

For Ages 10+

An Angle on Geometry

An introduction to geometry,
angles, triangles, circles and
other 2D shapes.

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TEACHERS' NOTES

This book is designed to complement the geometry component of the space maths strand of the curriculum. It provides a basic introduction to new concepts as well as activities that will consolidate the skills and ideas associated with introductory geometry.

The book is designed to be used sequentially as certain skills need to be mastered in order to complete some of the later activities. Many of the activity pages explain the various mathematical concepts and provide examples, however, it is assumed that these ideas will be discussed in class prior to students completing the worksheets.

The activities in this book cover the major learning areas such as identifying different types of angles, using a protractor to measure angles, using known rules to calculate the size of angles and constructing angles using either a compass or a protractor.

Angles in a wide range of 2D objects are explored, specifically, the angles of scalene, isosceles and equilateral triangles, parallel and intersecting lines and angles in a circle. In addition, there are several pages that apply many of these concepts to angles in everyday situations.

The book also explores the mathematics of circles examining features such as chords, arcs, angles and various shapes in circles.

Additional materials:

Before starting this unit of work, ensure that each student has access to a compass, a protractor and a ruler. It is probably best to use pencils rather than pens for construction activities.

Important notes about diagrams:

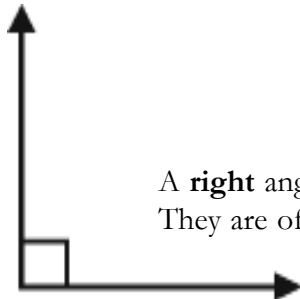
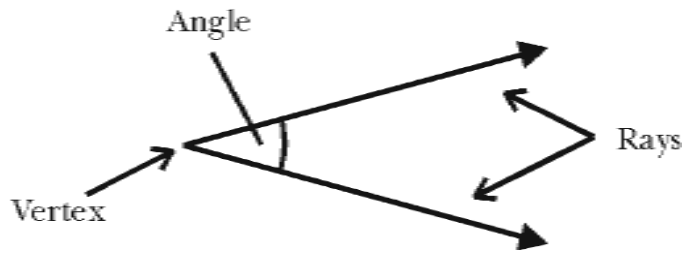
Occasionally some angles may not appear to be what the answers specify. This is due to slight variations in the printing process and, unfortunately, these differences are beyond our control.

Rays in diagrams would normally have arrow-heads but they have been omitted in this book to allow more room.

Also, many 90° angles have not been marked with squares to allow diagrams to be more clear. Angles that look 90° generally are 90° such as those on pages 7, 14 and 32.

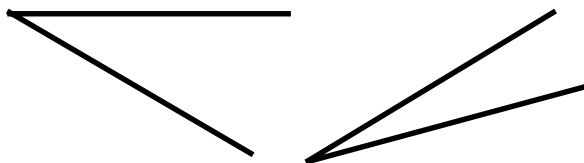
LOOKING AT DIFFERENT ANGLES

An angle is the amount of turn between two lines around a common point.
The lines are known as rays and the point at which they meet is called a **vertex**.



A **right** angle is an angle that measures exactly 90° .
They are often marked with a square at the angle.

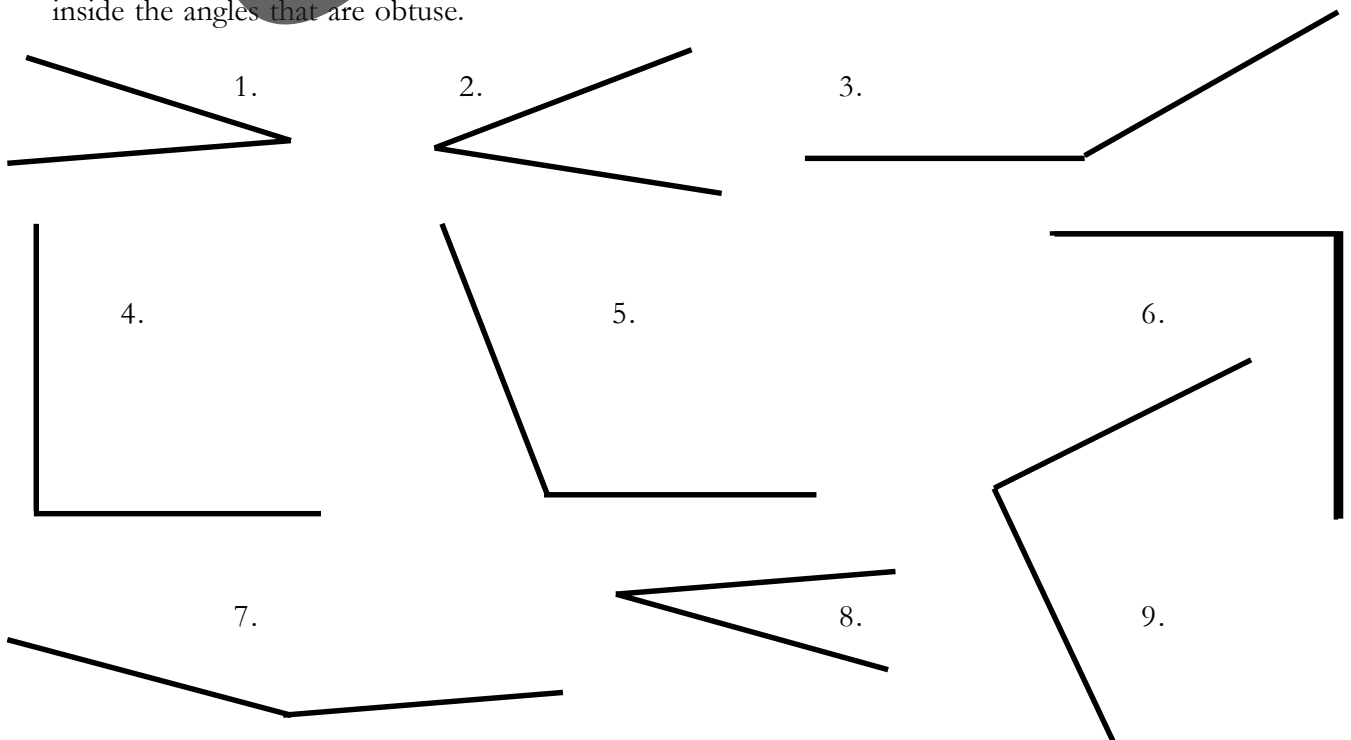
An **acute** angle is an angle less than 90° . Draw two more examples below.



An **obtuse** angle measures between 90° and 180° . Draw two more examples below.



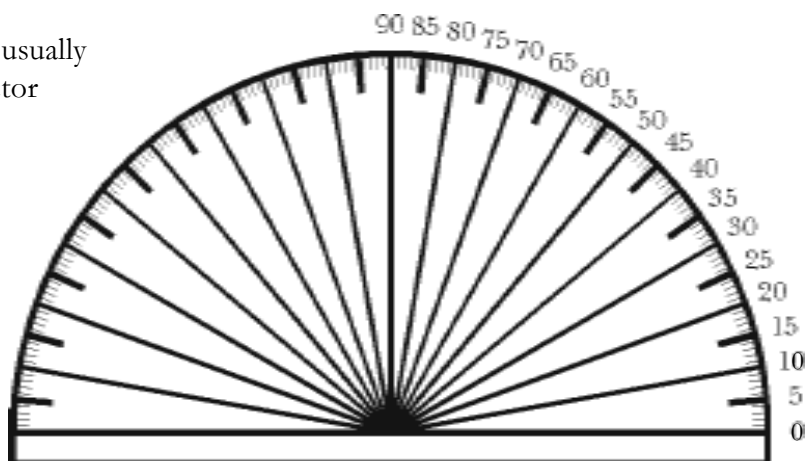
☐ Tick the angles below that are right angles. Draw a circle around the acute angles and put a cross inside the angles that are obtuse.



MEASURING ANGLES 1

Angles are measured in degrees. This is usually expressed with this symbol $^{\circ}$. A protractor is used to measure angles.

Using a protractor follow the example below and then complete the activities.



To measure an angle:

1. Place the centre of the protractor on the corner or sharpest point (vertex) of the angle.
2. Turn the protractor so that the base line runs along one of the lines that forms the angle.
3. You can then read the size of the angle from the position of the second line. For example this angle is approximately 45°

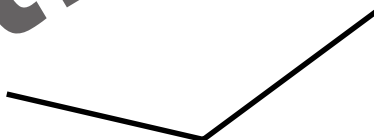
Most protractors number the angles both clockwise and anti-clockwise. Make sure that you start at 0 and follow the correct set of numbers.

☐ Measure the angles below and write down the type of angle for each one, e.g. acute, obtuse or right.

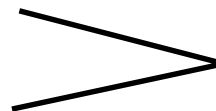
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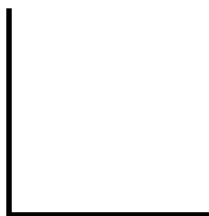
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c.
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d.
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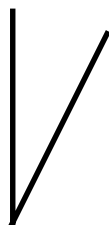
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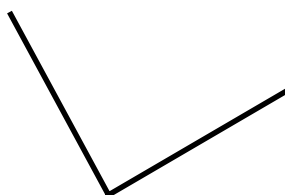
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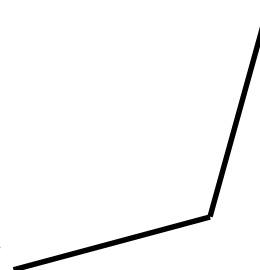
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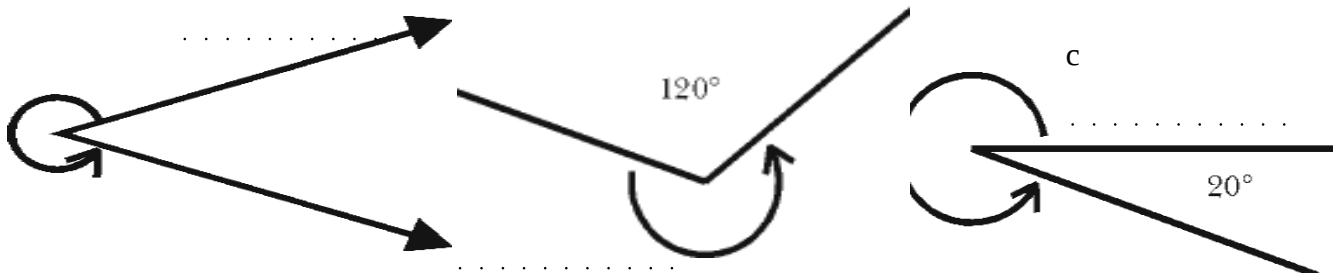
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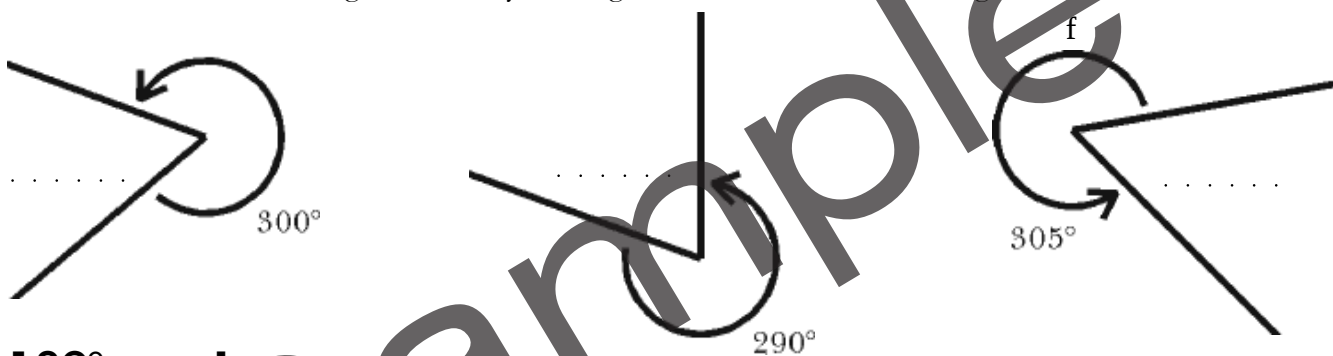
REFLEX ANGLES

A reflex angle is an angle between 180° and 360° . The reflex angle below measures 320°

- ☐ 1. Without using a protractor find the size of the reflex angles below.



- ☐ Find the size of the angles below by looking at the size of the reflex angle.



180° angles

What does a 180° degree angle look like?

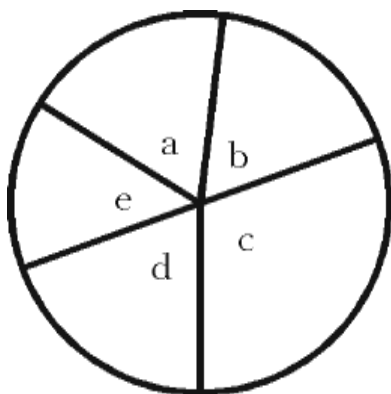


180° degree angles are in fact straight lines.

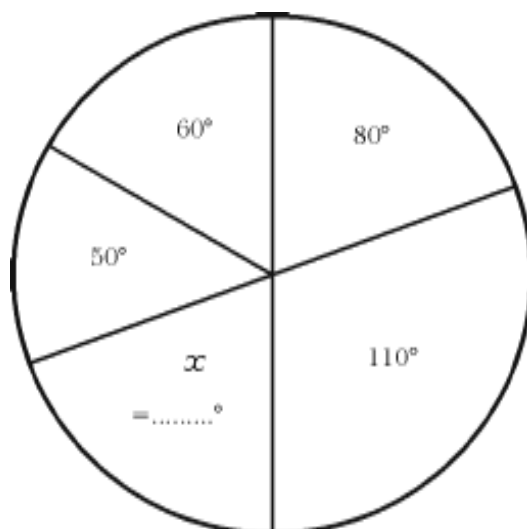
360° angles

This is the full way around the circle. In a circle all angles drawn will always add up to 360° .

- ☐ Using a protractor find the size of the angles in the circle below.



a = $^\circ$
b = $^\circ$
c = $^\circ$
d = $^\circ$
e = $^\circ$

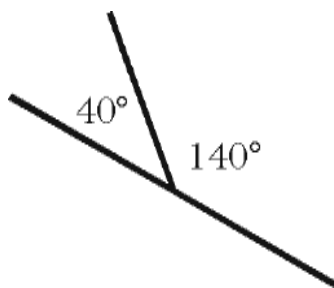
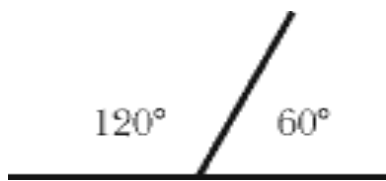


Now check if all the angles add up to 360° .

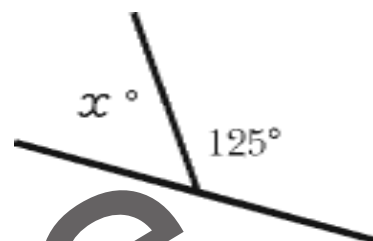
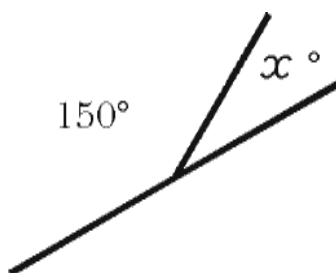
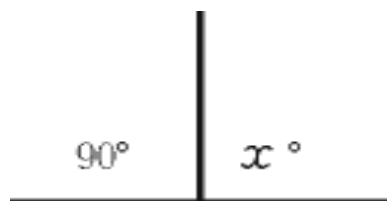
ANGLES ON THE LINE

Supplementary angles are two angles that add up to a total of 180° .

For example $120^\circ + 60^\circ = 180^\circ$.

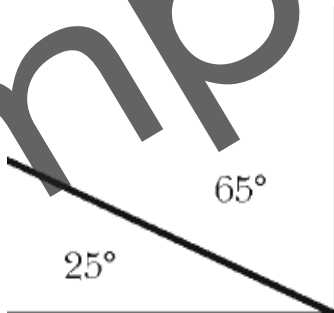
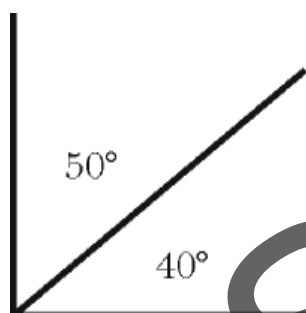


☐ Find the size of the angles marked below.

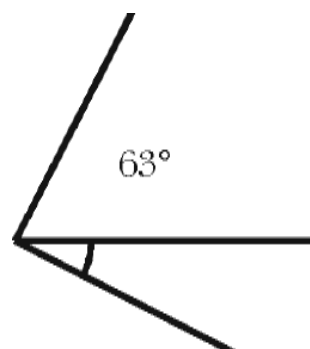
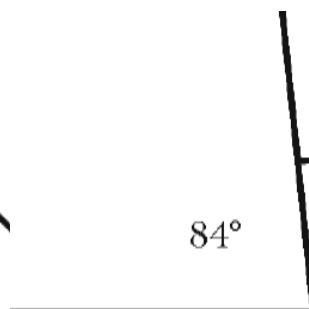
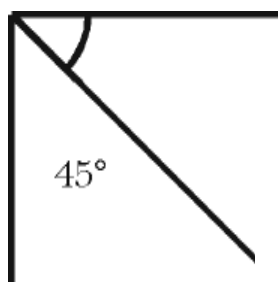
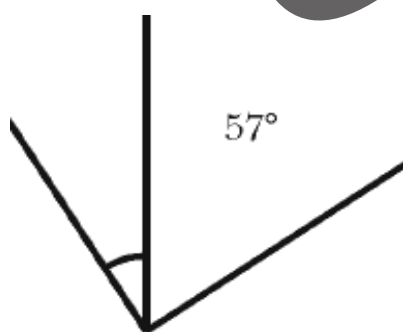


Complementary angles are two angles that add up to a total of 90° .

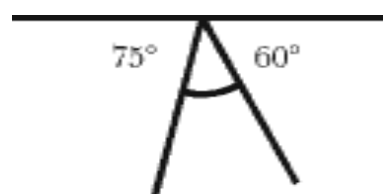
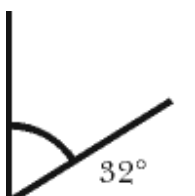
Note: All angles are contained within right angles (90°).



☐ Fill in the size of the missing angles below.

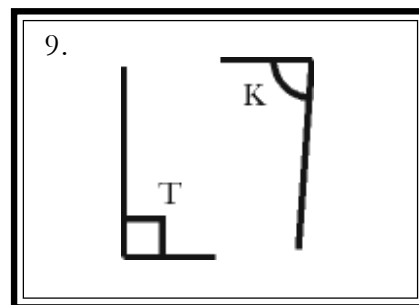
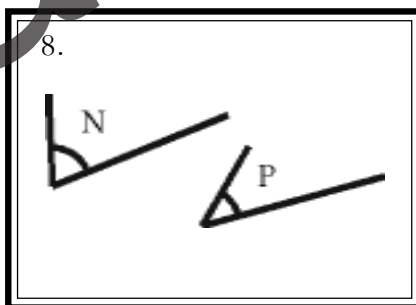
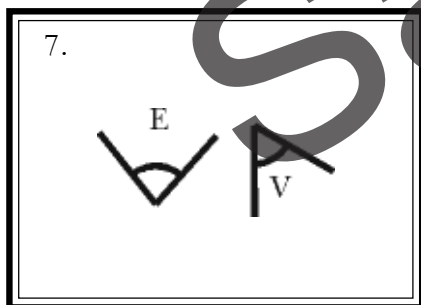
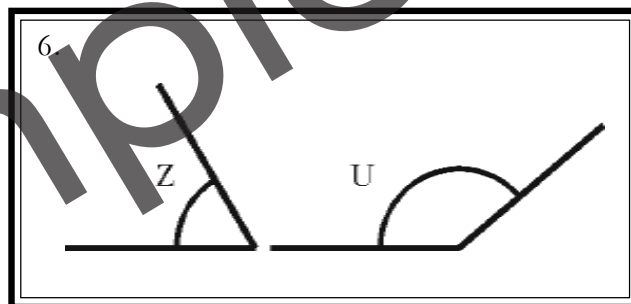
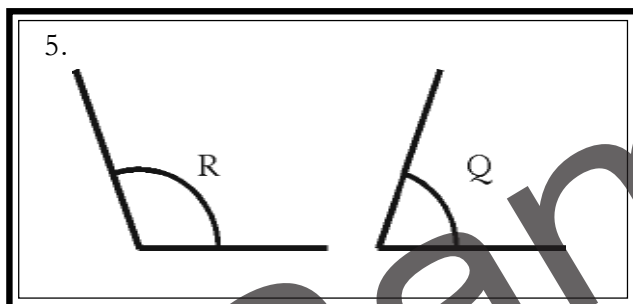
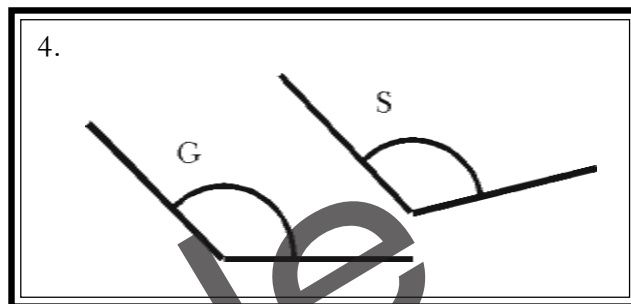
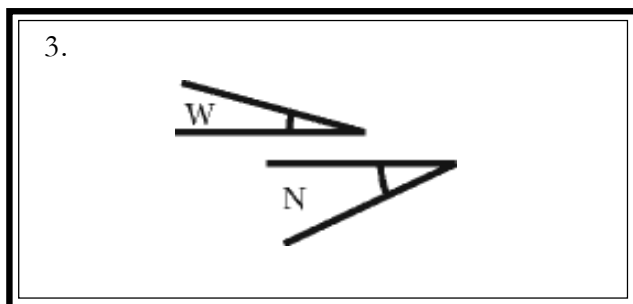
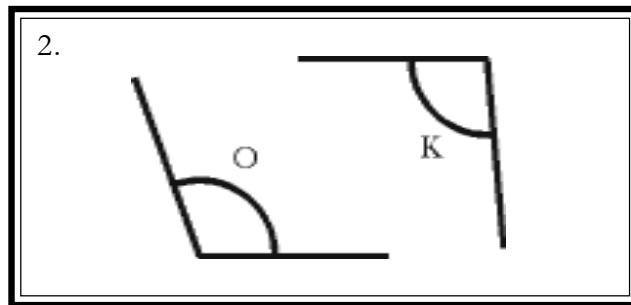
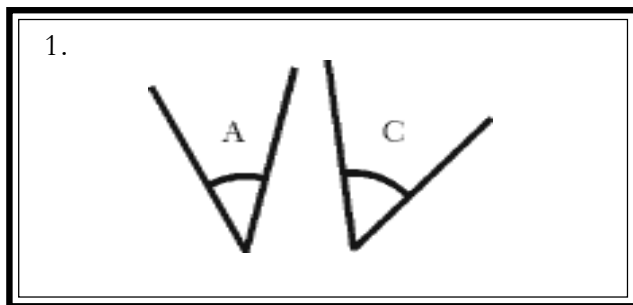


☐ Using the rules, calculate the size of the supplementary and complementary angles.



WHICH ANGLE IS LARGER!

☐ Look at the angles below. Without using a protractor, circle the letter of the largest angle.



☐ Using a protractor find the actual angle size for each of the angles above.

- | | | | |
|--------------|-----------|--------------|-----------|
| 1. A = | C = | 2. O = | K = |
| 3. W = | N = | 4. G = | S = |
| 5. R = | Q = | 6. Z = | U = |
| 7. E = | V = | 8. N = | P = |
| 9. T = | K = | | |

What word do the letters of the largest angles in each box spell out?

Write a definition for this word