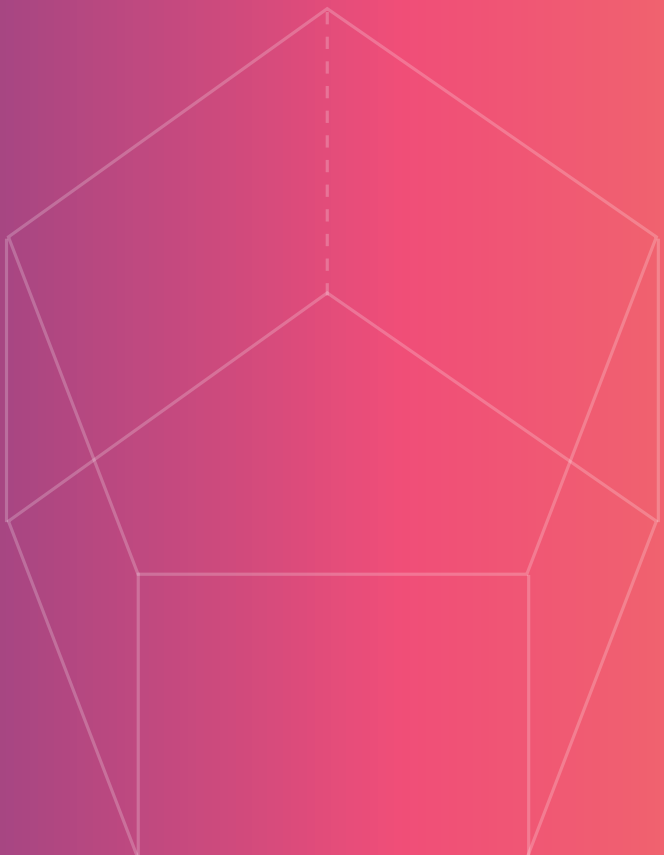
16

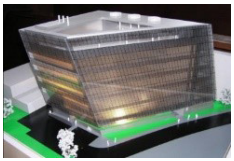


Prisms

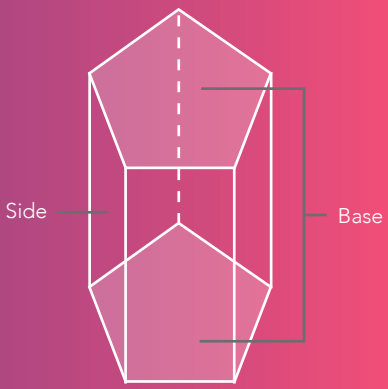
Topic: Geometry
Theme: How prisms are made
Abilities: Students will discover how a prism is created
Material: Styrofoam, sticks, marker
Level: Age 15-16

Math Reality

We see prisms in everyday life. Many objects in the world around us have the shape of a prism:



Prisms in the photos are triangular, quadrilateral etc. These are just some of the examples of prisms from real life that can remind us of some facts about prisms that we already know.
Let us remember:



- Two sides of a prism on parallel planes are called BASES OF A PRISM.
- Bases of a prism are different polygons, and they are always congruent.
- The remaining sides of a prism are parallelograms which are called LATERAL FACES of a prism.
- Edges of the prism that are part of the bases of the prism are called BASIC EDGES.
- The remaining edges of the prism that are part of lateral faces are called SIDE EDGES.

Let us compare the following photos:

Both photos show quadrilateral prisms. The first one shows a right prism, and the other an oblique prism.

Definition of a right prism:

Prisms whose lateral faces are rectangles and whose side edges are perpendicular to the planes of the bases of the prism are called RIGHT PRISMS.

Definition of an oblique prism:

Prisms whose lateral faces are parallelograms whose side edges are not perpendicular to the planes of the bases of the prism are called OBLIQUE PRISMS.

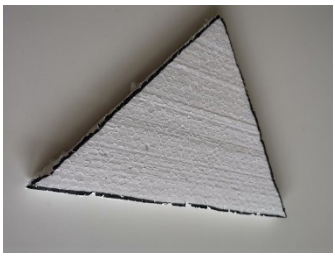
Based on the photos of prisms from real life and a revision of basic facts about prisms, we will find out how prisms are made and which set of points in space is called a prism.

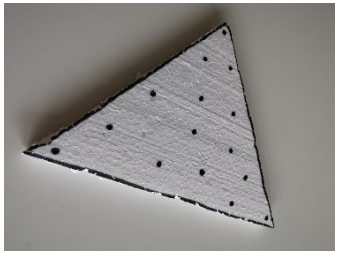
How prisms are made?

Group in 7 teams of 3 members. Each team gets 2 polygons cut out of styrofoam and about 15 sticks. Make right and oblique prisms and learn how a prism is formed in class discussion.

TEAM 1: get 2 congruent triangles and sticks.
TEAM 2: get 2 congruent quadrilaterals and sticks.
TEAM 3: get 2 congruent pentagons and sticks.
TEAM 4: get 2 congruent hexagons and sticks.
TEAM 5: get 2 congruent septagons and sticks.
TEAM 6: get 2 congruent octagons and sticks.
TEAM 7: get 2 congruent decagons and sticks.

Take the congruent polygons and draw a line around the lower base of the polygon and mark as well about 15 points on the base.

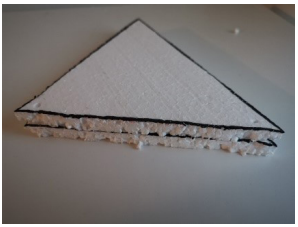


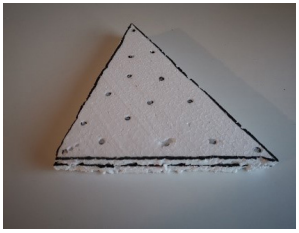


Then, stick the sticks into the marked points so that they are parallel to each other and perpendicular to the polygon.
The sticks represent the line segments. The starting point of the stick belongs to the polygon, and the end point is translated from this point in the direction of the stick and by its length.

We can stick an infinite number of such sticks because a polygon consists of an infinite number of points. All the sticks are of the same length and parallel to each other.
As the sticks represent line segments, and each stick has a length, a direction and an orientation, such line segments are called vectors. What we have actually done is translate the points of the polygon by the same vector. By this translation a polygon congruent to the starting polygon has been made.

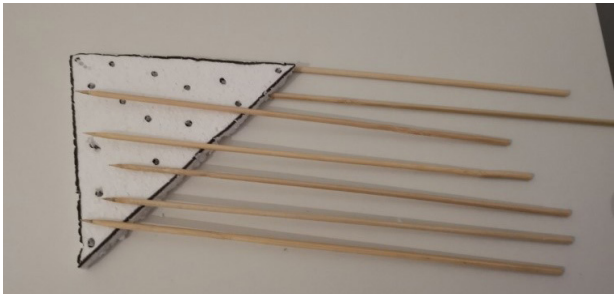
The two polygons will belong to parallel planes because all the points of the starting polygon are being translated by the same vector. The vectors are perpendicular to the plane of the polygon and by this translation a right prism is made.





If the vectors are not perpendicular to the plane of the polygon an oblique prism will be made.

If the points of the polygon are translated by a vecteur whose direction is included in the (direction of the) plane of the polygon, we can notice that a solid shape has not been made because all the points have remained in the plane of the polygon.



At the end of the activity, we easily describe a prism with the help of this practical work:

A prism is the « union » of all the line segments that are formed by the translation of all the points that belong to a polygon (including its sides) by the same vector, which is not included in the direction of the plane of the base.

Illustration : making a prism with a pentagonal base