



# Angles and Triangles

Year 9 Mathematics  
Mainstream

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## Learning Objectives

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By the end of the lesson I hope that you understand and can apply the following to a range of questions from the Year 9 Mathematics course.

- Know what angles and triangles are
- Understand what a complementary and supplementary angle is
- Know what vertically opposite and revolution angles
- Know and apply the exterior angle theorem



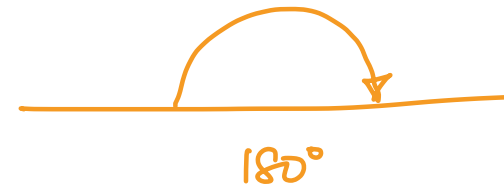
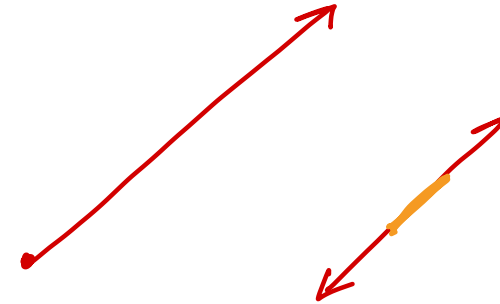
## RECAP

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Whilst this is a new topic in the Year 9 syllabus, it's not new content and should build on the work we have completed in previous years.

What is most important is an understanding of the language of angles.

- **Ray:** A straight line which extends from a point to infinity and beyond
- **Line:** A set of points which continue
- **Line Segment:** A section of a straight line
- **Acute angle:** between  $0^\circ$  and  $90^\circ$
- **Right angle:**  $90^\circ$
- **Straight angle:**  $180^\circ$
- **Reflex angle:** between  $180^\circ$  and  $360^\circ$
- **Revolution:**  $360^\circ$
- **Complementary angles:** Add to  $90^\circ$
- **Supplementary angles:** Add to  $180^\circ$



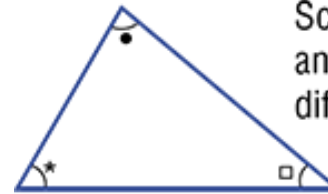
# Types of triangles

Everything has to have a name and triangles are no different.

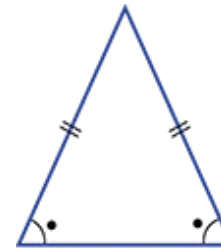
The main triangles are:

- Scalene
- Isosceles
- Equilateral, and
- Right Angled

**Note:** Angles in a triangle will always add to  $180^\circ$

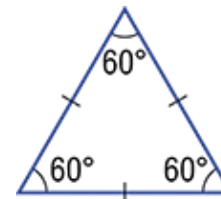


Scalene (all sides and angles are different sizes)



Isosceles (two angles equal and two sides equal)

Isosceles



Equilateral (all angles  $60^\circ$  and all sides equal)



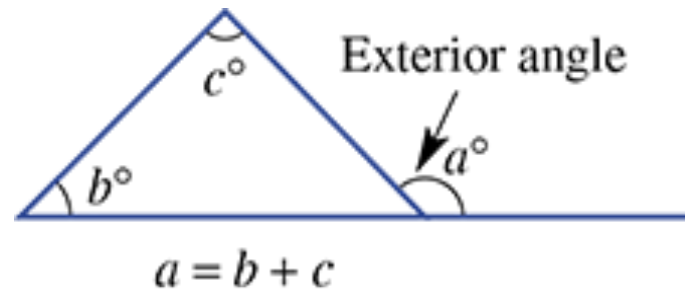
## Exterior angles

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Exterior means **outside**.

So it makes sense that an exterior angle is one which sits outside of a triangle (or shape).

Generally, we can use the idea that angles on a straight line add to  $180^\circ$  to find exterior angles (when given an interior one) or vice versa.



## Finding supplementary and complementary angles

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For an angle of size  $47^\circ$  determine the size of its:

- supplementary angle
- complementary angle.

$$180^\circ - 47^\circ = 133^\circ$$

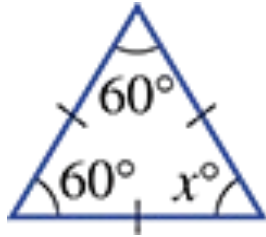
$$90^\circ - 47^\circ = 43^\circ$$

C  $90^\circ$   
S  $180^\circ$



## Finding unknown angles in triangles

Name the types of triangles shown here and determine the values of the pronumerals.



Equilateral  
 $x = 60^\circ$



Isosceles  
 $180 - 120 = 60$   
 $\therefore r = 30^\circ$

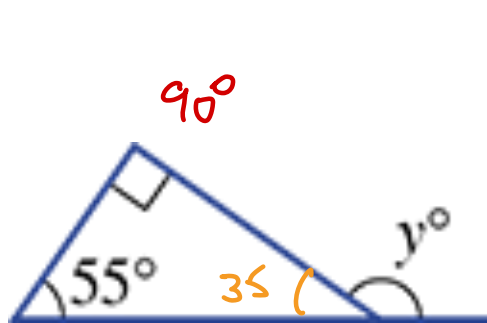


Scalene  
 $180 - 110$   
 $s = \underline{\underline{70^\circ}}$



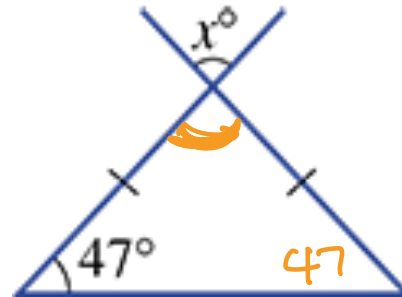
## Finding exterior exterior and other angles

Find the value of each pronumeral. Give reasons for your answers.



$$180^\circ - 90^\circ - 55^\circ = 35^\circ$$

$$y = 145^\circ$$



$$180^\circ - 47^\circ - 47^\circ = 86^\circ$$

$$x = \underline{\underline{86^\circ}}$$





## Questions to complete:

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The questions I would like you to complete for this lesson are:

### Exercise 7A Angles and Triangles

Questions: 2, 3bcdef, 4cdeg, 5adf, 6, 8fghi, 9, 10

Extension: 13



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