

# GEOMETRY

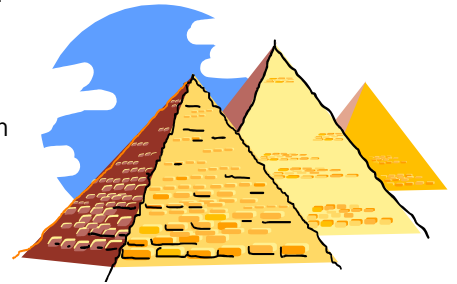
## WORDS

- **acute** = an angle of less than  $90^\circ$
- **angle** = the space between two lines that join each other
- **area** = the space that a shape covers
- **arrowhead** = the sharp, pointed end of an arrow
- **certain** = special
- **cone** = an object that is round at one end and has a point at the other
- **continue** = go on
- **cube** = an object with six equal sides
- **deal with** = is about
- **degree** = unit for measuring the size of an angle
- **measure** = to find out how big, long or heavy something is
- **obtuse** = an angle of more than  $90^\circ$
- **plane** = a completely flat surface
- **ray** = a line that goes in a certain direction
- **shape** = the form that something has
- **size** = how big or how small something is
- **square** = a shape with four equal sides and right angles
- **structure** = building
- **surface** = the top part of something
- **surveyor** = a person who measures land
- **triangle** = a flat shape with three sides and three angles

Geometry is a part of mathematics that **deals with** forms, **shapes** and the **sizes** of objects. There are many different kinds of **shapes**. Some are two-dimensional like circles, **squares** or **triangles**, others are three-dimensional like **cubes**, balls or **cones**. Geometry shows us how we can construct or draw such forms and how to **measure** them.

We need geometry in everyday life. Houses are made up of geometrical **shapes**. Pilots use geometry when they plan their routes and **surveyors** need geometry to make maps and **measure areas** of land.

The world is full of geometric **shapes**. Egyptian pyramids got their name from geometry and the biggest building in Washington is the Pentagon, a **structure** that has five sides.

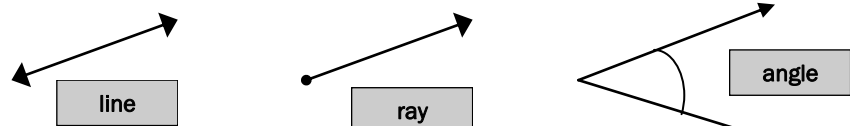


## PLANE FIGURES AND SHAPES

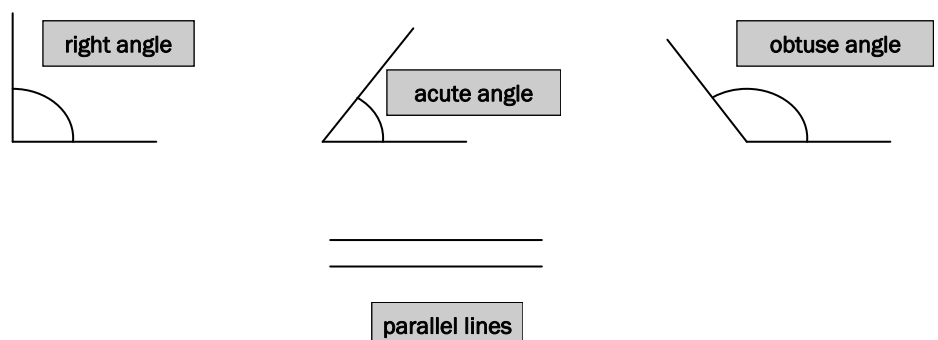
A **plane** is a flat **surface** like the top of a table. **Plane** geometry is also called two-dimensional geometry.

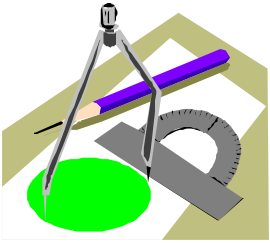
## LINES AND ANGLES

The simplest objects in geometry are lines and **angles**. A line is straight and has two **arrowheads** which show that it **continues** in both directions. A **ray** is a line that has a starting point and then goes on in a **certain** direction. Two lines that come together and have the same starting point form an **angle**. It can be **measured** in **degrees**.



**Angles** that make **square** corners **measure**  $90^\circ$  and are called right angles. Angles with less than  $90^\circ$  are **acute**, those with more than  $90^\circ$  are called **obtuse**. Two lines that never meet are parallel.





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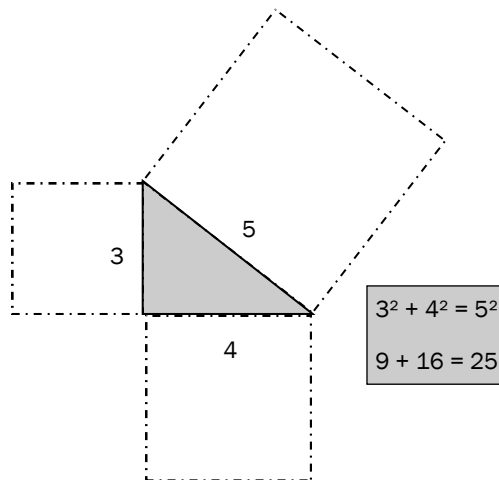
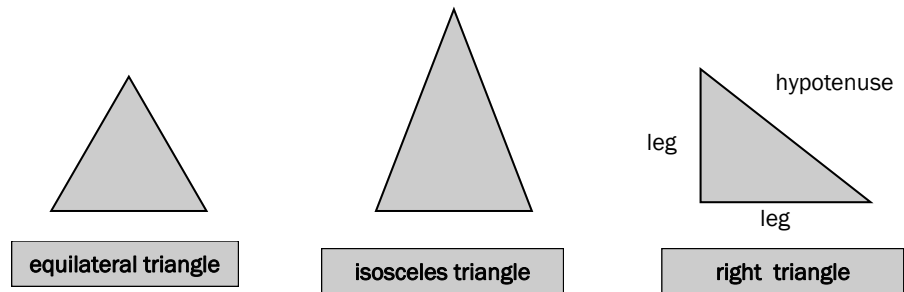
- **angle** = the space between two lines that join each other
- **closed** = not open
- **connection** = link, relationship
- **equal** = the same
- **equilateral** = all sides are the same
- **isosceles** = two of the three sides have the same length
- **join** = get together, meet
- **leg** = side
- **length** = how long something is
- **opposite** = on the other side of
- **quadrilateral** = a flat shape with four straight sides
- **segment** = part of a line
- **triangle** = a flat shape with three sides and three angles

## POLYGONS

When several **segments** of a line **join** together they create a **closed** figure called a polygon.

## TRIANGLES

A polygon with three sides is a **triangle**. If all three sides have the same **length** we have an **equilateral** triangle, two sides of the same length make up an **isosceles** triangle. A triangle with one right angle is called a right triangle. The side **opposite** the right angle is the hypotenuse, the other two sides are called **legs**.

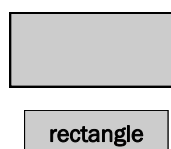


The Greek mathematician Pythagoras, who lived at about 500 B.C., found out that there is a **connection** between the length of the **legs** and the hypotenuse of a right triangle. If you add up the squares of both **legs** it is **equal** to the square of the hypotenuse.

## QUADRILATERALS

**Quadrilaterals** are polygons with four sides. They have many more shapes than **triangles** do.

A **quadrilateral** with four right **angles** is a rectangle. If all sides of this rectangle have the same **length** we call it a square. A parallelogram has **opposite** sides that are parallel and **equal** in **length**. If all sides are the same in **length** we call it a rhombus.



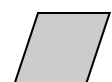
rectangle



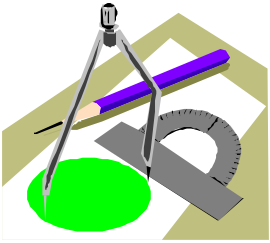
square



parallelogram



rhombus

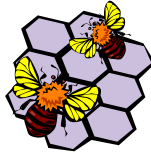


# GEOMETRY

## WORDS

- **angle** = the space between two lines that join each other
- **base** = bottom
- **border** = end, margin
- **circular** = the form and shape of a circle
- **coin** = a round flat piece of metal that is used for money
- **cone** = an object that is round at one end and has a point at the other
- **crossing** = where two or more roads meet
- **cube** = an object with six equal sides
- **diameter** = a straight line from one side of a circle to the other; it passes through the centre of the circle
- **distance** = space between two things
- **equal** = the same
- **face** = part of the outside surface
- **familiar** = well known
- **height** = how high something is
- **honeycomb** = a structure made by bees. It is made up of six-sided cells in which bees put their honey
- **length** = how long something is
- **pipe** = a tube through which water or other things can flow
- **polyhedron** = a solid shape with many sides
- **prism** = an object that has the same ends and sides that go up
- **shape** = the form that something has
- **solid** = an object that has a fixed shape
- **sphere** = a ball shape
- **surface** = the top layer of something
- **tile** = to cover a floor with small plates
- **triangle** = a flat shape with three sides and three angles
- **width** = how wide something is

## OTHER POLYGONS



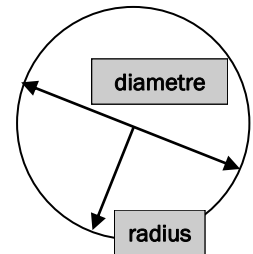
The term **polygon** comes from the Greek language and means "many **angles**". A five-sided polygon is a pentagon. Hexagons (six sides) are shapes we use to **tile** floors or bees use for their **honeycombs**. The stop sign we see at a road **crossing** is an eight-sided polygon, an octagon.



## CIRCLE

**Shapes** are not always made up of straight lines. A circle is a curved line. All points on this line have the same **distance** from the centre. Circles are found everywhere in our daily life—wheels, **coins** and cups have **circular shapes**.

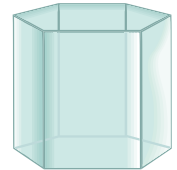
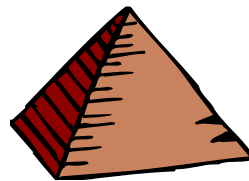
The line that cuts the circle into two **equal** halves is called the **diameter**. The radius is the line from the centre of the circle to every point on its **border**.



## SOLIDS

**Solids** are three-dimensional objects. They have a **length**, **width** and a **height**.

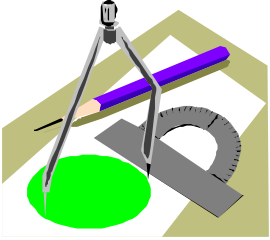
A **polyhedron** is a figure with **flat** faces and straight **edges**. A **cube**, for example, is built from a square. It has six **faces** that are all the same. However, not all **polyhedrons** are regular. A **prism** has two parallel **bases** and its other faces are parallelograms. A pyramid has a **base** that has four sides, the other **faces** are **triangles**.



Some solids are curved. A **sphere** is a ball-shaped object with a completely round **surface**. The distance from the middle to every point on the **surface** of the **sphere** is always the same.

Cylinders are **shapes** that we find in cans or **pipes**. They have two circles as **bases** and a curved side. The **cone** is probably the most **familiar** too us because it is **shaped** like an ice cream.





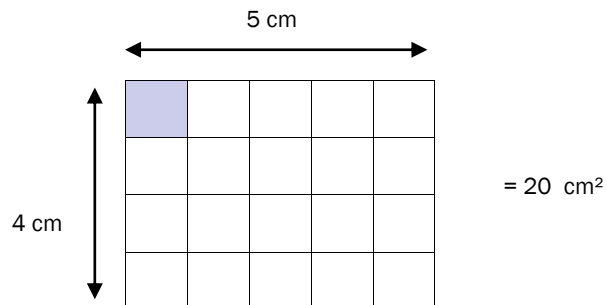
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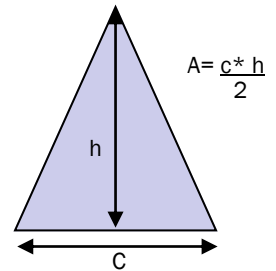
- **area** = the space that a shape covers
- **base line** = here: the line at the bottom
- **basically** = on the whole, normally
- **calculate** = to work out the size, length, volume etc... of something
- **cone** = an object that is round at one end and pointed at the other
- **cover** = spread over
- **cube** = an object with six equal sides
- **formula** = numbers that form an equation or a mathematical rule
- **height** = how high something is
- **irregular** = a shape that is not smooth or even
- **length** = how long something is
- **measure** = to find out how long something is or how big it is
- **rectangle** = a shape that has four straight sides and four 90° angles
- **solid** = hard, with a fixed shape
- **space** = room, area
- **sphere** = a ball shape
- **square** = a shape with four straight sides that have the same length and 90° angles at all corners
- **surface** = the top layer of something
- **triangle** = a flat shape with three sides and three angles
- **unit** = an amount of something that is used to measure
- **volume** = the amount that an object or container fills
- **width** = how wide something is

## MEASURING GEOMETRICAL OBJECTS

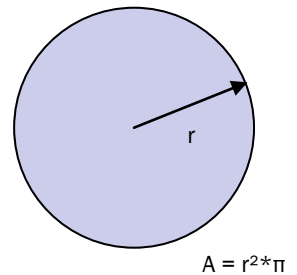
The **area** is the **surface** that a figure **covers**. It can be **measured** by putting squares on a shape and then counting them. A **rectangle** with a **length** of 5 cm and a **width** of 4 cm has an **area** of 20 square centimeters. You can put 20 square centimeter **units** into it.



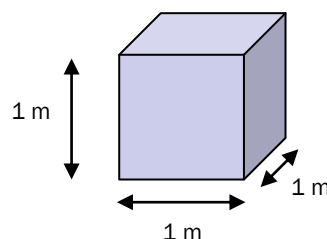
**Measuring** the **area** of other objects may be more difficult. You can get a **triangle's area** by multiplying the **base line** with its **height** and then dividing it by two.



The **area** of a circle is the **square** of the radius multiplied by 3.14159, a constant called Pi.



The amount of **space** that a **solid** figure fills is called its **volume**. **Basically**, you can get the volume when you multiply the **area** of the base by the **height** of the object. The unit for volume is the **cube**. A box, for example that has a **length**, **width** and **height** of 1 m would have a **volume** of 1 cubic metre.



The **volume** of curved or **irregular** objects are much more difficult to **calculate**. Mathematicians have complex **formulas** for finding out the **volume** of a **sphere** or a **cone**.