

CARTOGRAPHY I

LECTURE 3

WHAT IS AN ATTRIBUTE?

- Attribute of an object or feature
- Attributes are stored in an attribute table in a GIS
- Attributes are a description of the possible characteristics a feature or object may have
- E.g.

Building ID	Height	Wall type	Area	Owner
1	8.9	Brick	1.233	Esther. D
2	6.9	Concrete	1.163	Dadzie E



ATTRIBUTE VALUE SCALES

- Attribute values are measured in some scale:
- Ordinal- natural order e.g smaller or larger, higher or lower

E.G Soil Classes

- Interval- magnitude of difference between intervals

E.G 10 deg Celsius is warmer than 5 deg Celsius but not twice as hot mc-theta

- Ratio- absolute origin, usually zero(0).

E.G frequency monetary values, age

- Nominal- represent qualities not quantities

Street Names,



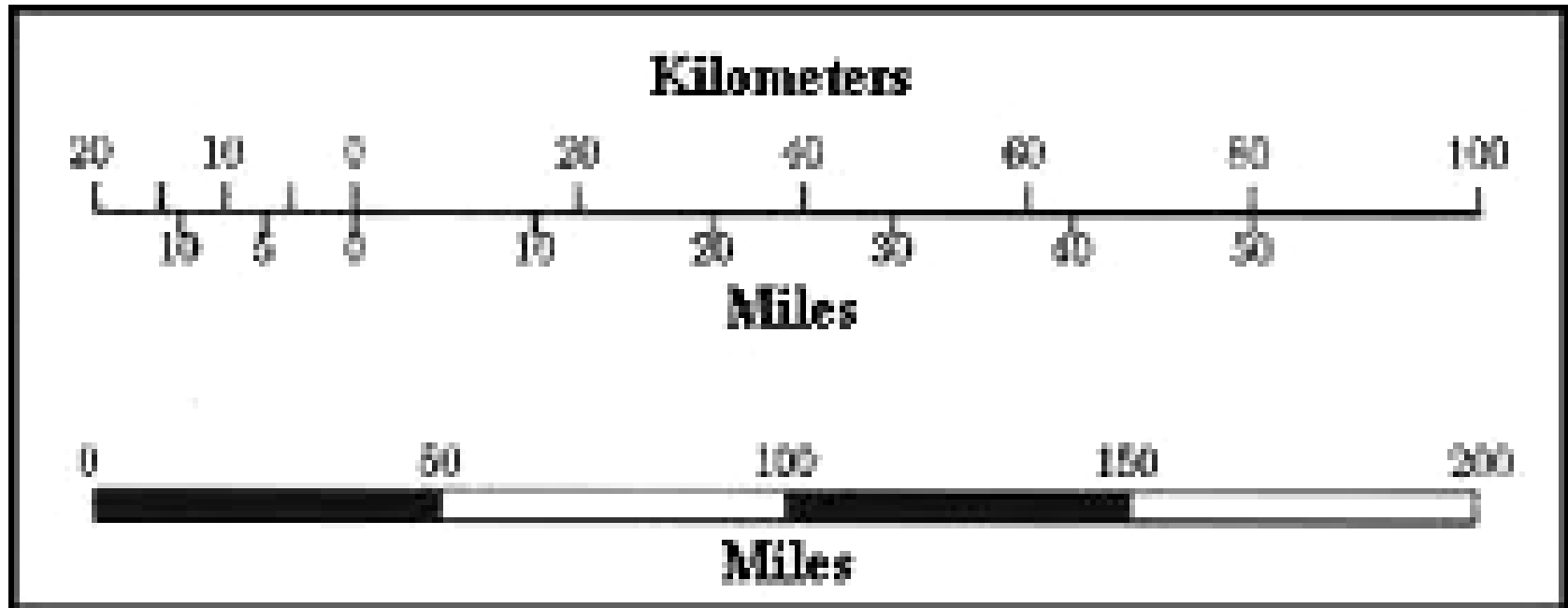
MAP- SCALE

- Map scale is the ratio between a distance on a map and the corresponding distance in the terrain.
- Scale is important
- Relates distances on map to ground
- Used to categorise maps- large scale $> 1:25000$, medium $1:25000 > 1:1000000$ scale small $(< 1:1000000)$
- Types of Map scale
 - Graphical
 - Verbal
 - RF- Representative Fraction



TYPES OF MAP SCALE

- Graphical



TYPES OF MAP SCALE

- Verbal Scale
- “1 cm represents 1km ” or 1 inch represents 1 mile
- RF scale: representative fraction

○ 1: 10000

$$= \frac{1}{10000}$$

=0.0001

In the fraction the denominator (10000) is called the Scale Number (Sc) Sc=10000



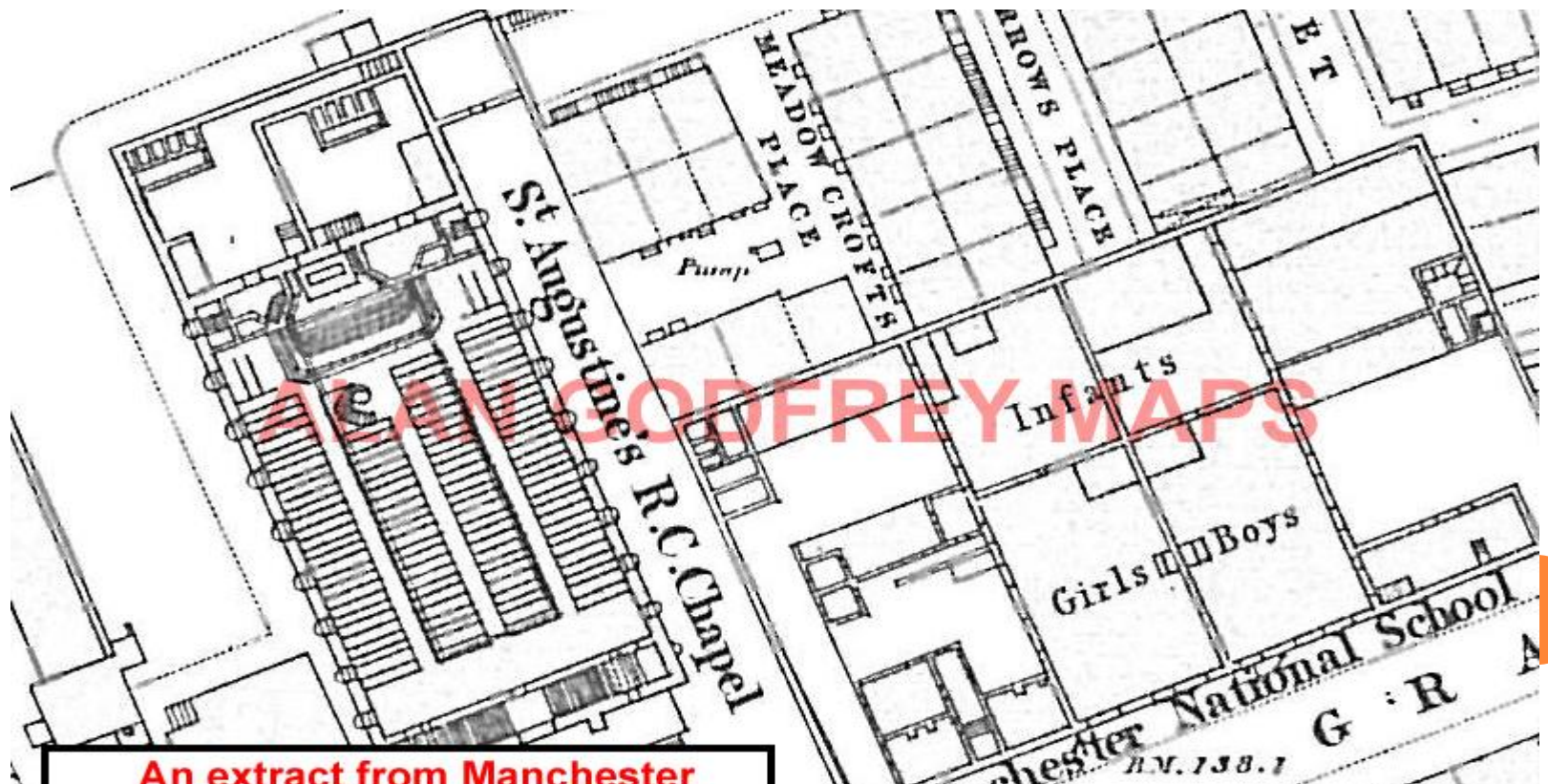
TYPES OF MAP SCALE

- RF- is not easily understood by many a map user.
 - No units
 - Interpretation of a ratio
 - As compared to VS and GS
- RF scale is common among Geographers
- RF can adapt to any units – imperial or metric
- Large scale covers a smaller area
- Small scale covers a larger area
- The smaller the scale number the larger the scale



TYPES OF MAP SCALE

- The smaller the scale number the larger the scale and the smaller the area- vice versa
- 1:200

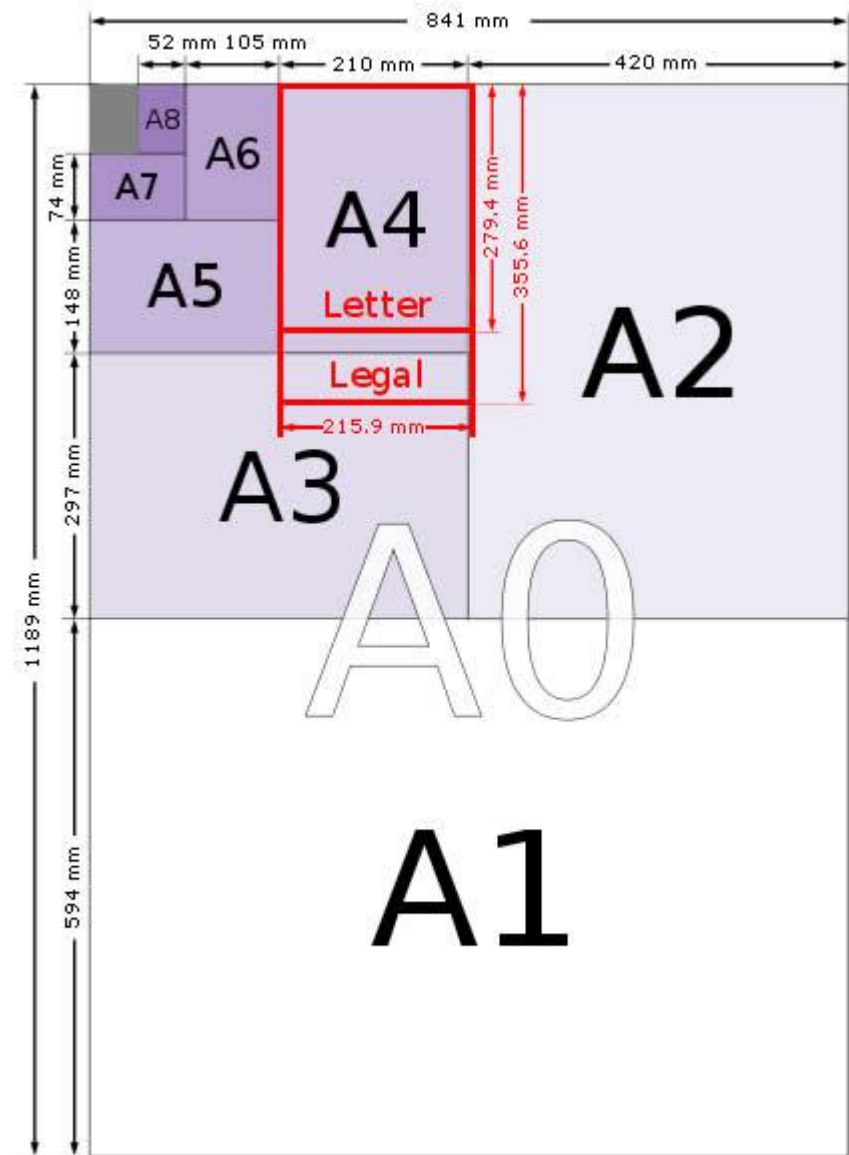


TYPES OF MAP SCALE



ASSIGNMENT-30%

- At what scale will a map of Ghana fit an A0, A1, A2, A3 and A4 sheet of paper?



DETERMINING DISTANCE AND AREA FROM MAP SCALE

- Suppose we have a map with a scale of 1:50000. We measure the distance along a property boundary as 1.7cm. What is the length in the real world?

- $$Sc = \frac{d_m}{d_g}$$

- NB: Not a ratio of areas!

$$d_g = \frac{d_m}{Sc}$$

- $1.7/0.00002 = 85000\text{cm} = 850\text{m} = .85\text{km}$



DETERMINING DISTANCE AND AREA FROM MAP SCALE

- Rectangular piece of land 3cm x 4 cm on map. Map scale is 1: 24 000. What is area of the parcel?
- Scale the sides

$$d_g = \frac{d_m}{Sc}$$

$$d_{g1} = 3 \times 24000 \text{ cm}$$

$$d_{g2} = 4 \times 24000 \text{ cm}$$

$$A_g = d_{g1} \times d_{g2}$$

$$= 3 \times 24000 \text{ cm} \times 4 \times 24000 \text{ cm}$$

$$= 3 \times 4 \times 24000 \text{ cm} \times 24000 \text{ cm}$$

$$= 691200000 \text{ cm}^2$$

$$= 691200 \text{ m}^2 \text{ (divide by 10000 i.e 100cm squared)}$$



$$d_g = \frac{d_m}{Sc}$$

$$d_{g1} = 3 \times 24000 \text{ cm}$$

$$d_{g2} = 4 \times 24000 \text{ cm}$$

$$A_g = d_{g1} \times d_{g2}$$

$$= 3 \times 24000 \text{ cm} \times 4 \times 24000 \text{ cm}$$

$$= 3 \times 4 \times 24000 \text{ cm} \times 24000 \text{ cm}$$

$$= 691200000 \text{ cm}^2$$

$$= 691200 \text{ m}^2 \text{ (divide by 10000 i.e 100cm squared)}$$



MAP SCALE

- Conversion from:
- V- RF
- V- Graphic
- RF-Graphic
- Graphic- RF

- How to determine scale of a map
 - Compare with Photo of known scale- chicken-n-eggish
 - Object of known size

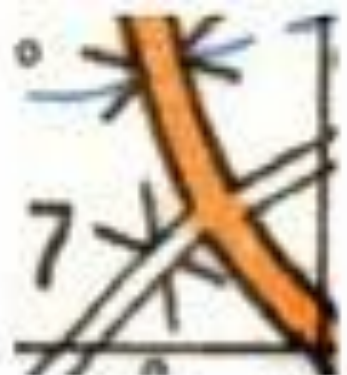


MAP RESOLUTION & SCALE

- Resolution – How accurately the location and shape of map features can be depicted for a given map scale-
- As scale increases(as in large scale) objects can be distinguished
- As scale decreases resolution of a map decreases and features are generalised and others omitted.
- As scale decreases small area features are represented as dots and narrow or long features like rivers as lines.



2 metres



23 metres



1:50 000



1 metre



30 metres

Figure 5



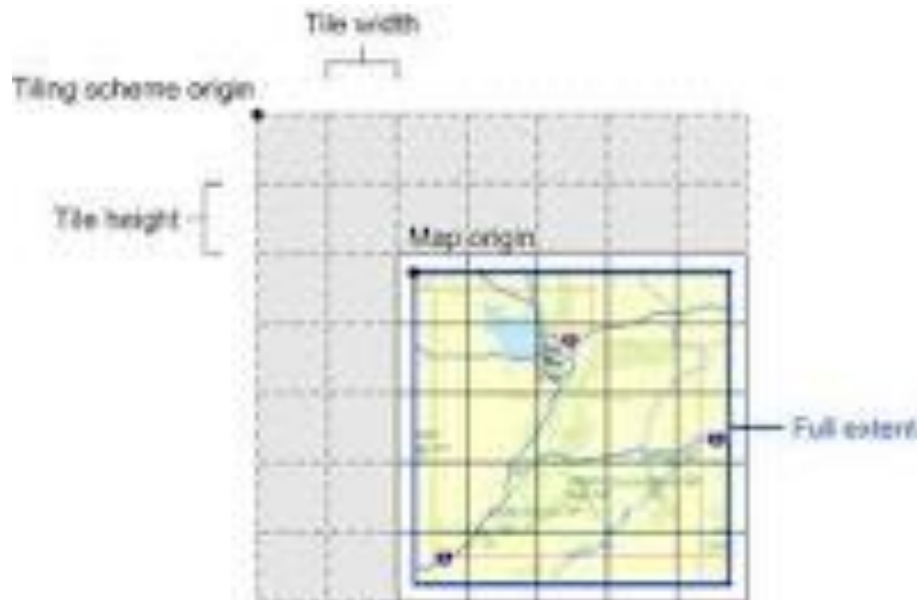
MAP ACCURACY

- $E = f(t) + f(l) + f(c) + f(d) + f(a) + f(m) + f(p) + f(rms) + f(mp) + u$
- t= flattening
- l=location accuracy
- c= cartographic interpretation
- d=drafting error- tracing,..
- a= analogue
- m= media stability
- p=digitising processor(cursor placement)
- rms= registration accuracy of tics(digitising)
- u=unexplained errors



MAP EXTENT

- The areal extent of a map is the area on the Earth's surface represented on the map.
- Defines the limit in x- y- coordinates encompassing all features
- Use a rectangle(convenient)



RELATION BETWEEN GIS AND MAPS

- Maps are input to GIS
- Maps communicate results of GIS operations
- Maps support spatial analysis operations
- Maps are output of GIS





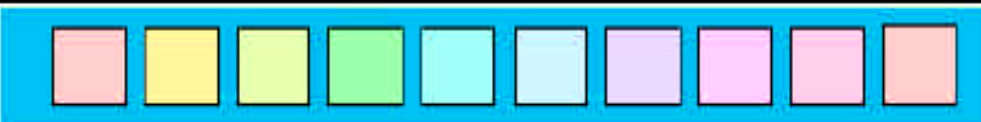

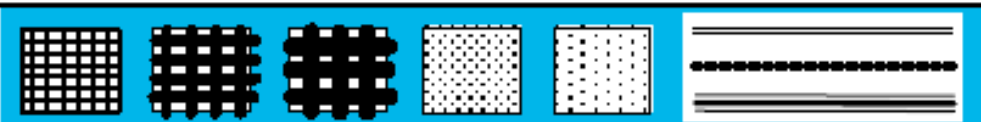


CARTOGRAPHIC SYMBOLISATION

- Cartographic data analysis
- **Berton's six symbols**
- Size
- Value
- Colour
- Shape
- Texture
- hue



CARTOGRAPHIC SYMBOLISATION- BERTON'S SIX VISUAL VARIABLES+ POSITION

Bertin's Original Visual Variables	
Position changes in the x, y location	
Size change in length, area or repetition	
Shape infinite number of shapes	
Value changes from light to dark	
Colour changes in hue at a given value	
Orientation changes in alignment	
Texture variation in 'grain'	



MAP GENERALIZATION

- Map generalization is the process of reducing the amount of detail in a map(or database) in a meaningful way.



MAP GENERALIZATION

- Maps- Symbolic abstractions or representations of real world phenomenon
- The Objective
- -How much to simplify the situation
- -How to symbolize the relationships
- Amount of detail/Message of the map
- Scale affects generalisation



FACTORS AFFECTING GENERALISATION

- Scale reduction
- Technical factors
- Human factors
- Purpose of the map
- User characteristics
- Nature of the data
- Choice of colours



FACTORS AFFECTING GENERALISATION

- Manual cartography needs to take into account the diverse scenarios-map purpose, e.g road map
- A building can be ignored if in a countryside and removed if within a the city
- In an area with so many rivers the cartographer is likely to eliminate certain rivers than in an are with fewer rivers



TYPES OF GENERALISATION

- - Graphic- the symbology is not affected after simplification, enlargement, displacement, merging and selection.
- -Conceptual- the symbology is affected or changed after merging and selection(symbolise and enhance)



THE GENERALISATION PROCESSES

- **Simplification-** map simplification, omission of certain detail due to scale change or sheer clumsiness
- **Classification-** reduce data to a form that can be easily represented on a map
- **Symbolization-** represent with symbols which reduce complexity of physical/cultural landscape- Use of dots of differing size and shapes, coloured lines and polygons to represent
- **Induction-**



THE GENERALISATION PROCESSES

- **Induction-**
- This occurs when the map contains more information than was in the original data. E.g rainfall / elevation
- -Watershed
- - Rainfall totals



GENERALISATION GUIDELINES

- Features that are necessary
- Displacement priority rules
- Trig. Pts? Hydro feats? Rail, Rds, bld, area
- Minimum size of graphic map symbols
- Planimetric accuracy
- Retain important and noticeable features. Buildings in rural area



GENERALISATION GUIDELINES

- Maintain shape of features and character of area with scale limitation
- Take into account relationship between features- contours and river flow



