = 2\sqrt{2}$.
- Then $\tan \left(\arcsin \left(\frac{1}{3} \right) \right) = \frac{1}{2\sqrt{2}}$.

