

# Discover the Hidden Secrets of Non-Right Angled Trigonometry Part III: Unleashing the Power of the Cosine Rule for All in One Worksheet

## Understanding the Cosine Rule for Non-Right Angled Triangles

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \quad \leftarrow \frac{\sin A}{a} = \frac{\sin B}{b}$$

$$a^2 = b^2 + c^2 - 2bc \cos A \quad \leftarrow$$

$$\text{Area} = \frac{1}{2} ab \sin C \quad \leftarrow$$

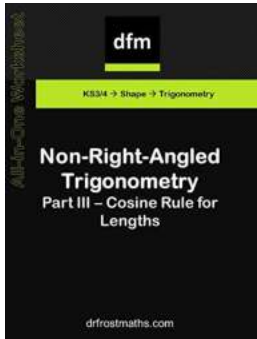
  

<p style="color: green; font-family: cursive;"> <math>x^2 = 9^2 + 11^2 - 2 \times 9 \times 11 \times \cos 73^\circ</math>  <math>x = 17.0</math> </p>	<p style="color: red; font-family: cursive;">5</p>	<p style="text-align: center;">Area?</p>
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Non-right angled triangles have fascinated mathematicians and learners for decades. These triangles, also known as oblique triangles, bring out the hidden complexities in trigonometry. In this comprehensive article, we will explore the third part of the non-right angled trigonometry series, focusing on the powerful and versatile Cosine Rule.

### An to the Cosine Rule

The Cosine Rule, also known as the Law of Cosines, helps us find missing angles and sides in non-right angled triangles. It provides a formula that relates the lengths of a triangle's sides to the cosine of one of its angles. The formula is as follows:



## All in One Worksheet - Non-Right-Angled Trigonometry - Part III - Cosine Rule for Lengths

by Florian Cajori (Kindle Edition)

★★★★☆ 4 out of 5

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X-Ray for textbooks : Enabled



$$a^2 = b^2 + c^2 - 2bc \cdot \cos(A)$$

Where:

- **a** is the length of the side opposite angle **A**
- **b** and **c** are the lengths of the other two sides
- **A** is the angle opposite side **a**

### Why is the Cosine Rule Important?

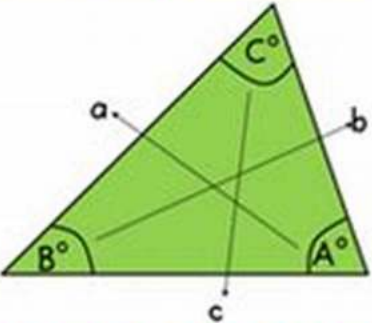
The Cosine Rule serves as a game-changer in non-right angled trigonometry. By utilizing this formula, we can solve complex triangles and unlock a wealth of information about their angles and sides. Whether you're a student struggling to

grasp the concept or a professional needing to solve real-world problems related to non-right angled triangles, the Cosine Rule can be your best friend.

## Applications of the Cosine Rule

### Trigonometry – Non Right-Angled Triangles

**Labelling your triangle**



**Area of a triangle**

$\frac{1}{2} \times a \times b \times \sin C^\circ$

**Cosine rule**

**Finding Sides**

$a^2 = b^2 + c^2 - 2bc \cos A$

To find sides you need:  
2 sides and 1 angle

**Finding Angles**

$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$

To find angles you need:  
3 sides

---

**Sine rule**

$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

To find sides you need:  
1 side and 2 angle

$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$

To find angles you need:  
2 sides and 1 angle

**You only need to use 2 of the 3 fractions given here!**

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The applications of the Cosine Rule extend far beyond the classroom. Here are a few real-life scenarios where it finds its relevance:

1. **Architecture and Engineering:** Architects and engineers heavily rely on the Cosine Rule to calculate the load-bearing capacities of structures and design safe building elements.
2. **Navigational Systems:** The Cosine Rule helps in determining distances at sea or in the air, assisting pilots and sailors in navigating their paths accurately.

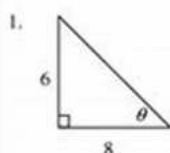
- Astronomy: Astronomers use the Cosine Rule to measure celestial distances, calculate the size of planets, and analyze the movements of heavenly bodies.
- Land Surveying: Surveyors make use of the Cosine Rule to map and measure land accurately, allowing for the creation of detailed topographic maps.

## Mastering the Cosine Rule: An All-in-One Worksheet

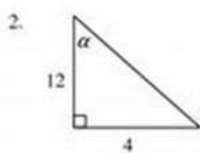
### Algebra 3/4 :: Unit 13: Worksheet 1b Right Triangle Trigonometry

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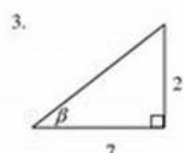
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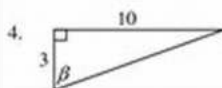
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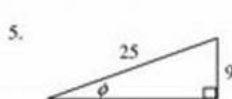
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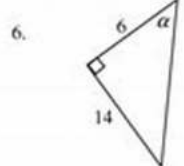
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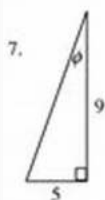
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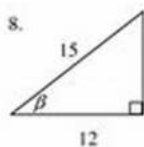
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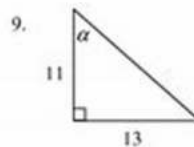
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$$\begin{aligned} \sin \alpha &= & \csc \alpha &= \\ \cos \alpha &= & \sec \alpha &= \\ \tan \alpha &= & \cot \alpha &= \end{aligned}$$

To help you excel in non-right angled trigonometry, we have created an all-in-one worksheet that covers every aspect of the Cosine Rule. This comprehensive worksheet includes step-by-step instructions, solved examples, and challenging exercises to test your knowledge.

Whether you're a student preparing for an upcoming exam, a teacher looking for valuable educational resources, or an enthusiast wanting to delve deeper into the realms of non-right angled trigonometry, this worksheet has got you covered!

The Cosine Rule is a powerful tool that enables us to solve non-right angled triangles effortlessly. With its applications spanning across various fields, understanding and mastering this rule opens up new possibilities in problem-solving and critical thinking.

So, don't hesitate! Dive into the world of non-right angled trigonometry and unravel the secrets of the Cosine Rule with our all-in-one worksheet.



## All in One Worksheet - Non-Right-Angled Trigonometry - Part III - Cosine Rule for Lengths

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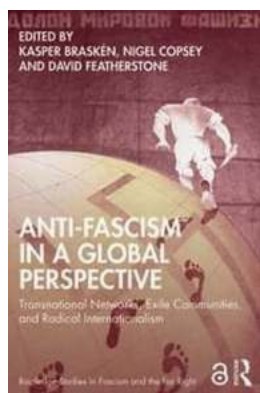
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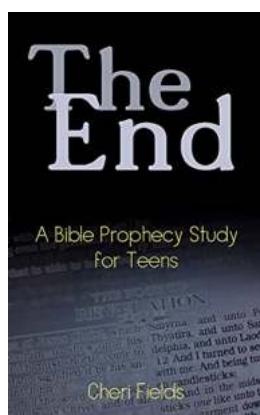
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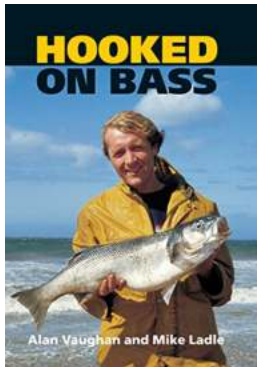
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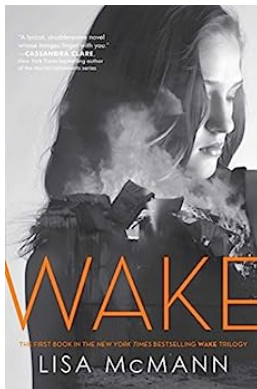
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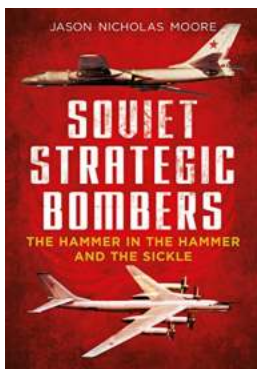
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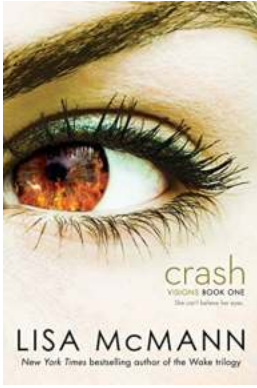
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