

A Chromosome Study

Name _____

In this activity, you will create a karyotype from a page of mixed chromosomes. Karyotypes are created by matching homologous pairs and numbering them from largest to smallest. Abnormalities, such as extra or deleted chromosomes can then be diagnosed. You will create two karyotypes, the first represents a normal human karyotype of a male or a female, the second represents an abnormal karyotype. You will then compare and diagnose the abnormality present in the patient of the second karyotype.

Normal Human Karyotype

Examine the page marked "normal" (You will receive either a boy or a girl set) These chromosomes are actually enlarged photographs of what is seen through a microscope. Note that the sex chromosomes have been labeled for you as either X or Y chromosomes. They have been marked this way to indicate these are the sex chromosomes. **Cut out each chromosome with scissors, to make it go faster, cut them out as squares rather than trying to cut around the margin of each chromosome.**

On the next page, you will prepare a karyotype of these chromosomes. A karyotype is a pattern or picture of chromosomes from one cell **grouped into pairs and organized by size.**

--Pair up each of the chromosomes with its homologous pair, use the size and markings on the chromosomes to determine pairs. Temporarily put the two unshaded chromosomes aside.

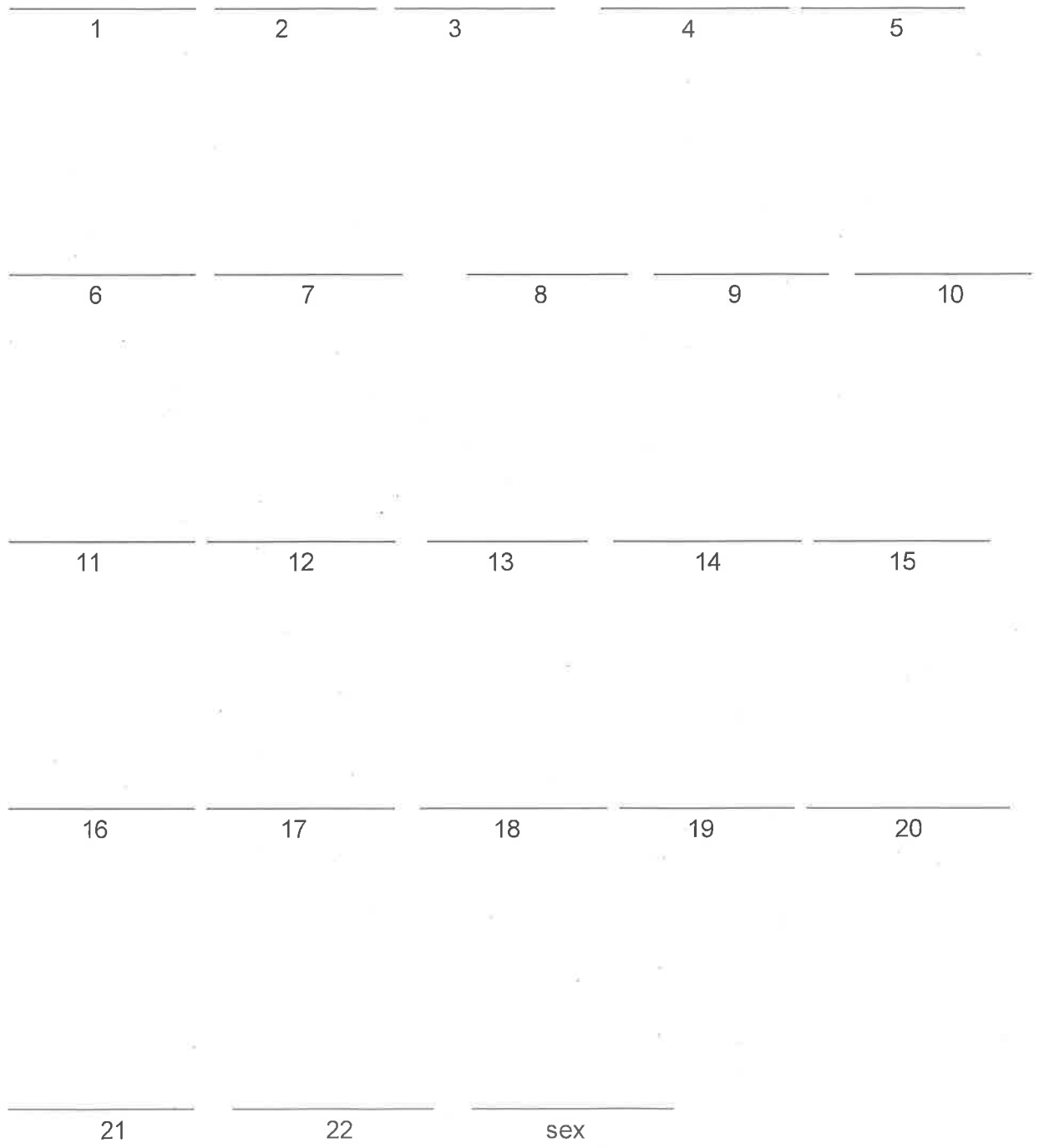
--On the next page, arrange the chromosome pairs from largest to smallest and number them. Your numbers should range from 1(largest) to 22(smallest). Put the sex chromosomes last, this is pair #23. Glue the chromosomes to the paper in the correct order.

Sex chromosomes determine the sex of the individual. A female develops when the sex chromosomes match--XX . A male develops if the two sex chromosomes are unmatched--XY. (These chromosomes are unshaded on your karyotype)

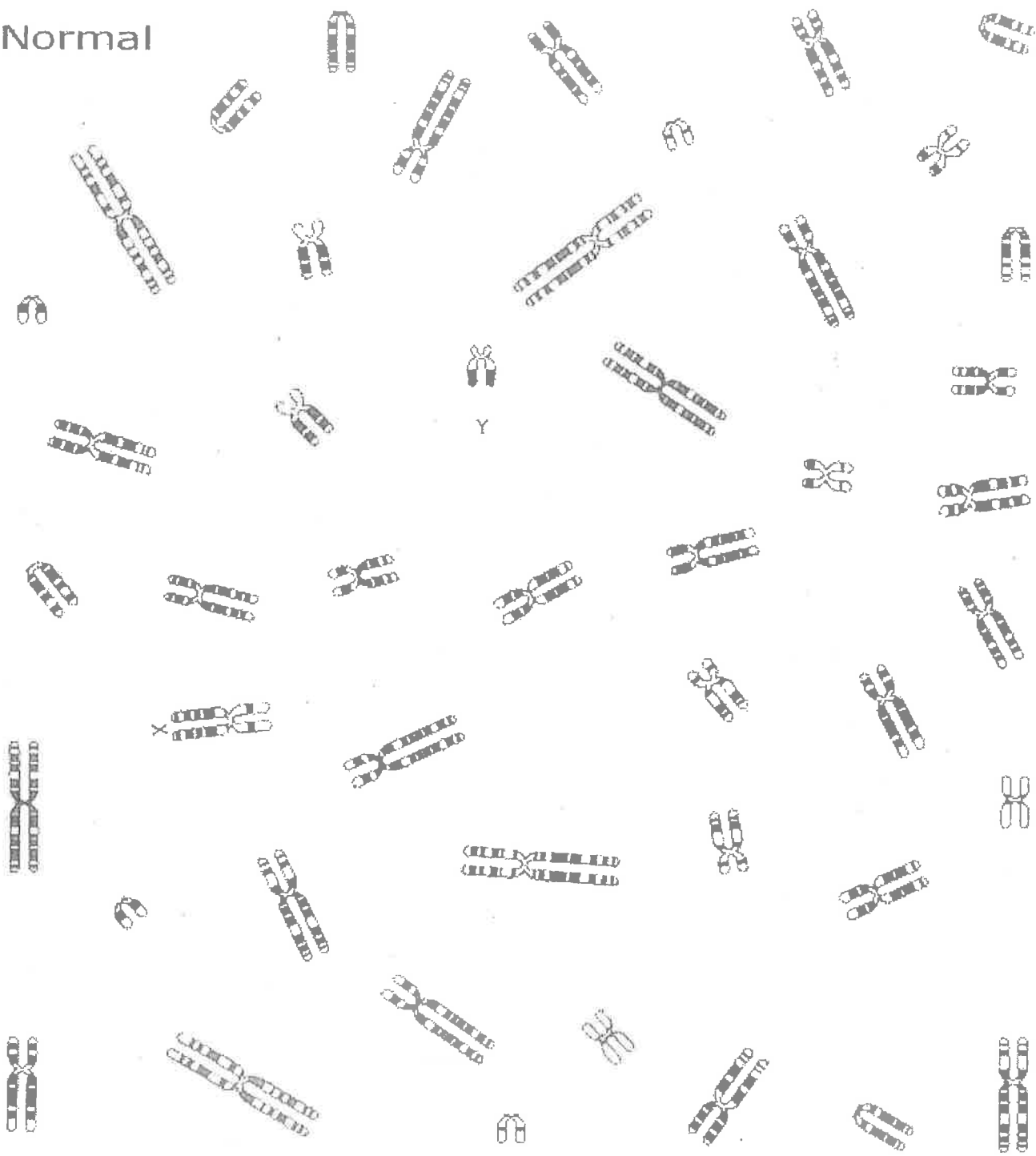
Once you finish your karyotype, answer the following questions:

1. How many total chromosomes are present in this karyotype? _____
2. How many chromosomes are present in each cell of this human? _____
3. Does your karyotype represent a male or a female? _____
4. Chromosomes that are NOT sex chromosomes are called autosomes. How many total autosomes are present in your normal karyotype? _____

Normal Karyotype



Normal



Abnormal Human Karyotype

Examine the page marked "Abnormal". Look at the top corner, what set do you have? _____

Prepare a second karyotype as you did the first. In this karyotype, you will discover an abnormality in the chromosome number. Finding incorrect chromosome numbers in the cells of an unborn baby alerts doctors to the fact that their child is abnormal and will be born with birth defects.

Possible genetic disorders:

- If the unborn has an extra number 13 chromosome, it is born with Patau syndrome.
- An extra chromosome 18 results in Edward syndrome.
- An extra chromosome number 21 results in Down Syndrome.
- A missing sex chromosome results in an X0 offspring who has Turner's syndrome.
- An extra X chromosome results in Klinefelters syndrome (XXY).

5. How many chromosomes are present in the abnormal karyotype: _____

6. Which chromosome pair is abnormal? _____

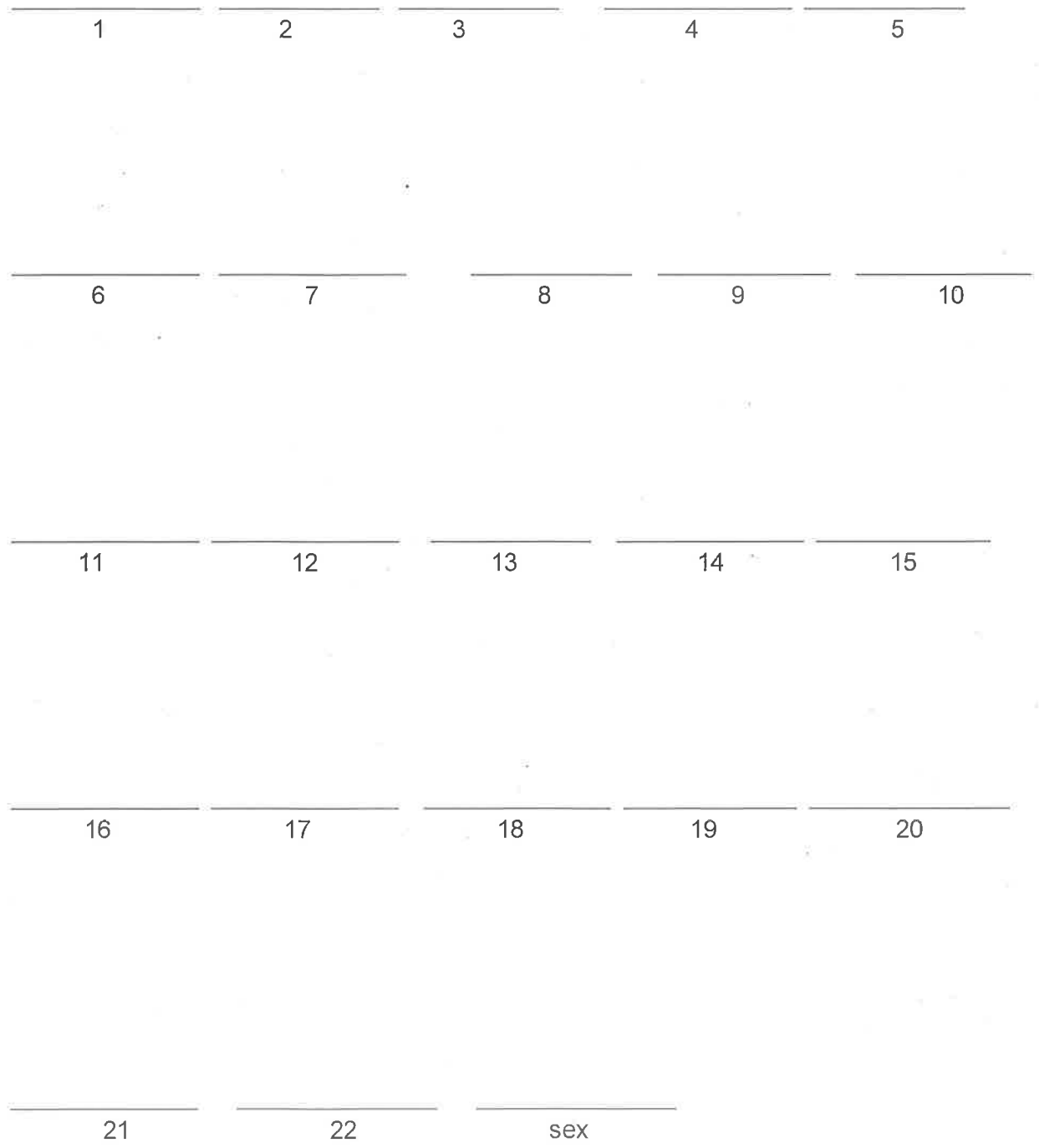
7. What syndrome does this unborn child have? _____

8. What sex will the unborn child be? _____

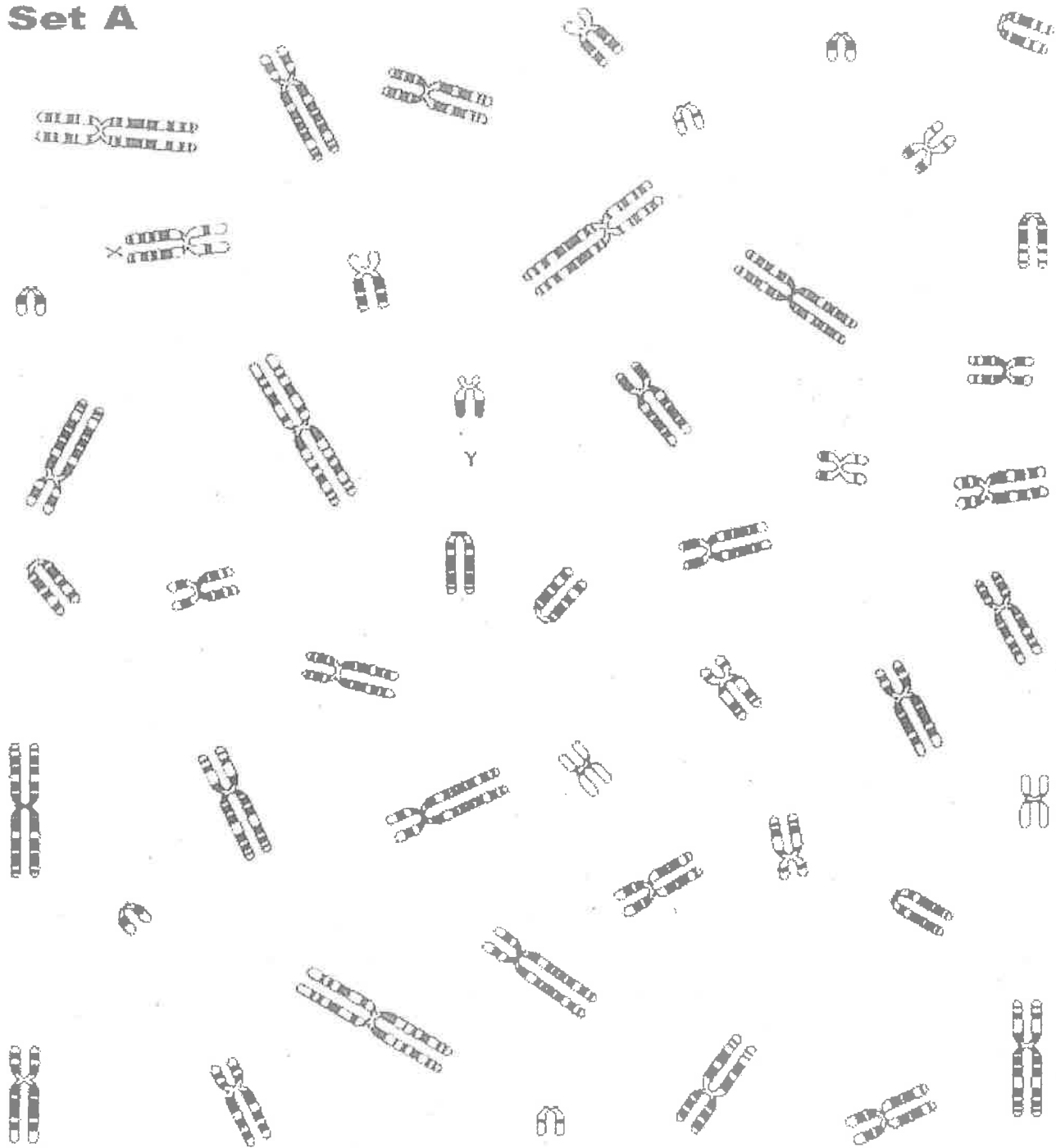
9. Describe two types of information that can be gained about a child before it is born through a karyotype.

10. Genetic information can be applied in healthcare, agriculture, forensics, and many other fields. Using at least three vocabulary terms we have learned in our genetics unit, describe a situation in which genetic information such as a karyotype could have either a positive or a negative impact on your daily life. Explain your reasoning and underline your vocabulary terms.

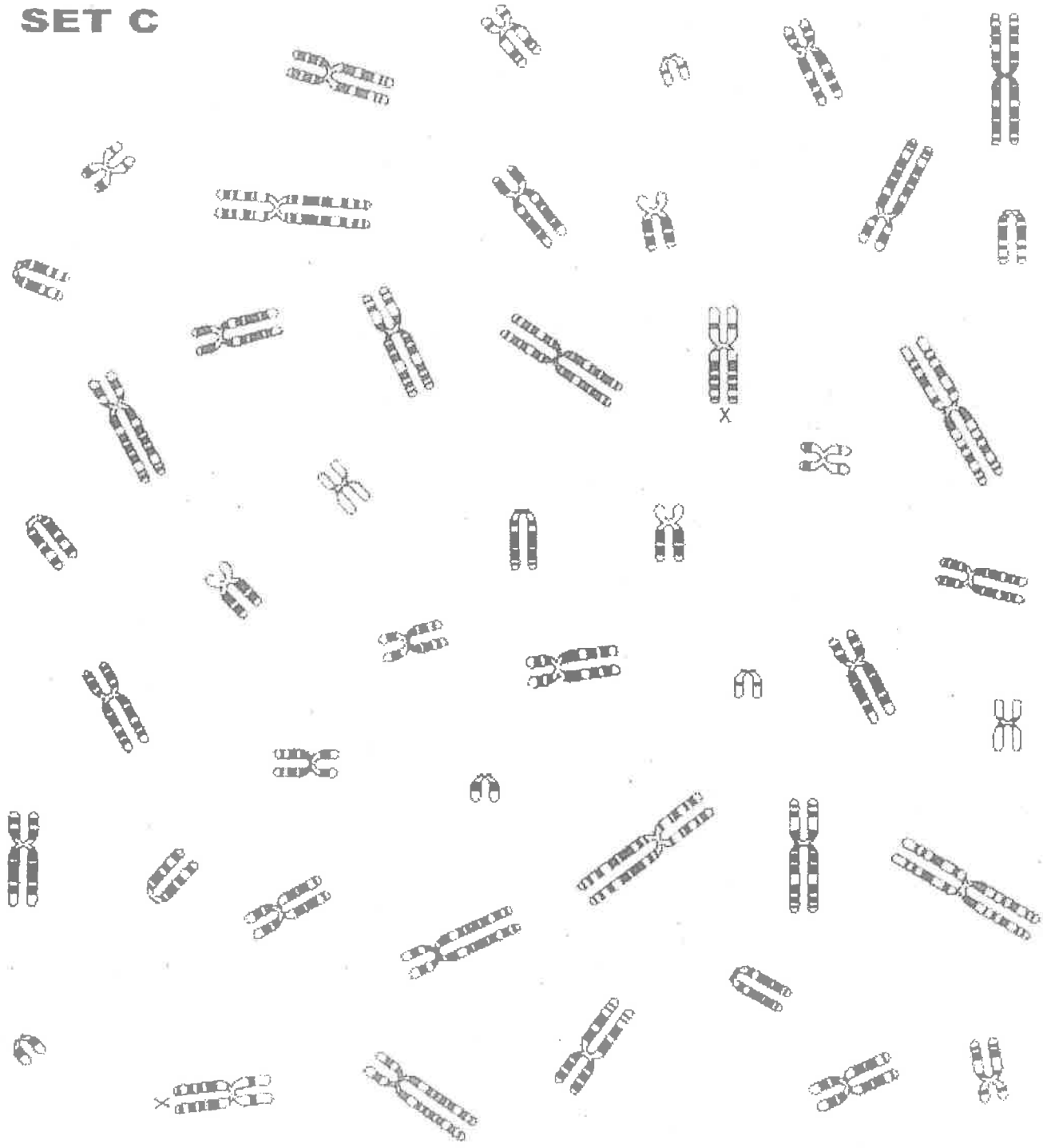
Abnormal Karyotype



Set A



SET C



Set D

