Lower 6 Chapter 9

Trig Ratios

Chapter Overview

1. Sine/ Cosine Rule

2. Areas of Triangles

3. Trig Graphs

4. Proof of Sine/ Cosine Rule





Sine and Cosine Rule

|  |  |  |
| --- | --- | --- |
| **You have** | **You want** | **Use** |
| #1: Two angle-side opposite pairs | Missing angle or side in one pair | Sine rule |
| #2 Two sides known and a missing side opposite a known angle | Remaining side | Cosine rule |
| #3 All three sides | An angle | Cosine rule |
| #4 Two sides known and a missing side not opposite known angle | Remaining side | Sine rule twice |

The Cosine Rule

Examples:

15

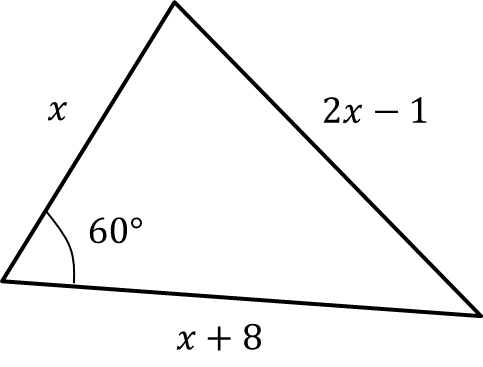
x

115

12

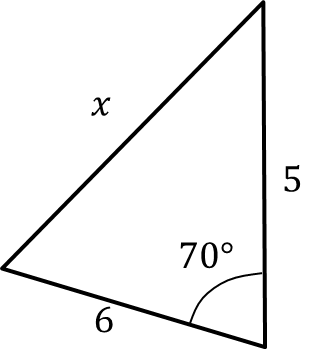


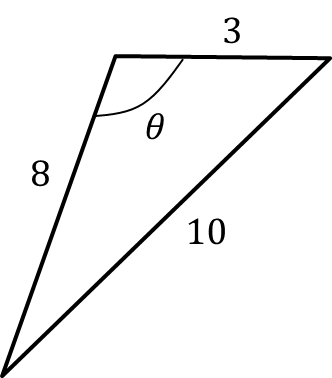


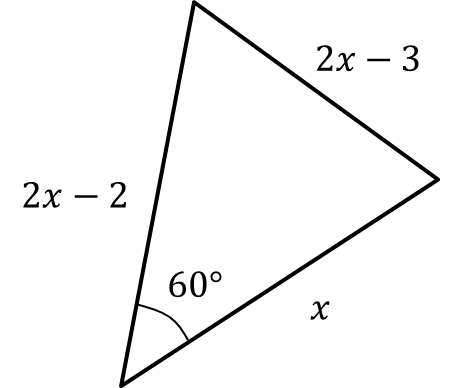


2. Coastguard station is 8 km, on a bearing of , from coastguard station . A ship is 4.8 km on a bearing of , away from . Calculate how far is from .

Test Your understanding



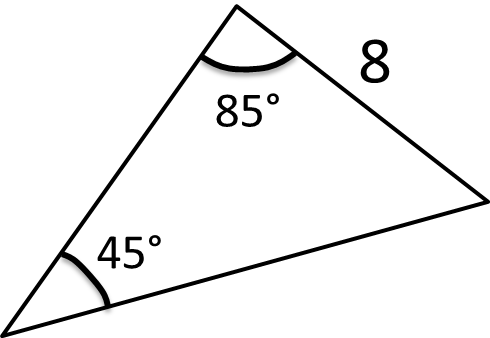


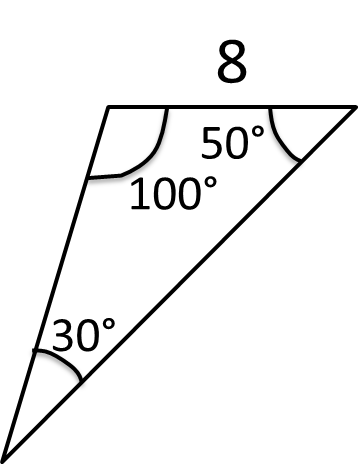


Ex 9A Pg 177

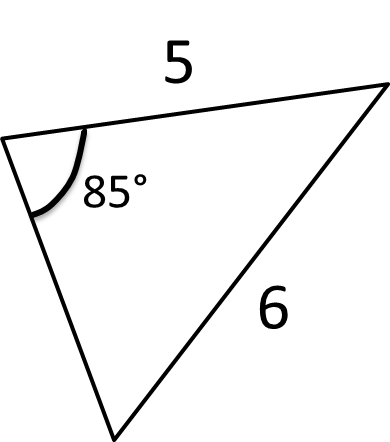
The Sine Rule

Examples:

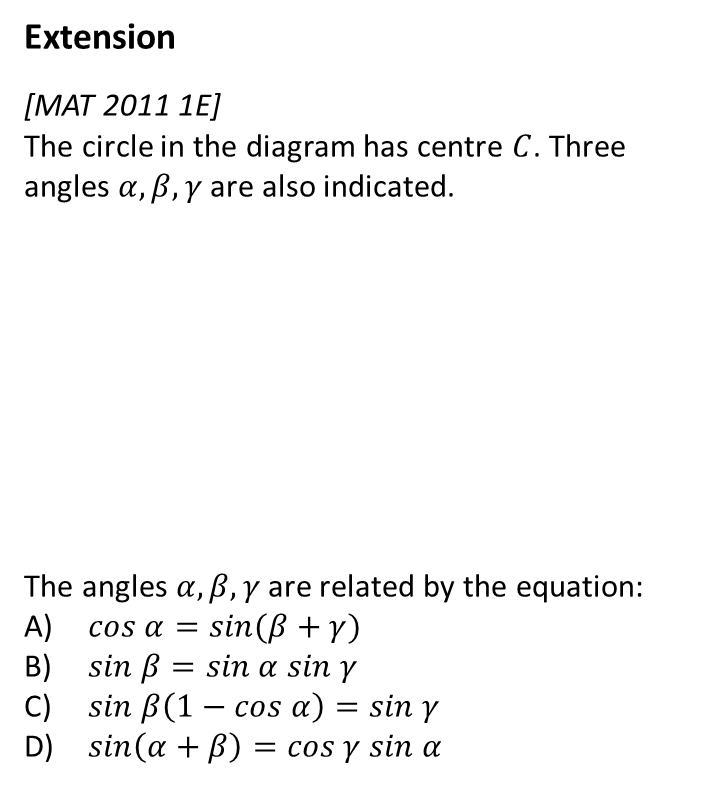
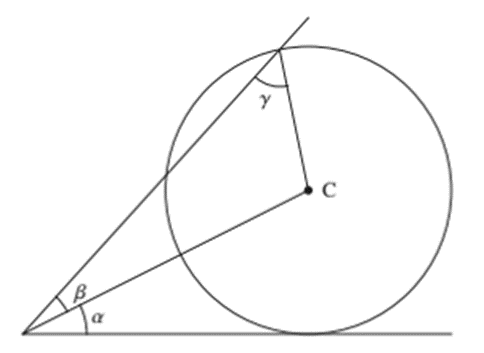
1. 



2.

3.

4.

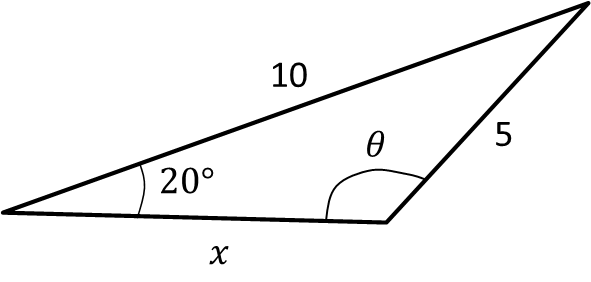


Ex 9B Pg 181

The Ambiguous Case

Example:

Given that the angle is obtuse, determine and hence determine the length of .

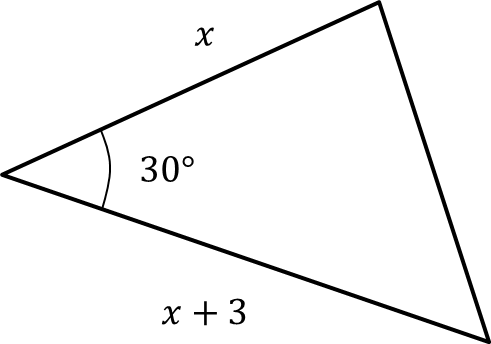


Ex 9C Pg 184

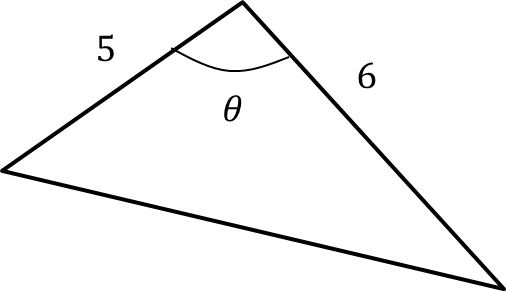
Area of Non Right-Angled Triangles

Test your understanding:

1. The area of this triangle is 10. Determine .



1. The area of this triangle is also 10. If is obtuse, determine .



Ex 9D Pg 186

Problem solving with sin/cos rule

Example

The diagram shows the locations of four mobile phone masts in a field, . , angle and angle .

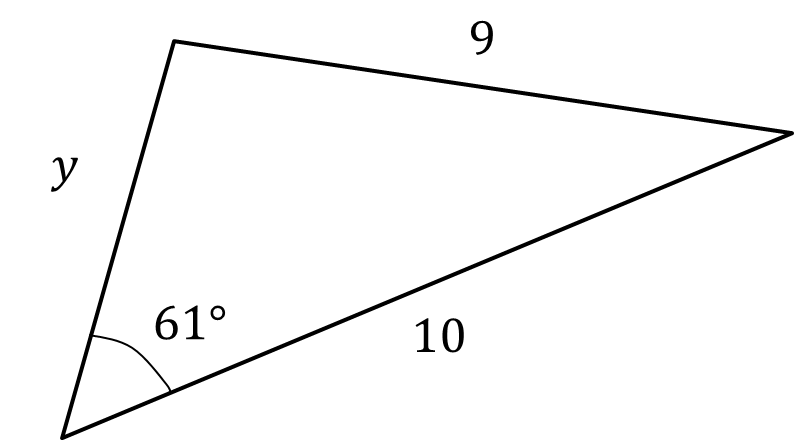
In order that the masts do not interfere with each other, they must be at least 70m apart.

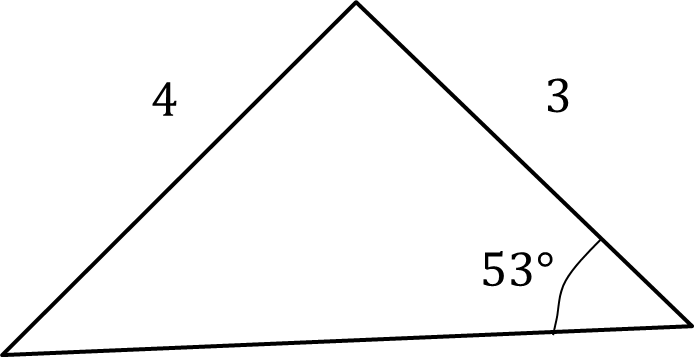
Given that is the minimum distance from , find:

1. The distance is from
2. The angle
3. The area enclosed by the four masts.

Using the sine rule twice:

Test your understanding



1. 

Extension

1. [AEA 2009 Q5a] The sides of the triangle have lengths and , where . The sizes of the angles and form an arithmetic sequence.
2. Show that the area of triangle is .

Given that and , find

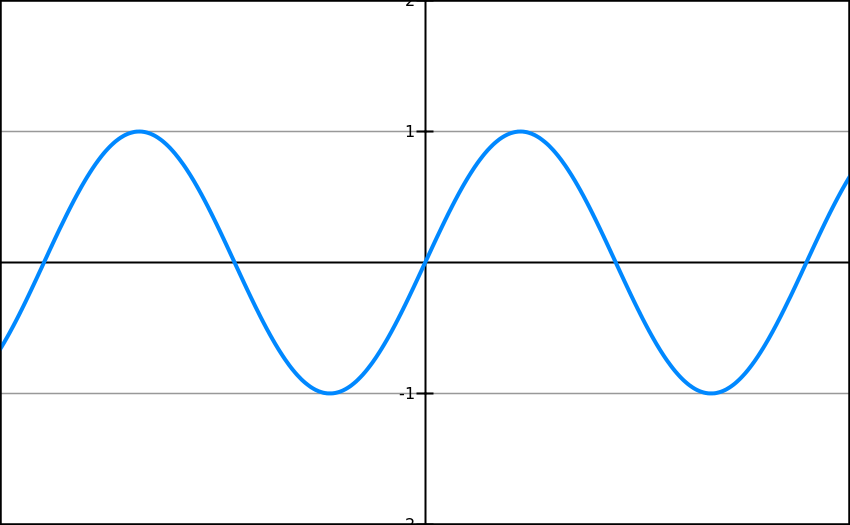
(ii) the value of ,

(iii) the value of .

Ex 9E Pg 189

Trig Graphs

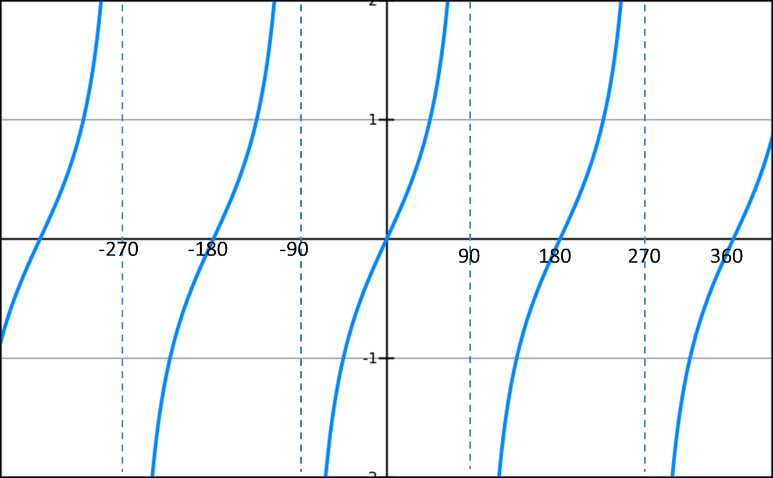
Y = sin x



Y = cos x



Y = tan x



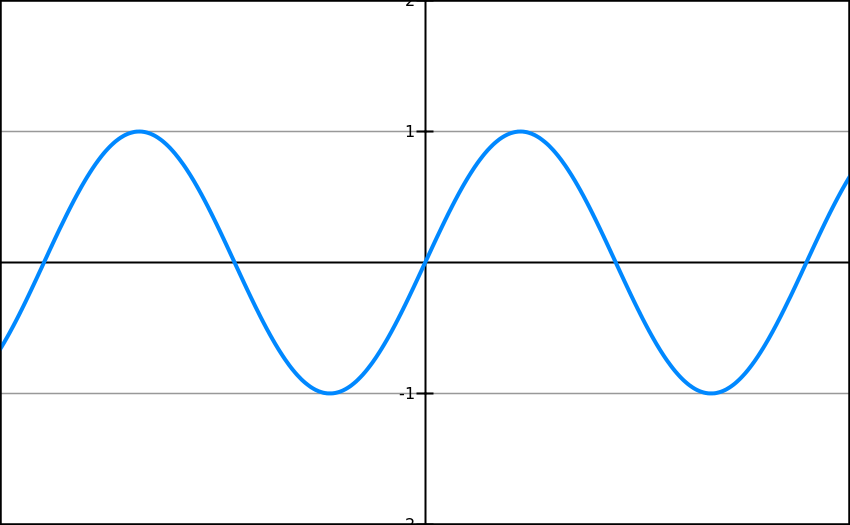
Using trig graphs

Suppose we know that sin(30) = 0.5. By thinking about symmetry in the graph, how could we work out:

Sin(150)

Sin(-30)

Sin(210)



Suppose we know that **cos(60) = 0.5**. By thinking about symmetry in the graph, how could we work out:

Cos(120)

Cos(-60)

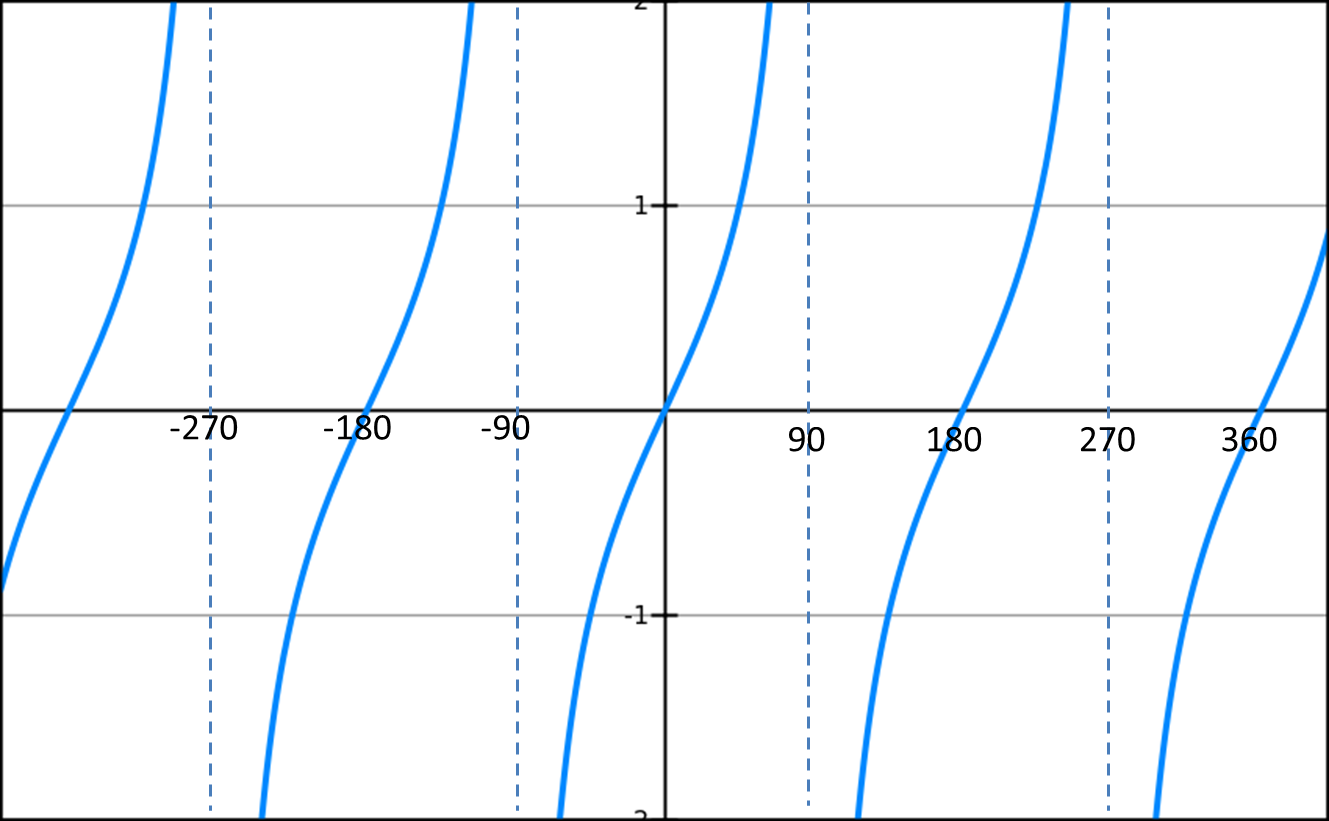
Cos(240)



Suppose we know that . By thinking about symmetry in the graph, how could we work out:

Tan(-30)

Tan(150)



Transforming Trig Graphs

We can use our knowledge of transforming graphs to transform trig graphs.

Recap

Examples

1. Sketch ,
2. Sketch ,
3. Sketch ,
4. Sketch ,

Extension

*[MAT 2013 1B]* The graph of is reflected first in the line and then in the line . The resulting graph has equation:

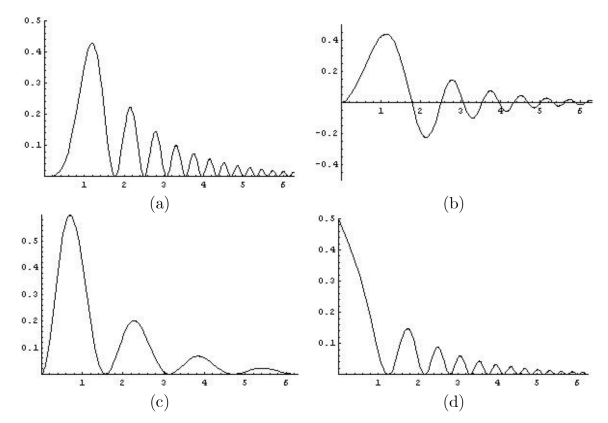


*[MAT 2011 1D]* What fraction of the interval   
 is one (or both) of the inequalities:

true?

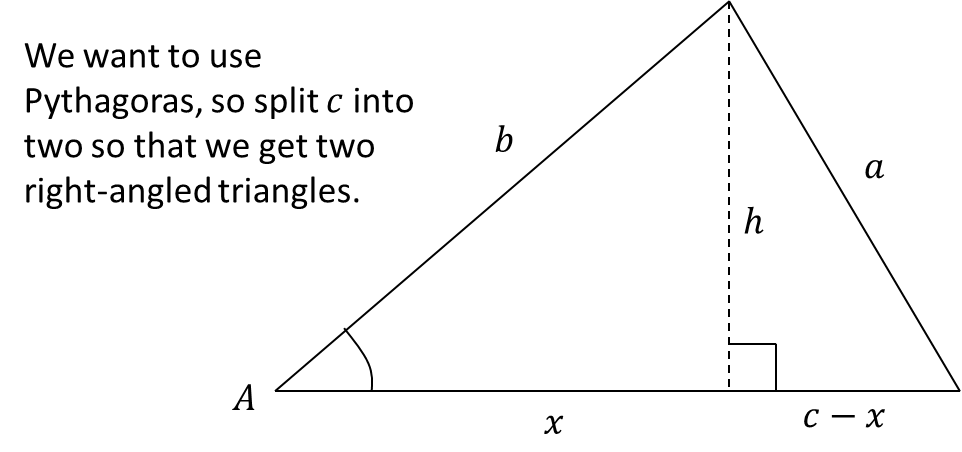
*3.*

*MAT 2007 1G]* On which of the axes is a sketch of the graph



Ex 9F/G Pg 194 – 197.

Proof of Cosine Rule



Proof of Sine Rule

