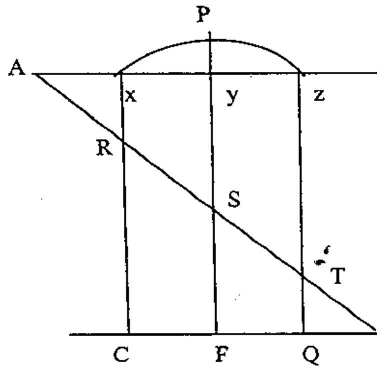
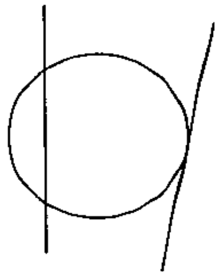
7 MAP PROJECTIONS

1. Look at the figures and find:

parallel lines
curved line
horizontal line
vertical line
perpendicular lines
right angle
diagonal / oblique line
tangent
secant





2. Draw these figures and answer the questions below:

a circle ***a square*** ***a rectangle*** ***a triangle*** ***a semi-circle***

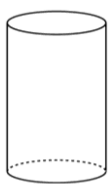
a) Which figure is curved?
b) Which figures have parallel sides?
c) Which figure has a curved side and a straight side?
d) Which figure always has equal sides?
e) Which figure may have equal sides?
f) Which figure has 3 angles?

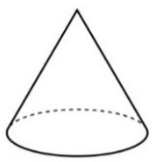
3. Now make sentences from the table.

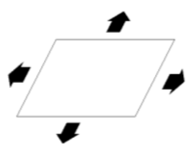
A coin	is shaped like a	*square*	It is	*rectangular*	in shape.
A ruler		*rectangle.*		*circular*	
A set square		*semi-circle.*		*square*	
A protractor		*triangle.*		*semi-circular*	
A chess-board		*circle.*		*triangular*	

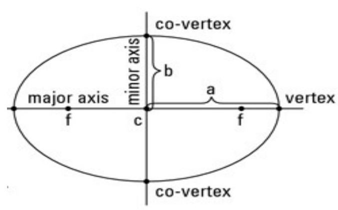
4. Complete the forms of adjectives

a) A ball is shaped like a sphere, it is ………...
b) A test-tube is shaped like a cylinder, it is ….
c) A funnel is shaped like a cone, it is ………..
d) Flat surface is like a plane, it is ………
e) The path of the Earth around the Sun is like an ellipse, it is …….









5. Eternal dilemma of map makers

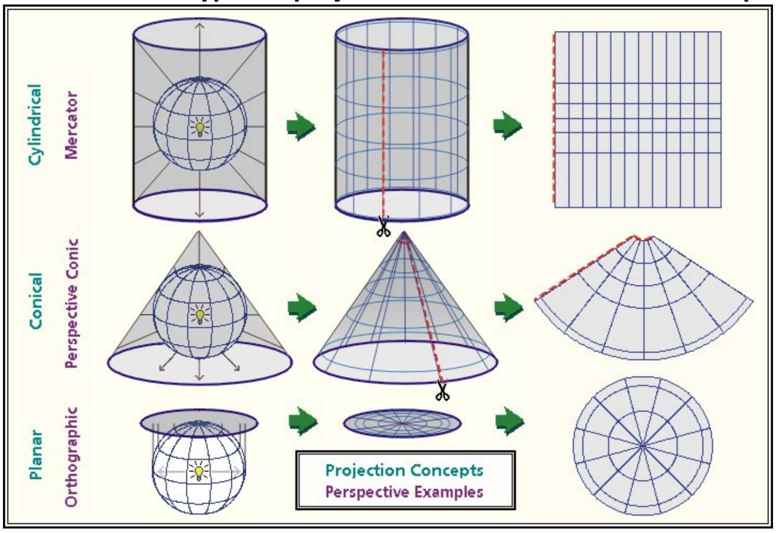
Watch the extract without sound 0 – 1.10 **and write the script for the video.**

https://www.youtube.com/watch?v=kIID5FDi2JQ&t=3s

How did the speaker explain the principle of cylindrical projection?

Imagine putting a theoretical …………………….. over the globe and projecting each of the points of the ……………..……….. onto the …………………………. surface. Unroll the ……………………………..., and you have a flat rectangular map.

6. Which three types of projection surfaces are shown in the picture below?



http://www.geog.ucsb.edu/~dylan/mtpe/geosphere/topics/map/map1.html#proj

Complete the text with suitable words form page 1.

The systematic way in which a **1** ………………… surface is represented on a flat plane (such as a page in an atlas) is called a map projection. Three such projection methods are easy to visualize – **2**……………………, **3** ……………………, and **4** ……................... . If a spherical or spheroidal (or "squashed sphere") object is imagined as a wire-frame model with a light source in the center, the shadows created beyond the **5** ………………… can be "projected" onto a flat surface. There are several variations possible with any of these configurations; for example, placing an imagined light source in a place other than the center of the wire-frame, skewing the cylinder, **6**………………… or plane to a non-upright orientation, or even allowing the "paper" to "slice" through the sphere. The conic and planar projections constructed as shown in the diagram above are called " **7** ……………. projections," because in these cases the "paper" is touching the surface of the sphere without slicing it. The "**8** ………………… projection" maps (where the "paper" slices through the sphere), are more conceptual and complicated to produce, but are generally preferred over the tangent map varieties, due to the lower amounts of distortion revealed.

7. Distortion

Have a look at the pictures and say which properties are changed in comparison with real head.

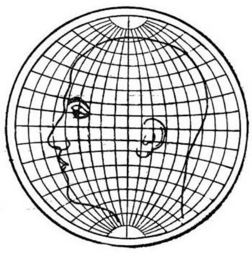


Fig. 42.—Man's head drawn on globular projection.

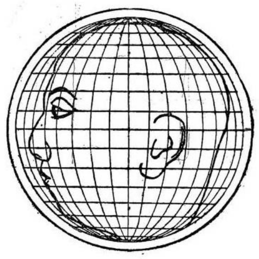


Fig. 43.—Man's head plotted on orthographic projection.

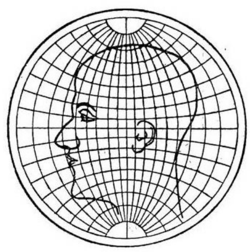


Fig. 44.—Man's head plotted on stereographic projection.

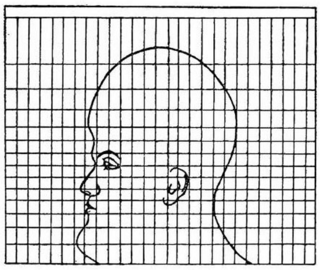


Fig. 45.—Man's head plotted on Mercator projection.

http://geoawesomeness.com/amazing-image-1921-will-explain-essence-map-projections/

Match the properties and definitions: https://en.wikipedia.org/wiki/Map_projection

area *shape* *direction* *bearing* *distance* *scale*

a) the information contained in the relative position of one point with respect to another without distance information
b) the angle between a line connecting two points and a north-south line
c) a numerical description of how far apart objects are
d) the ratio of a distance on the map to the corresponding distance on the ground
e) the form of an object or its external boundary
f) a quantity expressing the two-dimensional size of a defined part of a surface

Which properties are preserved in the different types of projection? Complete the table.

Projection	*preserves*
Conformal	
Equal area	
Equidistant	
Azimuthal	

Watch and check https://www.youtube.com/watch?v=v5fSBQRbPR0 3.12 – 5.15

8. Advantages / disadvantages of map projections

Mercator Projection https://www.youtube.com/watch?v=kIID5FDi2JQ&t=3s 1.36 - 5.05

- What do you know about Mercator projection?
- Listen to the extract and note down its advantages and disadvantages.

Which projection is used for the maps of your country?

1) Which projection surface does it use?
2) What are its advantages?

HOMEWORK
Choosing a model for the shape of the Earth

- What models for representing the shape of the Earth are used?

Complete the text with the missing parts.

1. distinct major and minor axis
2. terrestrial and satellite gravity measurements
3. large and medium scale maps
4. closer in shape to an ellipsoid
5. better match the Earth's actual shape

The projection is also affected by how the shape of the earth is approximated. In the following discussion on projection categories, a sphere is assumed, but the Earth is not exactly spherical but is **A)** ……….with a bulge around the equator. Selecting a model for a shape of the earth involves a choice between the advantages and disadvantages between using a sphere vs. an ellipsoid. Spherical models are useful for small-scale maps (features are small) such as world atlases and globes since the error at that scale is not usually noticeable or important enough to justify using the more complicated ellipsoid. The ellipsoidal model is commonly used to construct topographic maps and for other **B)** ….. that need to accurately depict the land surface.

A third model of the shape of the earth is called a geoid, which is a complex and more or less accurate representation of the global mean sea level surface that is obtained through a combination of **C)** …… . This model is not used for mapping due to its complexity but is instead used for control purposes in the construction of geographic datums. A geoid is used to construct a datum by adding irregularities to the ellipsoid in order to **D)** …… (it takes into account the large scale features in the Earth's gravity field associated with mantle convection patterns, as well as the gravity signatures of very large geomorphic features such as mountain ranges, plateaus and plains). Datums are always based on ellipsoids that best represent the geoid within the region the datum is going to be used for. Each ellipsoid has a **E)**………. and different controls (modifications) are added to the ellipsoid in order to construct the datum, which is specialized and used for specific geographic regions (such as the North American Datum).

https://www.gislounge.com/map-projection/