

SI Genetics- Full Discipline Demo

Karyotyping

Final Report - Answer Guide

Institution	Science Interactive University
Session	SI Genetics - Full Discipline Demo
Course	SI Genetics- Full Discipline Demo
Instructor	Sales SI Demo

Test Your Knowledge

Match each term with the best description.

Terms to match:

- Aneuploidy
- Idiogram
- Karyotyping
- Monosomic
- Trisomic

Descriptions:

- Process of pairing and ordering all the chromosomes of a cell to identify abnormalities
- Individual with an extra copy of an autosome or sex chromosome
- Individual with a missing copy of an autosome or a missing sex chromosome
- Standardized diagram that emphasizes the shapes and banding patterns of an individual chromosome
- Deviation in chromosome number

Answer boxes:

-
-
-
-
-

Correct answers:

- 1 Karyotyping 2 Trisomic 3 Monosomic 4 Idiogram
5 Aneuploidy

Categorize each statement as true or false.

⚡ Karyotypes are analyzed to determine abnormalities in chromosome number and form.	
⚡ A typical human has 49 chromosomes.	
⚡ Humans are better able to tolerate abnormalities involving sex chromosomes.	
⚡ Ring 18 Syndrome is an example of a disease resulting from an added chromosome.	
True	False
1	2

Correct answers:

1

Karyotypes are analyzed to determine abnormalities in chromosome number and form.

Humans are better able to tolerate abnormalities involving sex chromosomes.

2

A typical human has 49 chromosomes.

Ring 18 Syndrome is an example of a disease resulting from an added chromosome.

Exploration

Karyotyping is the process of pairing and ordering all the chromosomes of a cell to identify abnormalities associated with ____.

- ☐ birth defects
- ☐ genetic disorders
- ☐ some cancers
- ☒ All of the above

✓

Idiograms are used to identify individual chromosomes and to detect conditions arising from chromosomal malformations.

- ☒ True
- ☐ False

✓

____ syndrome produces trisomic males with an extra X chromosome.

- ☐ Down
- ☐ Triple X
- ☒ Klinefelter
- ☐ Turner

✓

Exercise 1

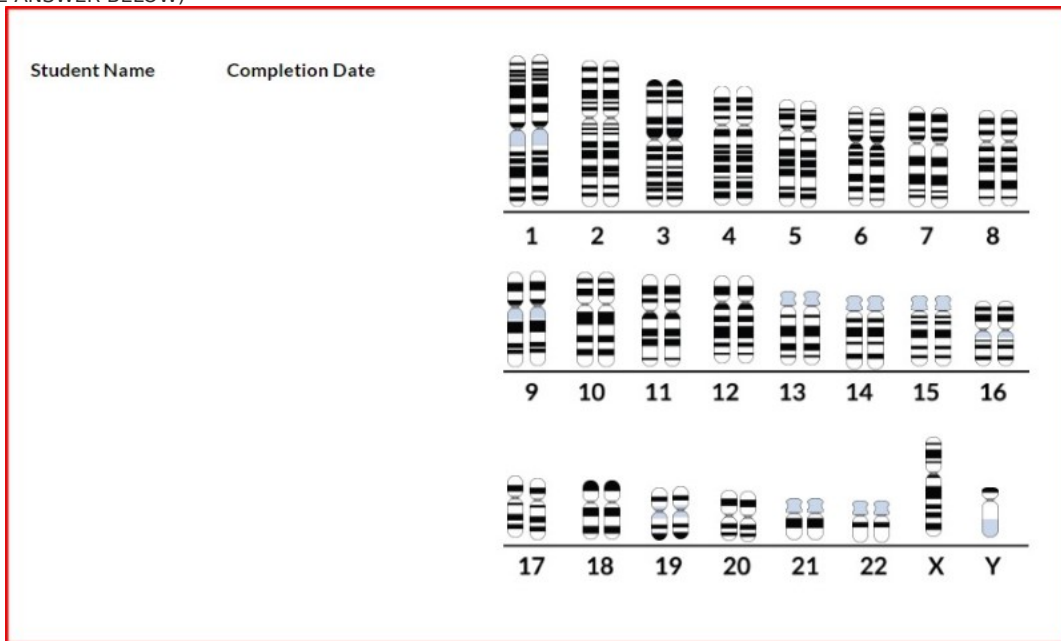
What are idiograms? How are idiograms used in a genetics laboratory?

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How do the effects of aneuploidies differ between autosomes and sex chromosomes? Which of the genetic diseases recorded in Data Table 1 involve autosomes?

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(SAMPLE ANSWER BELOW)



Data Table 1: Karyotype Analysis
(SAMPLE ANSWER BELOW)

Karyotype #	Disease	Description
1	Down Syndrome	Trisomic males or females with an extra copy of chromosome 21 resulting in short stature; round, flat face profile with slanted eyes; and developmental and intellectual delays.
2	Triple X Syndrome	Trisomic females with extra X chromosome resulting in wide-spaced eyes, incurved little fingers, tall stature, and increased probability of learning disabilities.
3	Turner Syndrome	Monosomic females missing one X chromosome resulting in short stature, delayed puberty, infertility, and heart defects.

Competency Review

_____ are thread-like structures located in the nucleus of eukaryotic cells that carry the genetic code for an organism.

- ☒ Chromosomes ✓
- ☐ Karyotypes
- ☐ Aneuploidies
- ☐ Idiograms

A monosomic individual has only _____ chromosomes.

- ☐ 40
- ☒ 45 ✓
- ☐ 47
- ☐ 50

_____ are used to identify individual chromosomes and to detect conditions arising from chromosomal malformations.

- ☐ Monosomies
- ☐ Aneuploidies
- ☒ Idiograms ✓
- ☐ Autosomes

A healthy human has 22 pairs of autosomes and one pair of sex chromosomes.

- ☐ True ✓
- ☐ False

____ syndrome is a genetic disease resulting from an added chromosome.

- ☐ Down
- ☐ Patau
- ☐ Jacob
- ☐ All of the above ✓

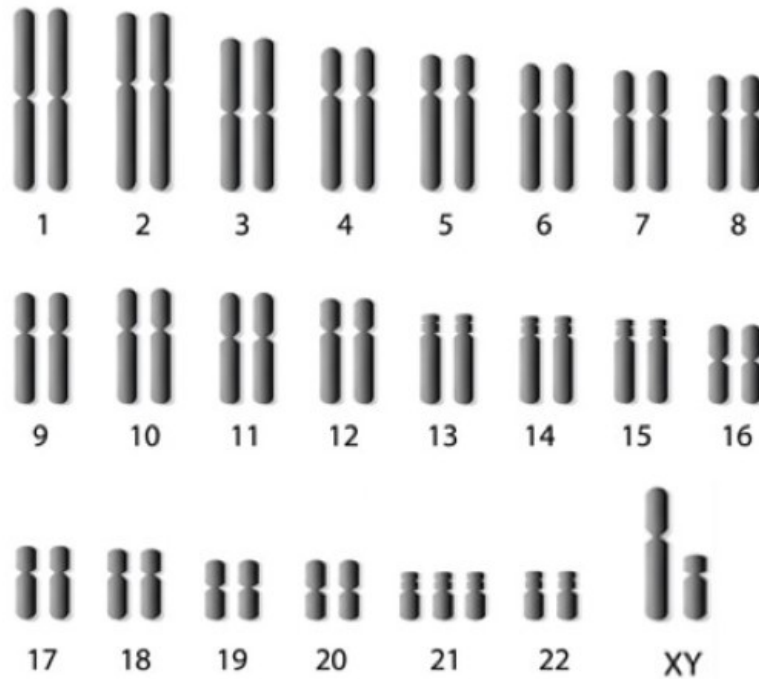
Most abnormalities involving autosomes are lethal to embryos and result in miscarriage.

- ☐ True ✓
- ☐ False

Chromosomes are ordered by ____ when performing karyotyping.

- ☐ size
- ☐ form
- ☐ banding pattern
- ☐ All of the above ✓

The karyotype below indicates ____.



- ☐ typical chromosomes
- ☒ Down syndrome
- ☐ Fragile Z syndrome
- ☐ Turner syndrome



Extension Questions

A 37-year-old pregnant woman has a precautionary karyotype performed on her developing fetus to test for Down syndrome and other chromosomal abnormalities. The results indicate the fetus has 22 pairs of normally shaped autosomes and a trisomy of the X chromosome. Apply your knowledge of karyotyping and genetic diseases to explain the test results to the woman. (SAMPLE ANSWER BELOW)

I would explain to the expectant mother that her developing fetus has 22 pairs of normally shaped autosomes meaning that her baby will not have Down syndrome or other genetic disorders related to autosome abnormalities. I would then explain that her developing fetus does have an extra X chromosome that is indicative of a condition called triple X syndrome meaning that her future daughter could display wide-spaced eyes, incurved little fingers, tall stature, and potential learning disabilities; however, most individuals with the condition remain unaware.