Human Karyotype

Background and Instructions

Humans have 46 Chromosomes found in 23 Pairs

22 pairs of homologous chromosomes

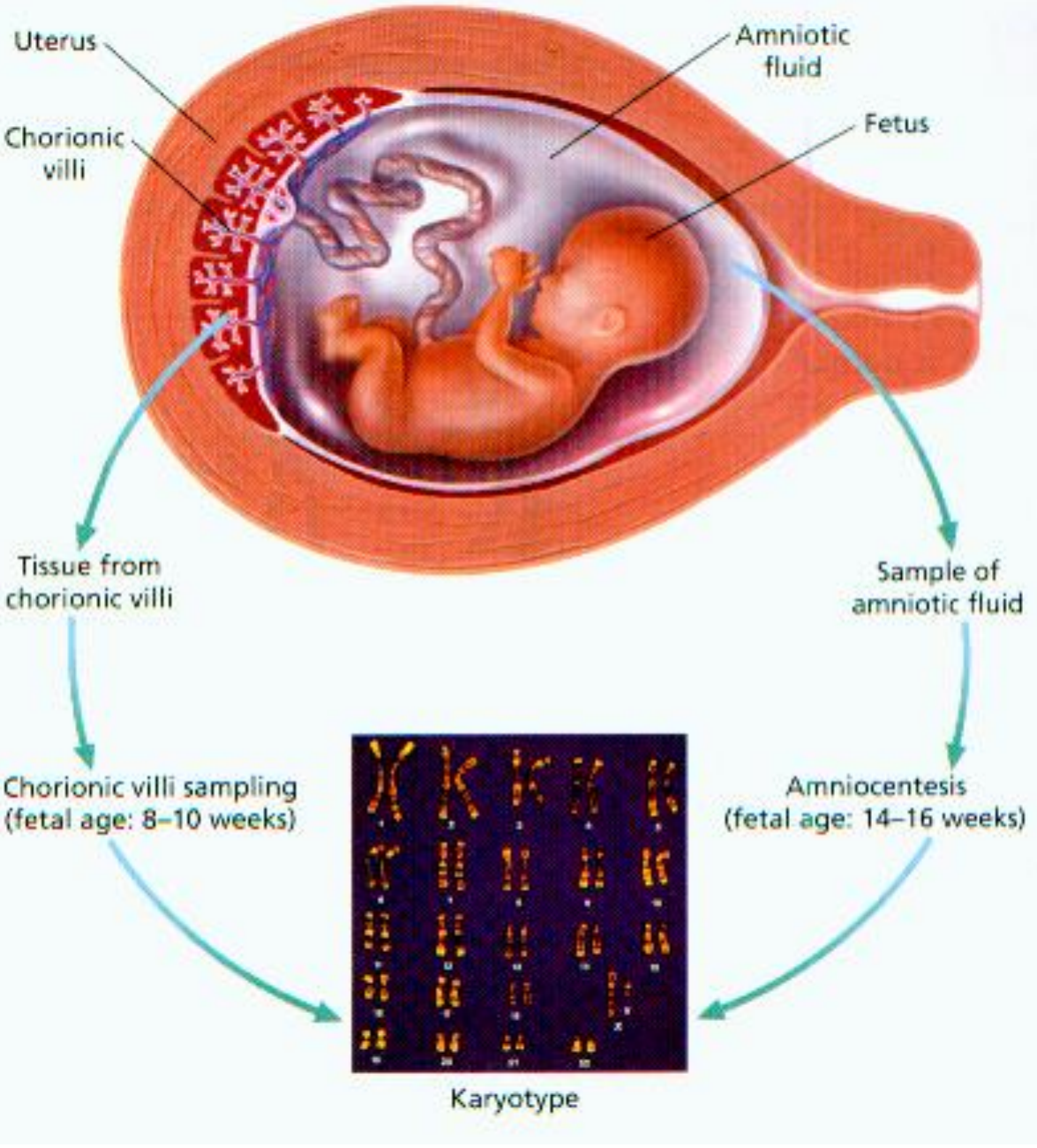
1 pair of sex chromosomes (XX or XY)

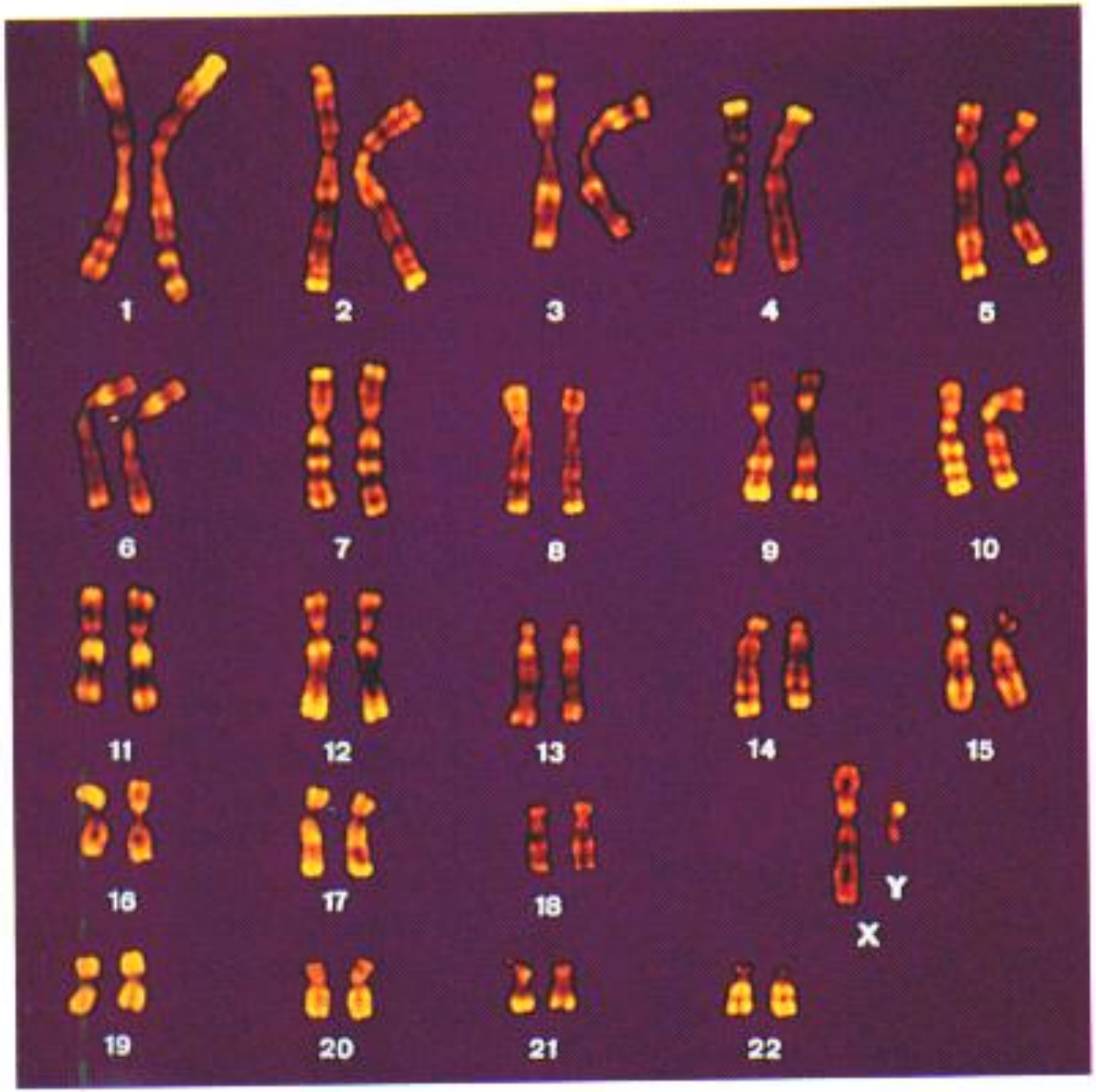
Genetic Screening - examination of genetic make-up.

Pedigrees and Karyotypes

Constructing a Human Karyotype

Amniocentesis and Chorionic Villi Sampling


Uterus
Chorionic villi
Amniotic fluid
Fetus
Tissue from chorionic villi
Sample of amniotic fluid
Chorionic villi sampling (fetal age: 8–10 weeks)
Amniocentesis (fetal age: 14–16 weeks)
Karyotype


1
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Y
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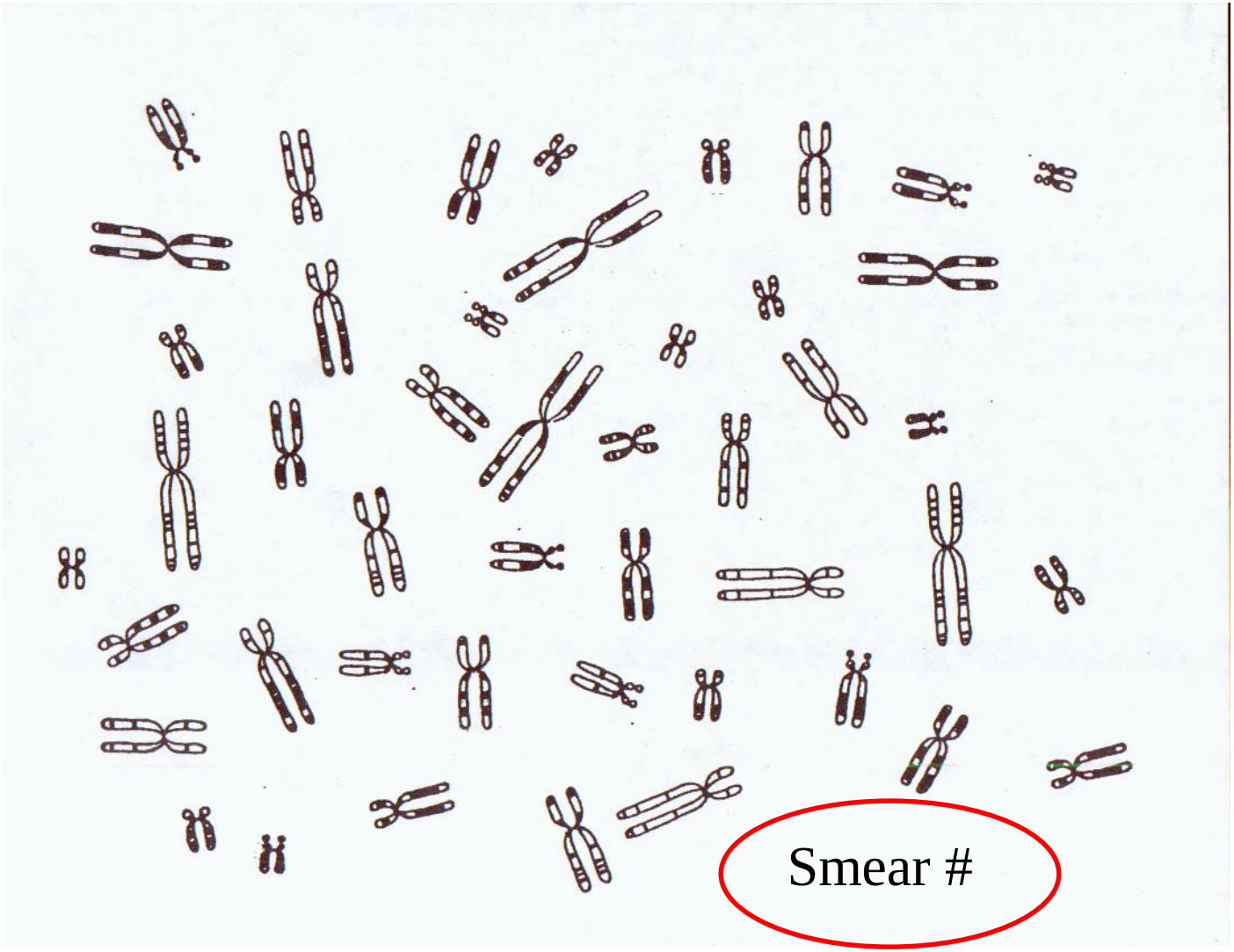
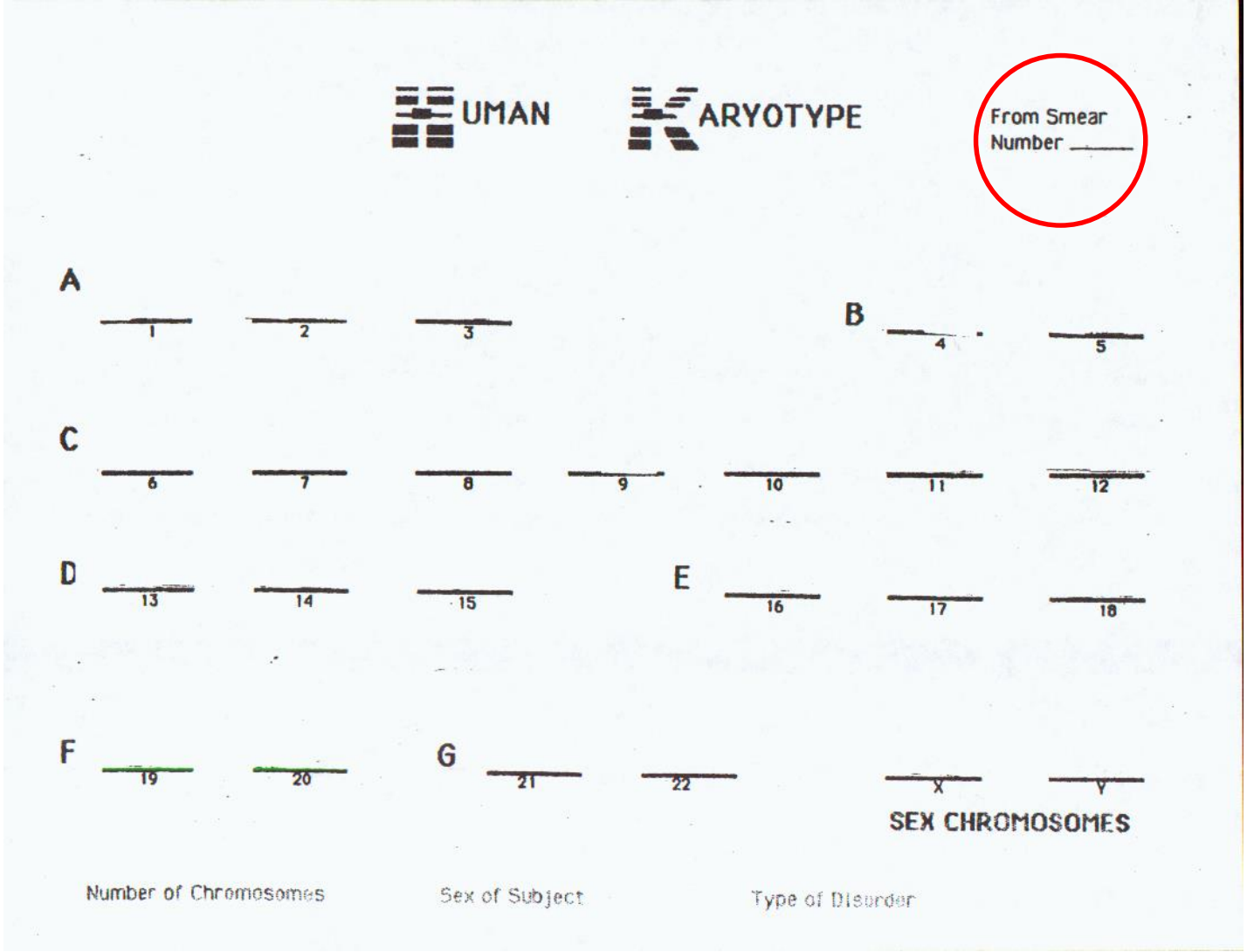
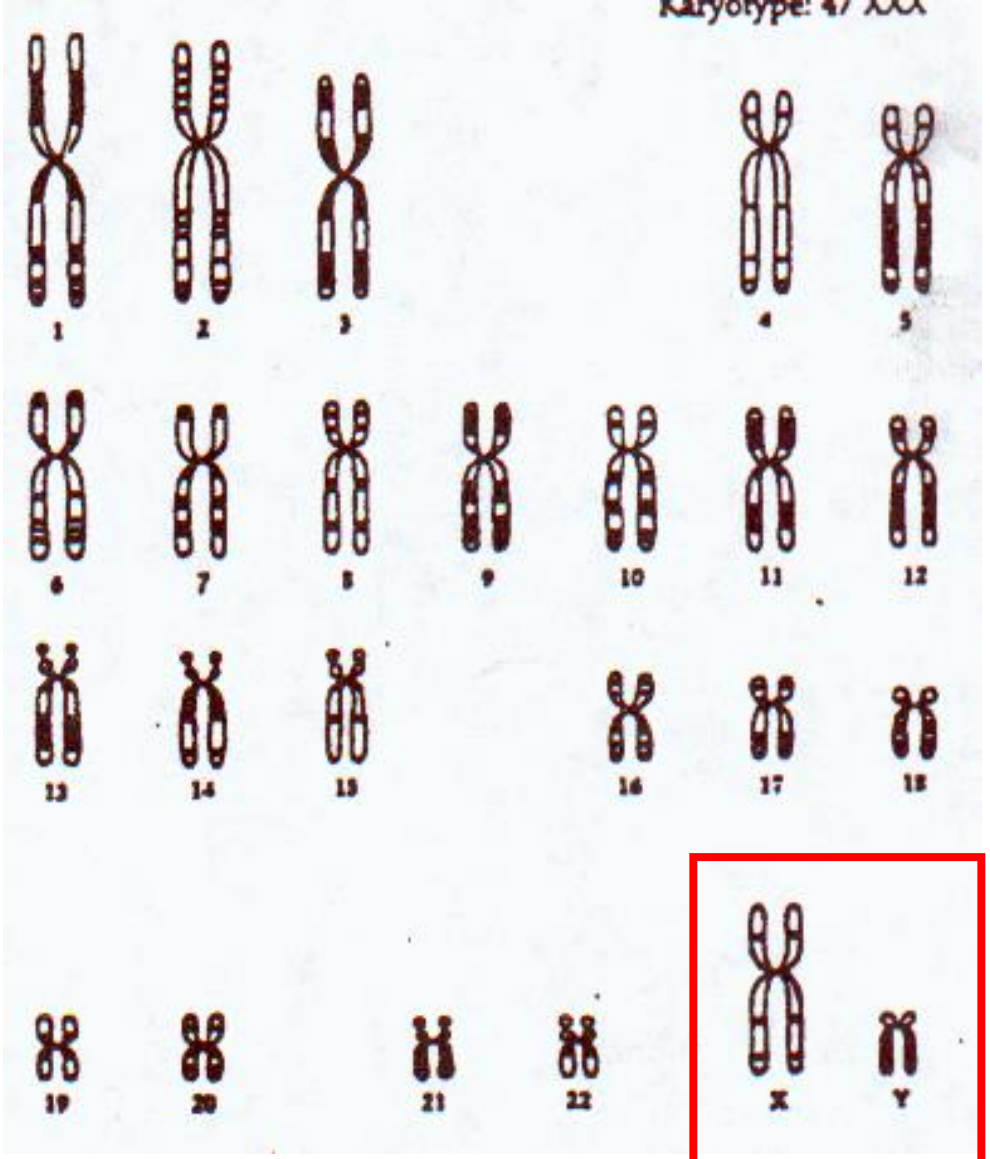


You will be given a chromosome sample. Be sure to make a note of what SMEAR # you have (1, 2, 3, 4 or 5)



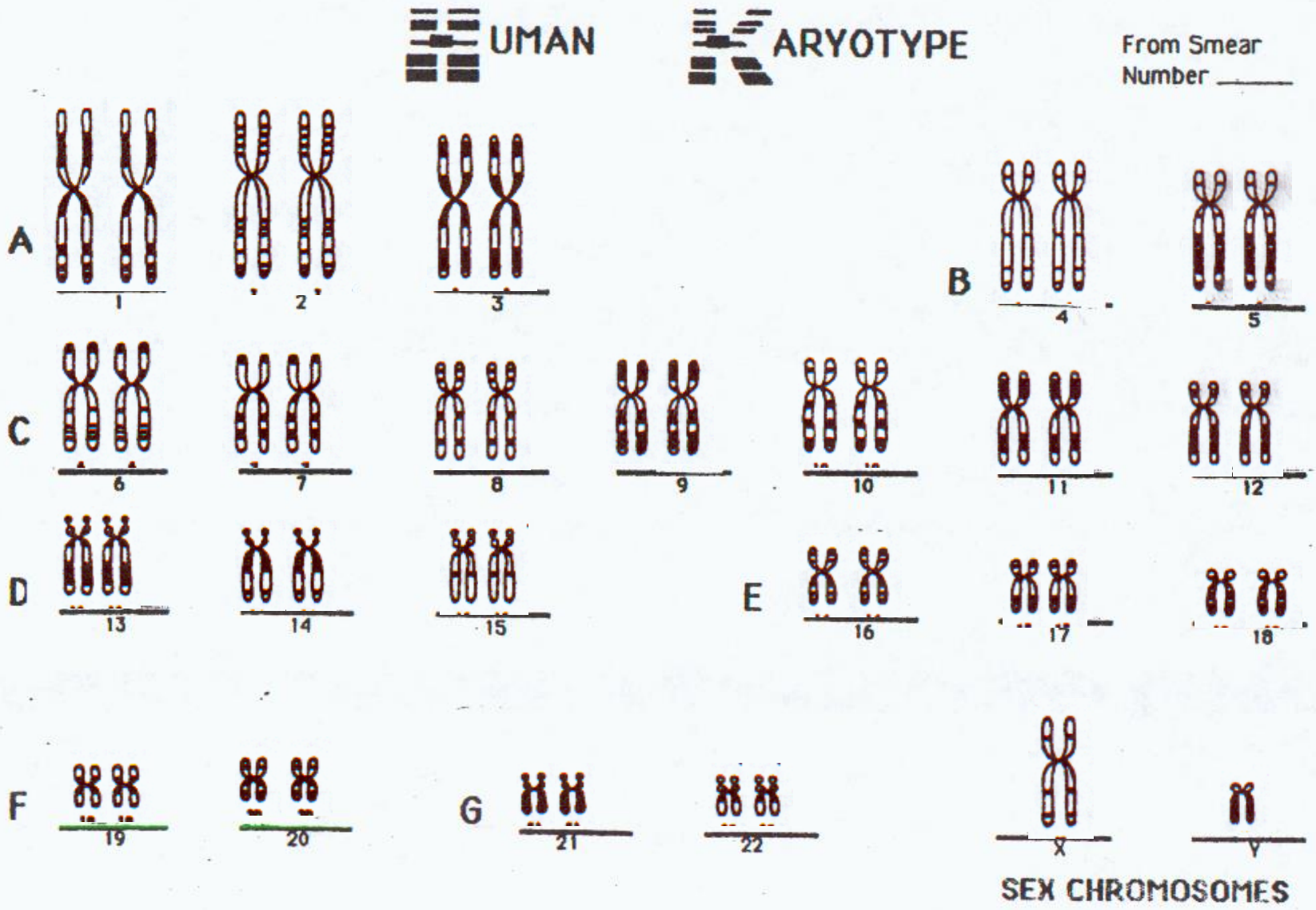
In addition, you will be given a Karyotype chart to make your Karyogram (an organized set of chromosomes). Attached to this will be a list of possible chromosomal disorders and how to identify them.



This chart will help you to identify each of the chromosomes. There are 22 pairs of homologous chromosomes numbered 1-22.

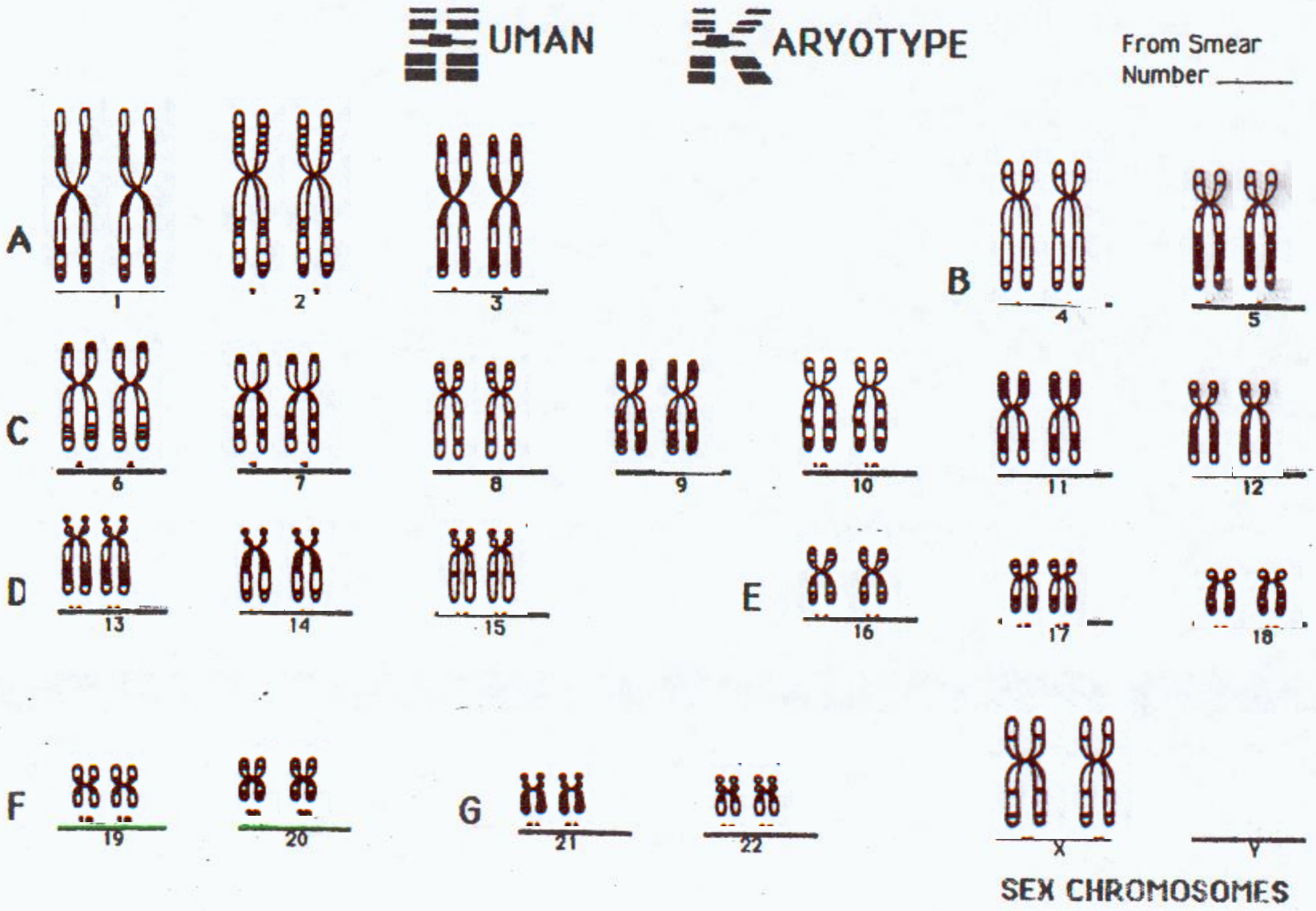
Note the Sex Chromosomes, if you have a male you will have one X and one Y (a mismatched pair). If you have a Female you will have 2 X chromosomes (a matched pair).

This is a sample of a NORMAL MALE



Number of Chromosomes 46 Sex of Subject Male Type of Disorder Normal

This is a sample of a NORMAL FEMALE



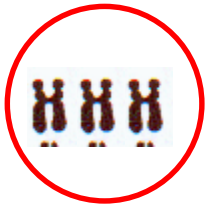
Number of Chromosomes 46 Sex of Subject Female Type of Disorder Normal

Genetic Disorders caused by Non-Disjunction of Chromosomes:

Down Syndrome (Trisomy 21)

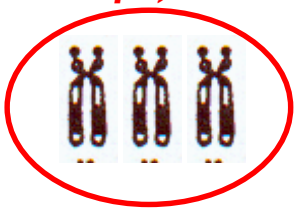
Mental Retardation and distinctive facial features

Karyotype: XX or XY with 3 chromosome #21



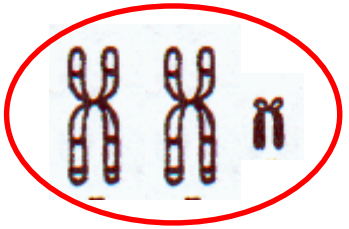
Notice that each of these involves the individual having an EXTRA Chromosome. (3 instead of 2)

Patau Syndrome (Trisomy 13)



Severe mental disorder and cleft palate (Fatal)

Karyotype: XX or XY with 3 chromosome #13



Klinefelter Syndrome (XXY)

Male with tall stature, reduced sexual organs, and sterility

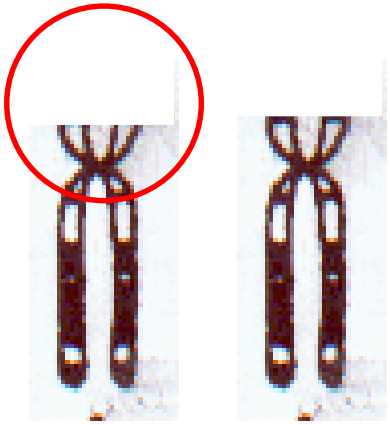
Karyotype: XXY

Disorder caused by damaged chromosome:

Cri-du-chat (Chromosome 5 with upper arm deletion)

Babies with the cry of a cat and severe mental retardation

Karyotype: XX or XY with chromosome #5 upper arm deletion

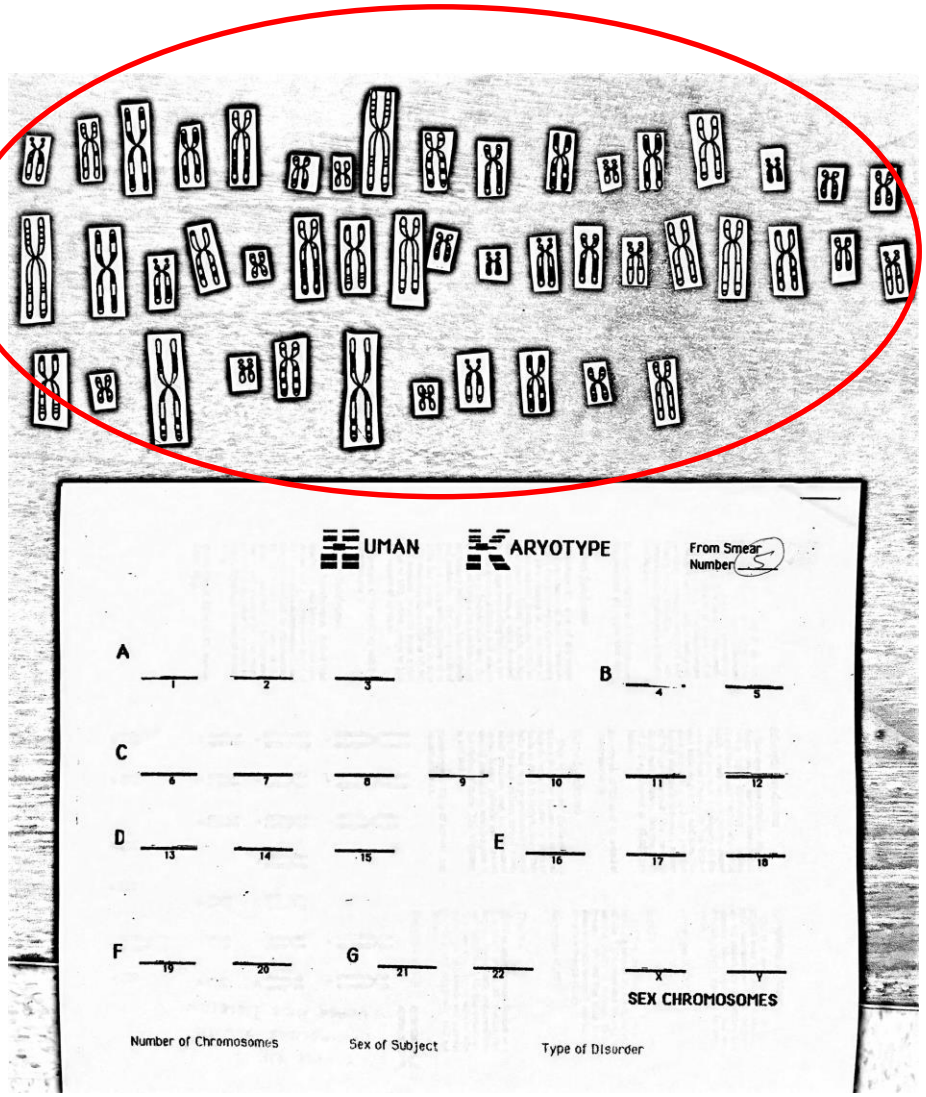


The damage may be to one or both of the #5 chromosomes.

Step 1:

Cut out all the chromosomes.

Depending on the SMEAR # you may have 46 or 47 chromosomes.

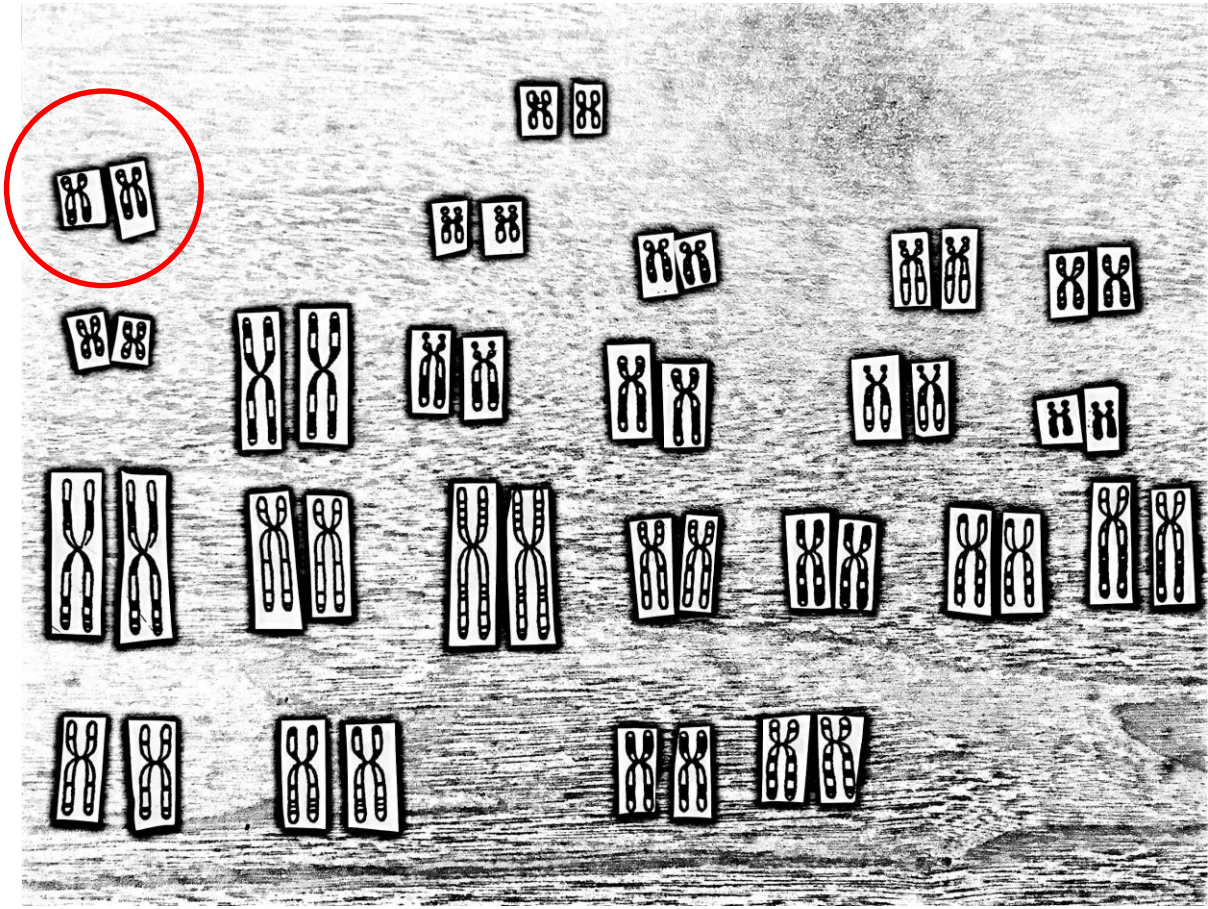


Step 2:

Find all the matching pairs of chromosomes.

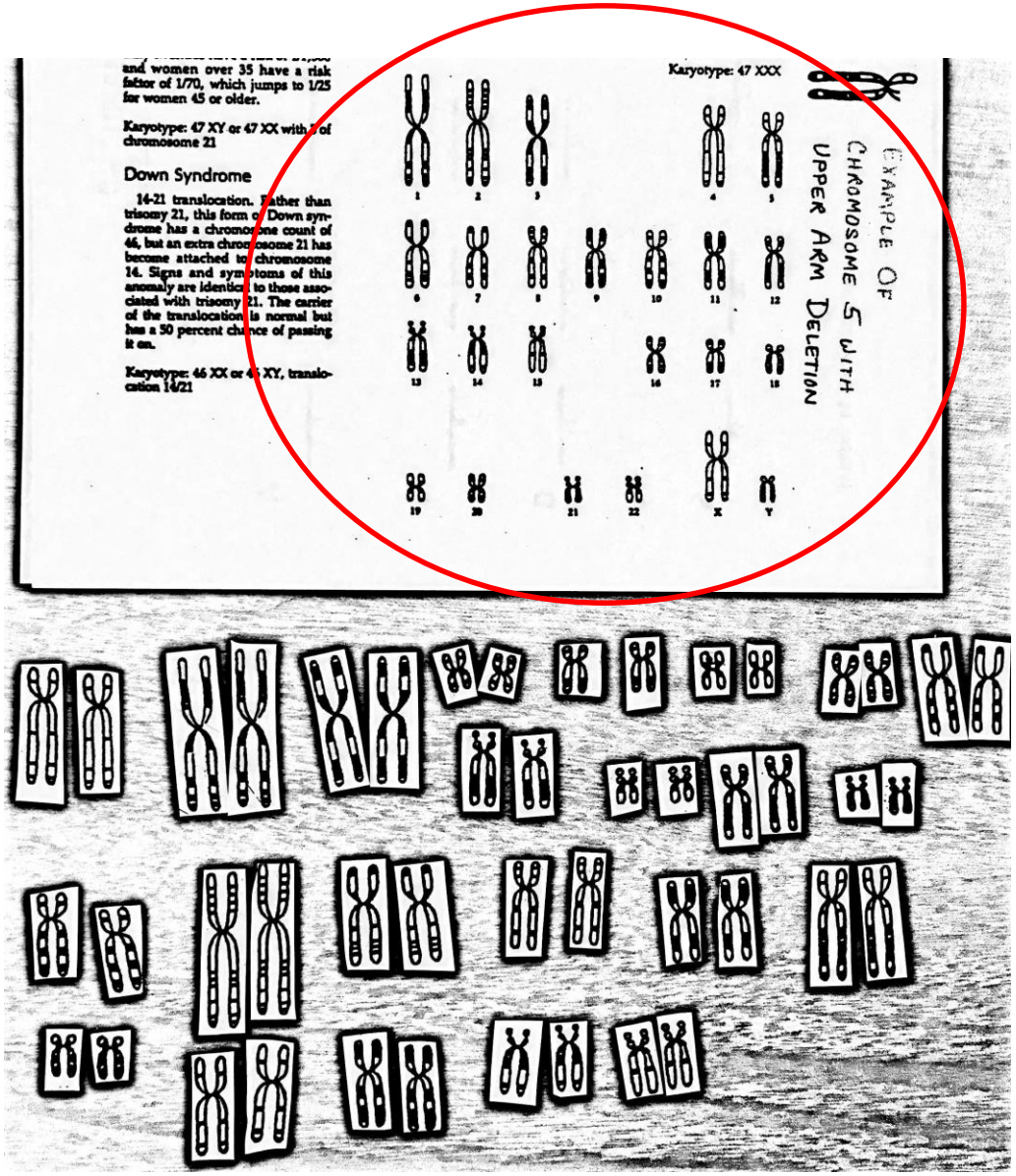
Depending on the SMEAR # you may have one group that has 3.

It is also possible to have 2 X chromosomes and a Y.



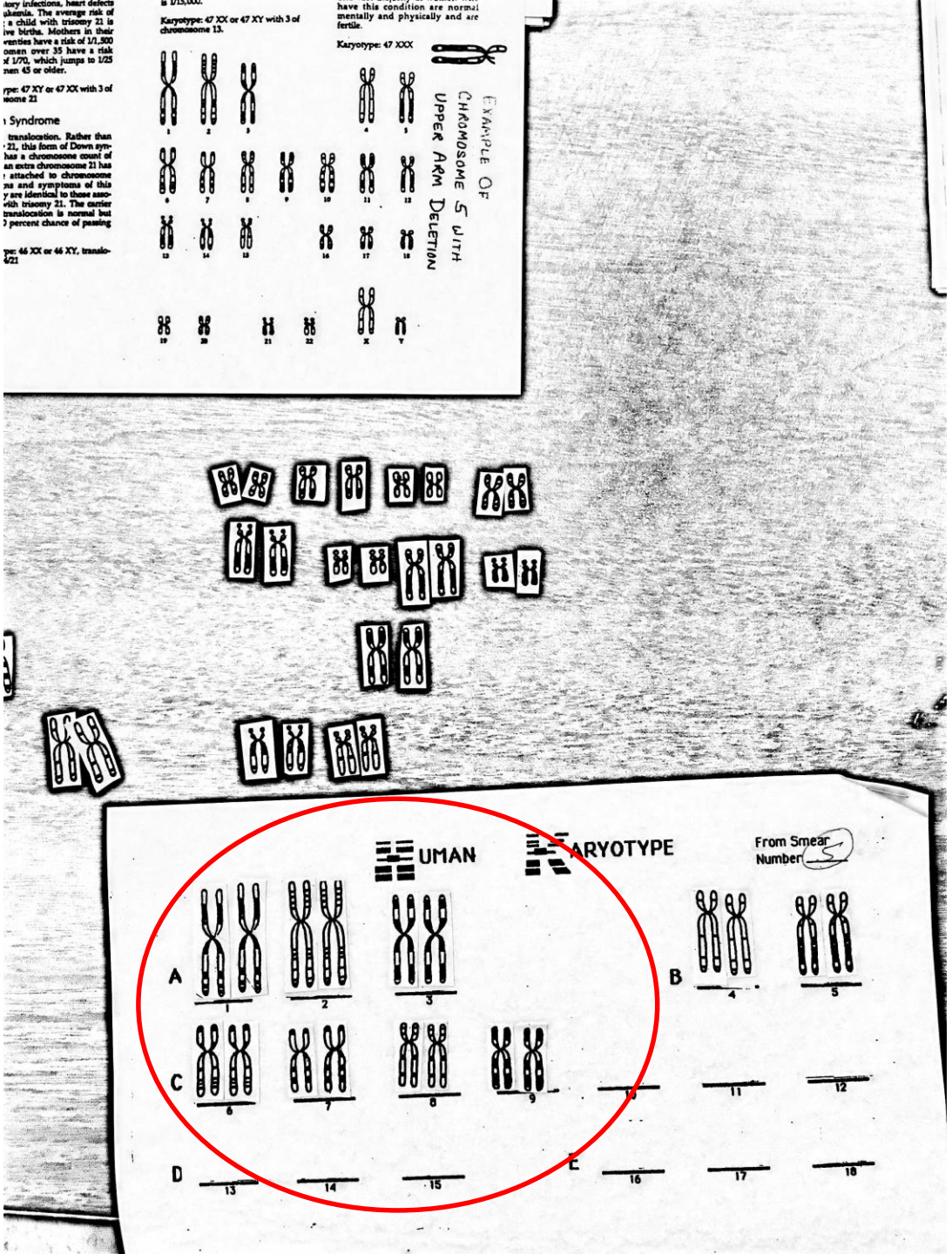
Step 3:

Use the chart of the chromosomes to identify the # for each pair.

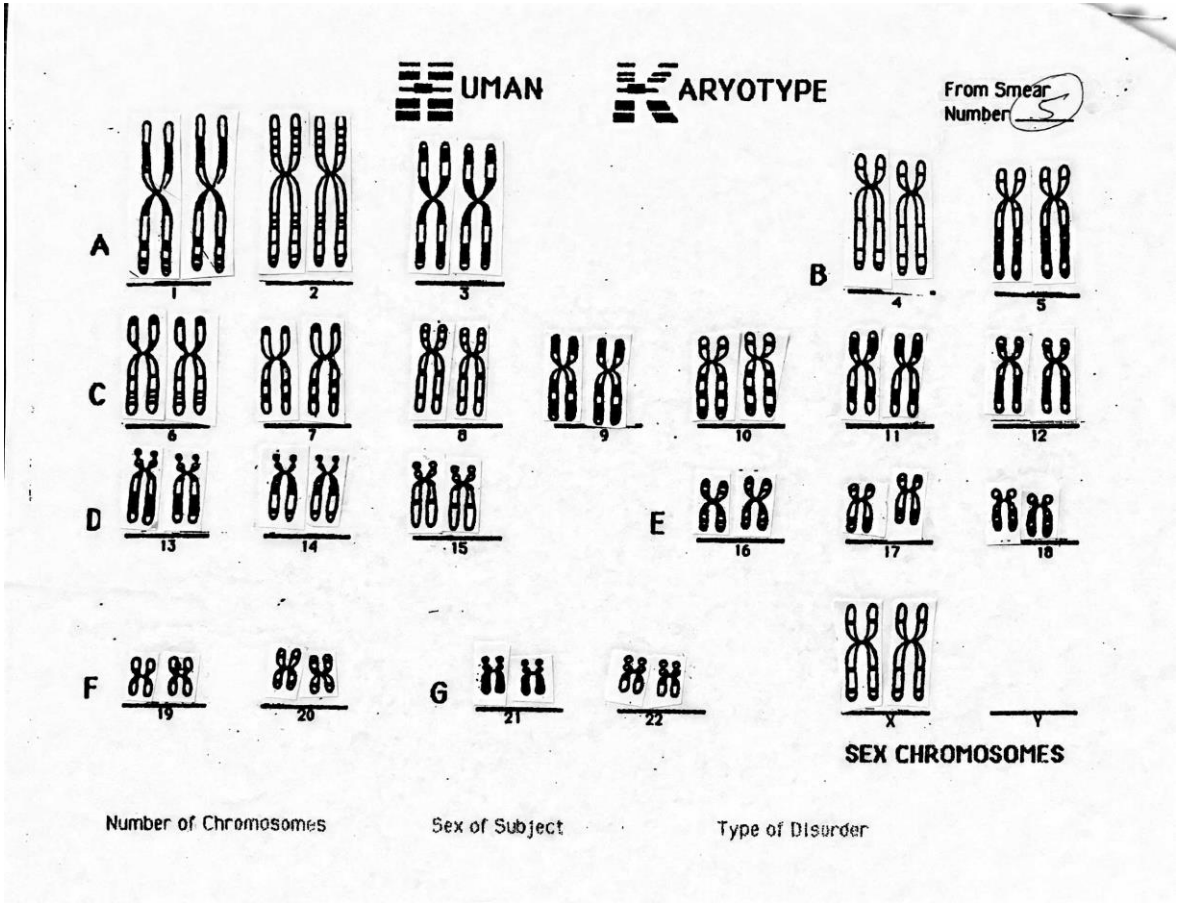


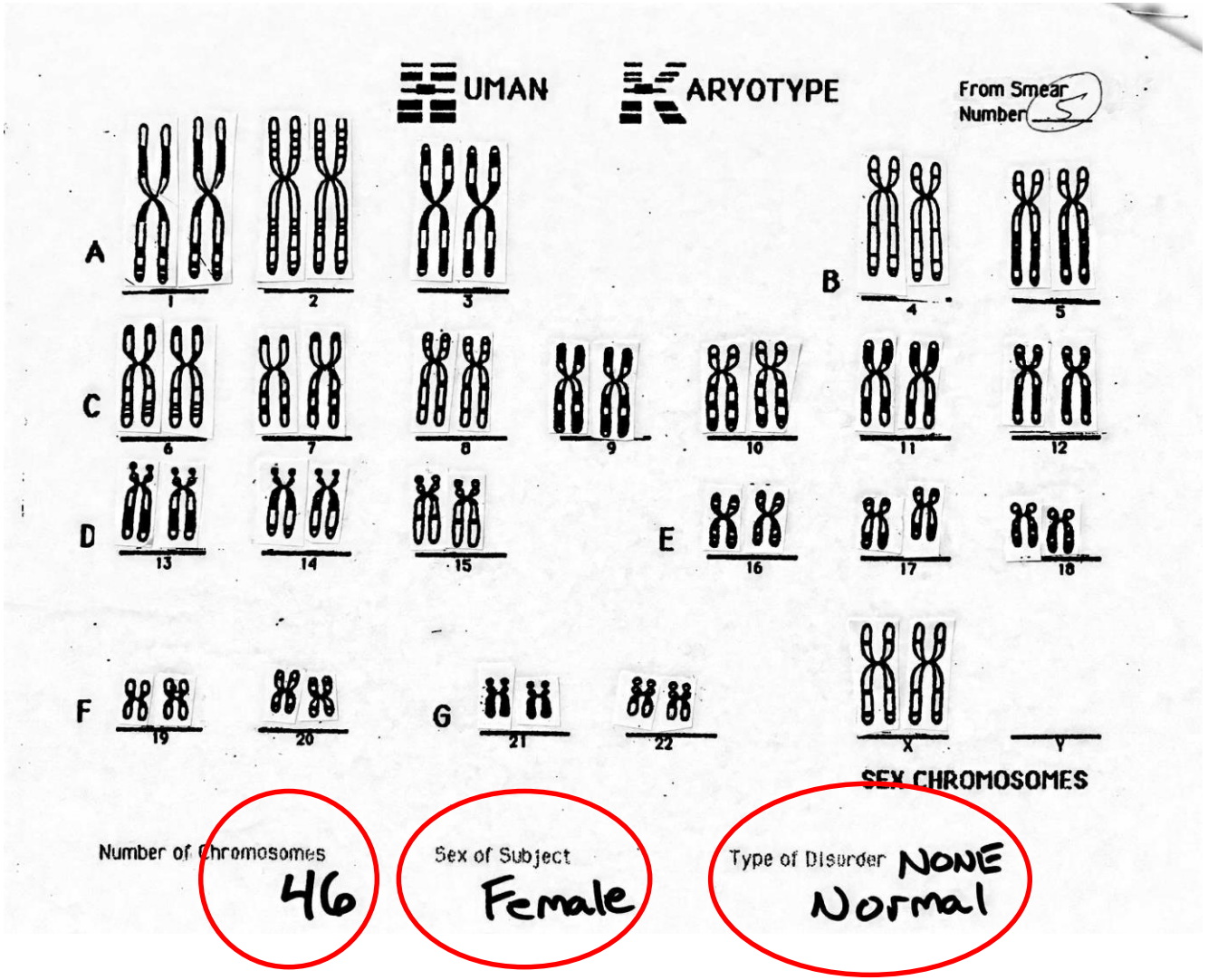
Step 4:

Glue down the chromosomes on their correct number on the Karyogram chart.



Continue gluing until you have glued down ALL of your chromosomes.





Step 5:

When you have finished, identify the number of chromosomes you have glued down (46 or 47). If the subject is Male or Female and Identify the disorder they have by referring to the list of disorders above. If the individual does not have a disorder, label it Normal. **TURN – IN!!!**