3d molecular designs
Transforming Science Learning

Chromosomes in Action: Revisualizing Meiosis

3d molecular designs

Transforming Science Learning

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Who's Here

- Middle School, High School, Post-secondary
- Rural, Suburban, Urban
- Biology, AP Biology, Anatomy and Physiology, Other
- Where are you in your course?

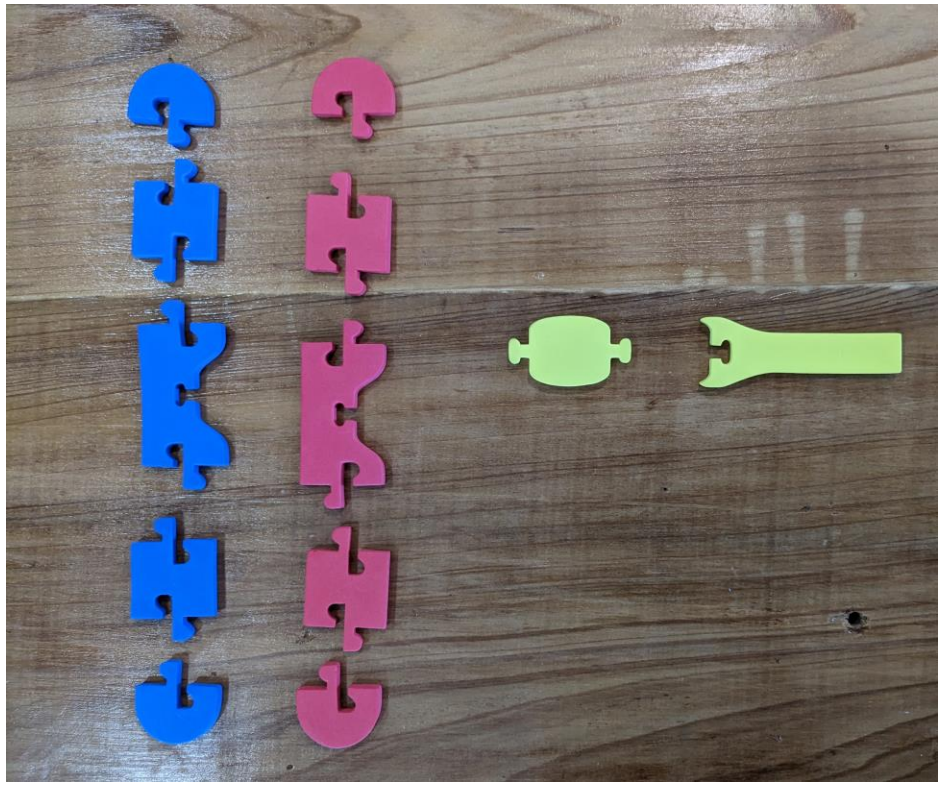
Workshop Learning Goals

- Demonstrate what cell processes increase gamete diversity when compared to the parent cell.
- Explain which mechanisms contribute to genetic variation
- Have fun!

Why do I look different than my siblings?

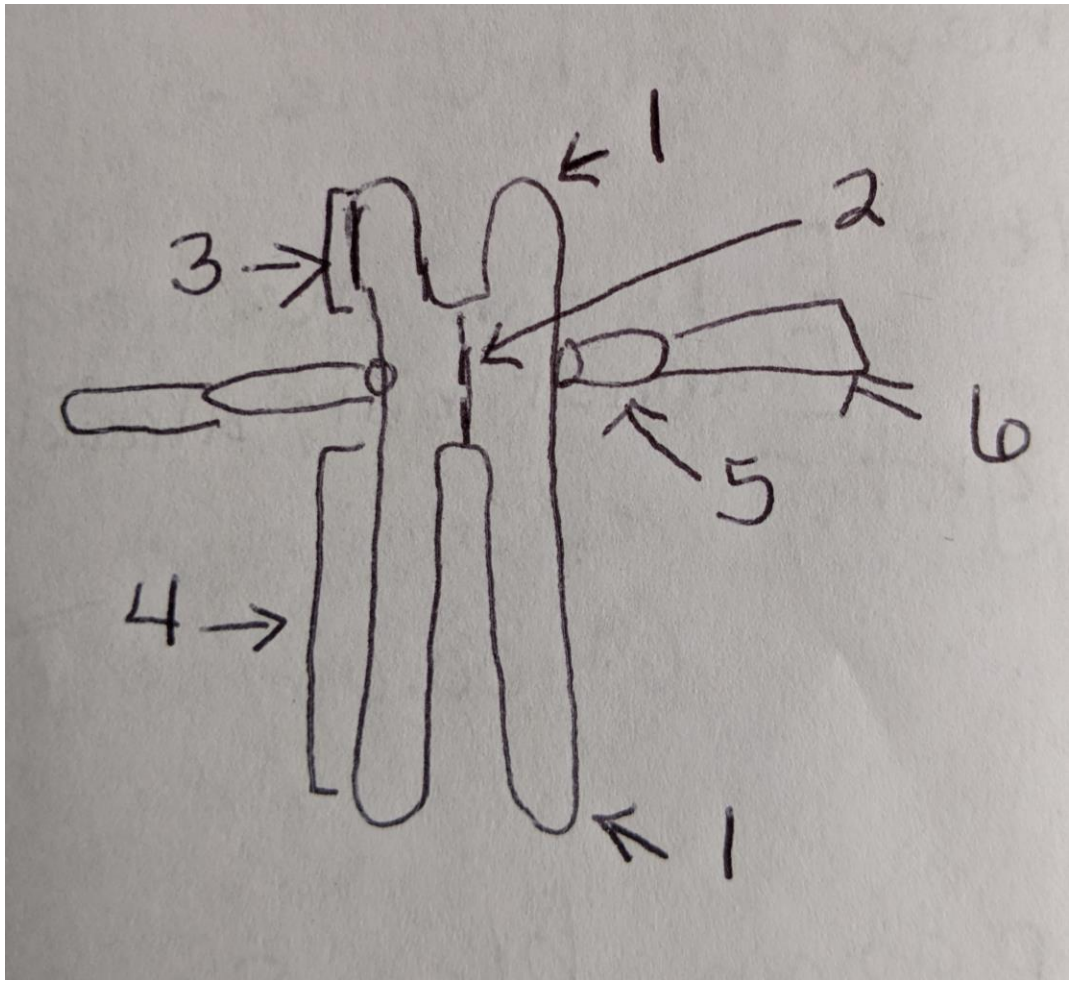
Why do siblings in a litter look differently?

Suggested Chromosome Assembly

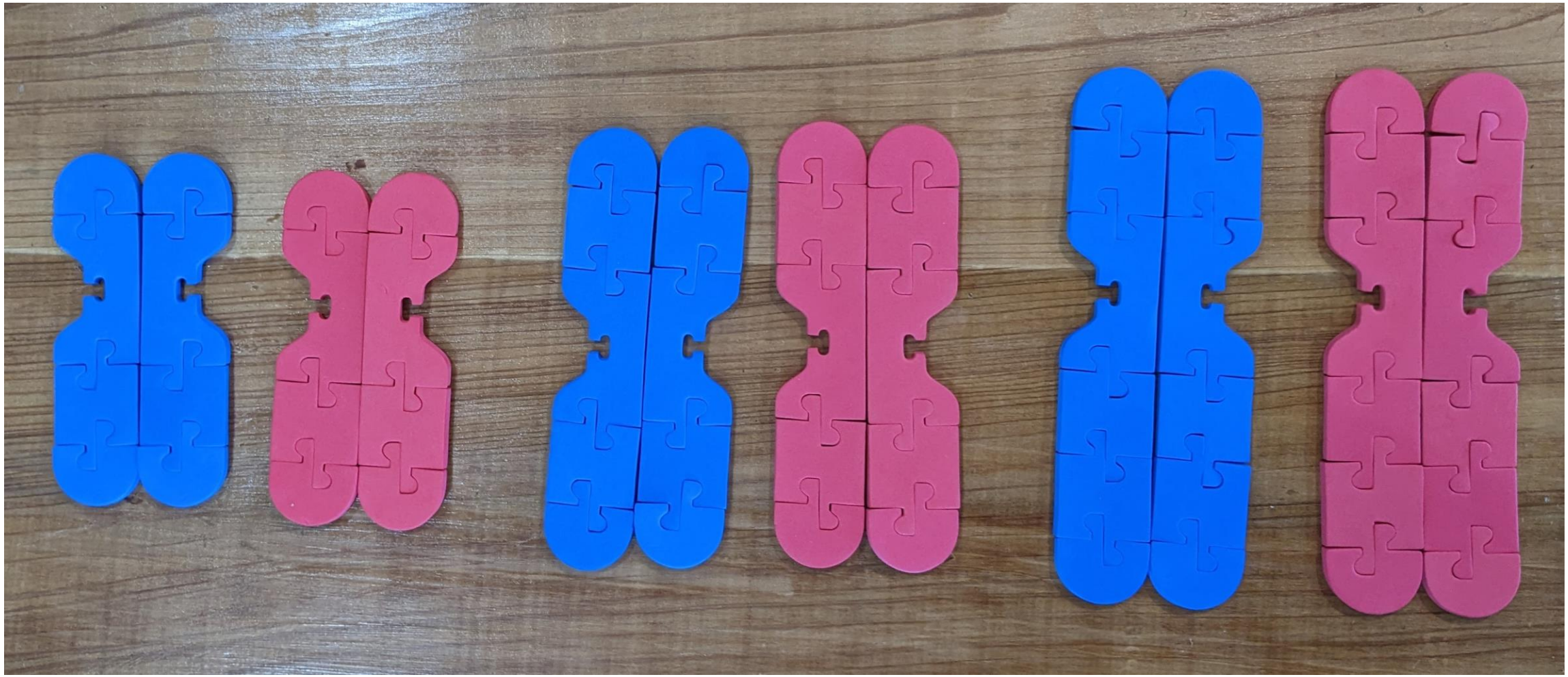


Chromosome Size	Part	Egg donating parent chromosome (Red Foam)	Sperm donating parent chromosome (Blue Foam)
Short chromosome (Acrocentric)	p arm linkers	0	0
	q arm linkers	1	1
Medium Chromosome (metacentric)	p arm linkers	1	1
	q arm linkers	1	1
Long Chromosome (submetacentric)	p arm linkers	1	1
	q arm linkers	2	2

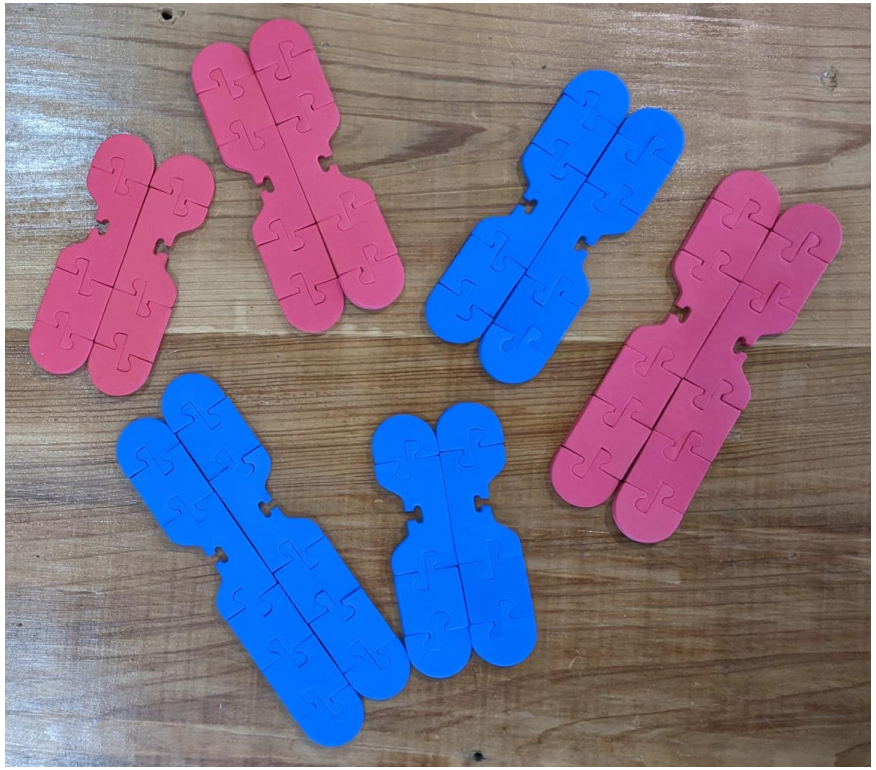
Label the parts to create a shared vocabulary

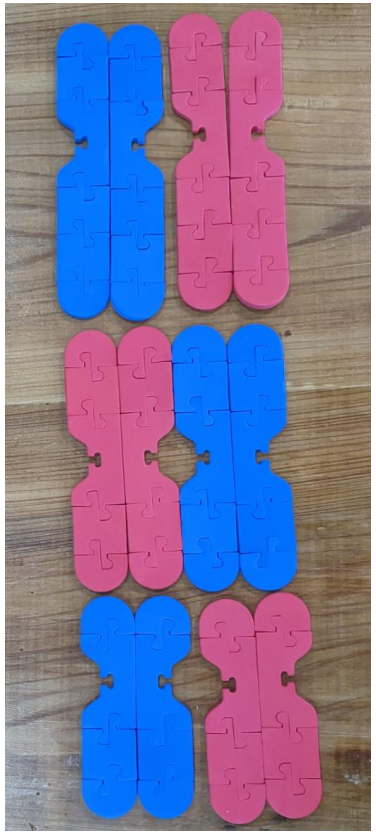


Create a duplicate copy to make a sister chromatid



What happens during meiosis?

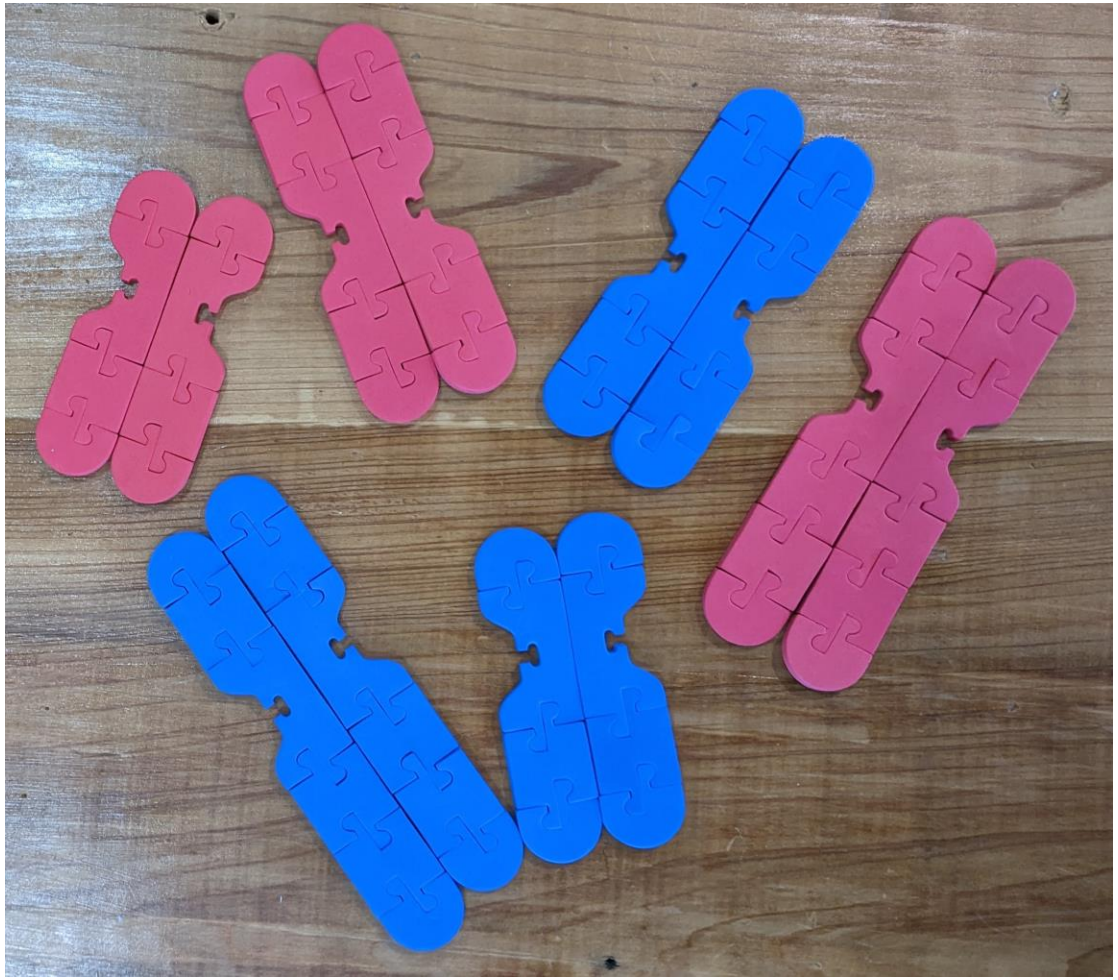




What occurs next so the end result are four haploid cells?

How can your students model what happens when eggs are made?

Mechanisms that Contribute to Genetic Variation

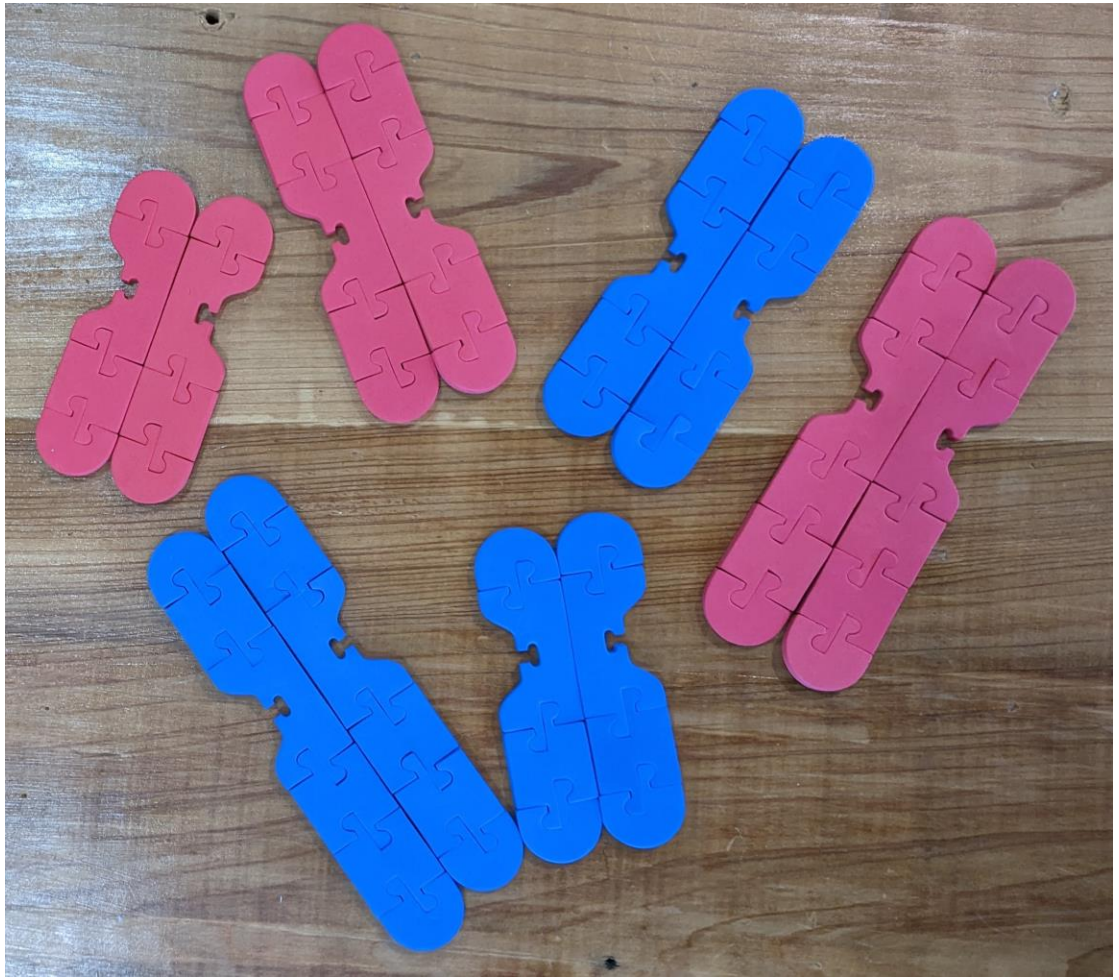


Diploid number of chromosomes:

Haploid number of chromosomes:

How many possibilities of chromosome combinations during meiosis?

Mechanisms that Contribute to Genetic Variation



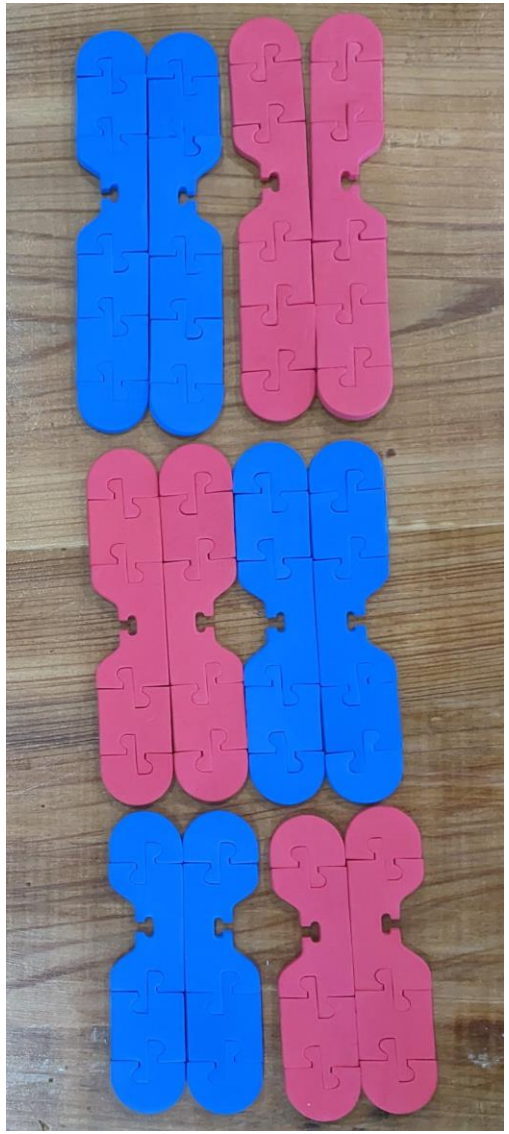
How many possible combinations in humans?

Diploid number of chromosomes (2n): 6

Haploid number of chromosomes (n): 3

How many possible chromosome combinations during meiosis?

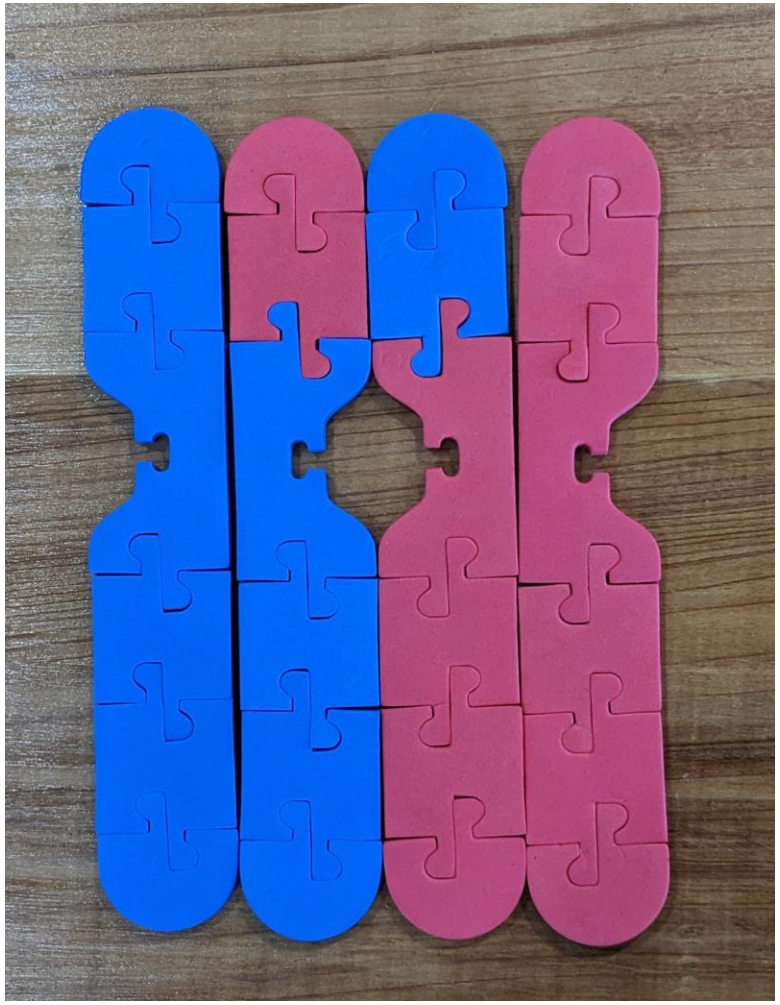
2^n or 8



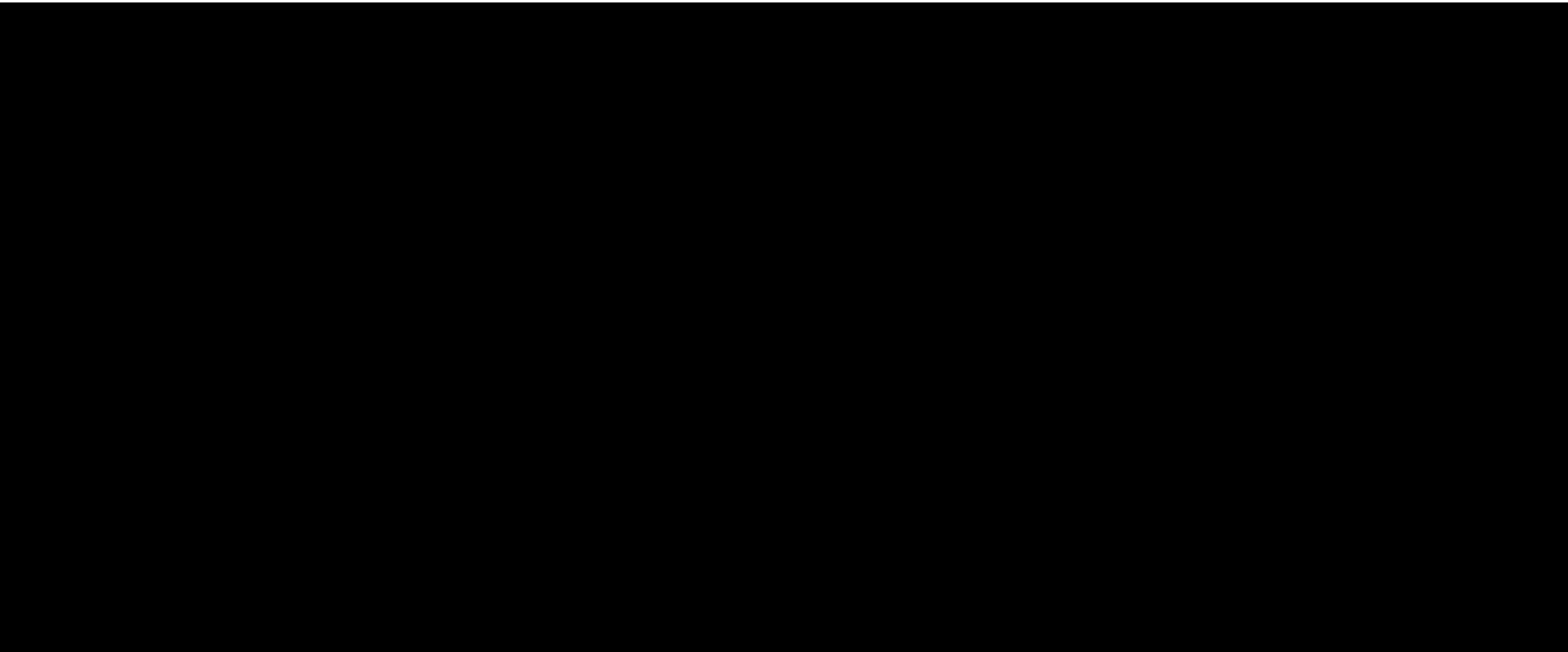
What happens during meiosis?

How do homologous chromosomes find each other?

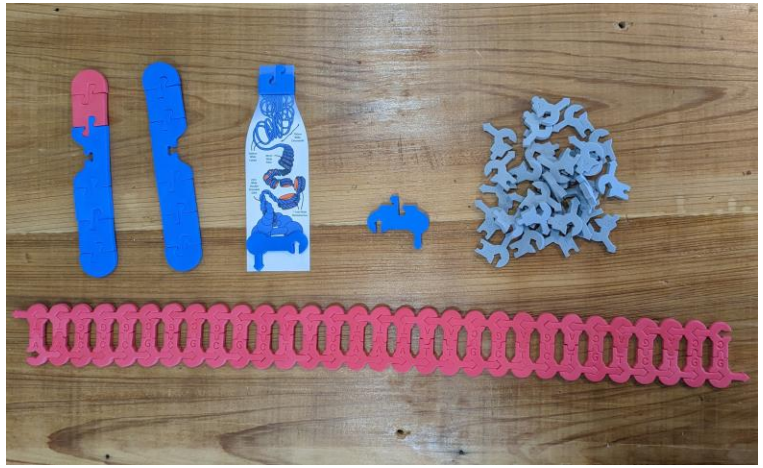
Crossing Over at the Microscopic Scale

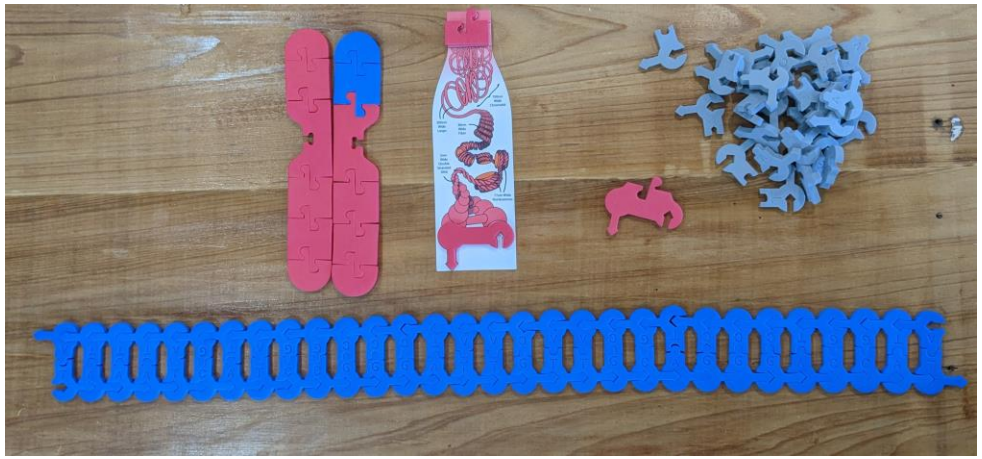


Crossing Over at the Microscopic Scale



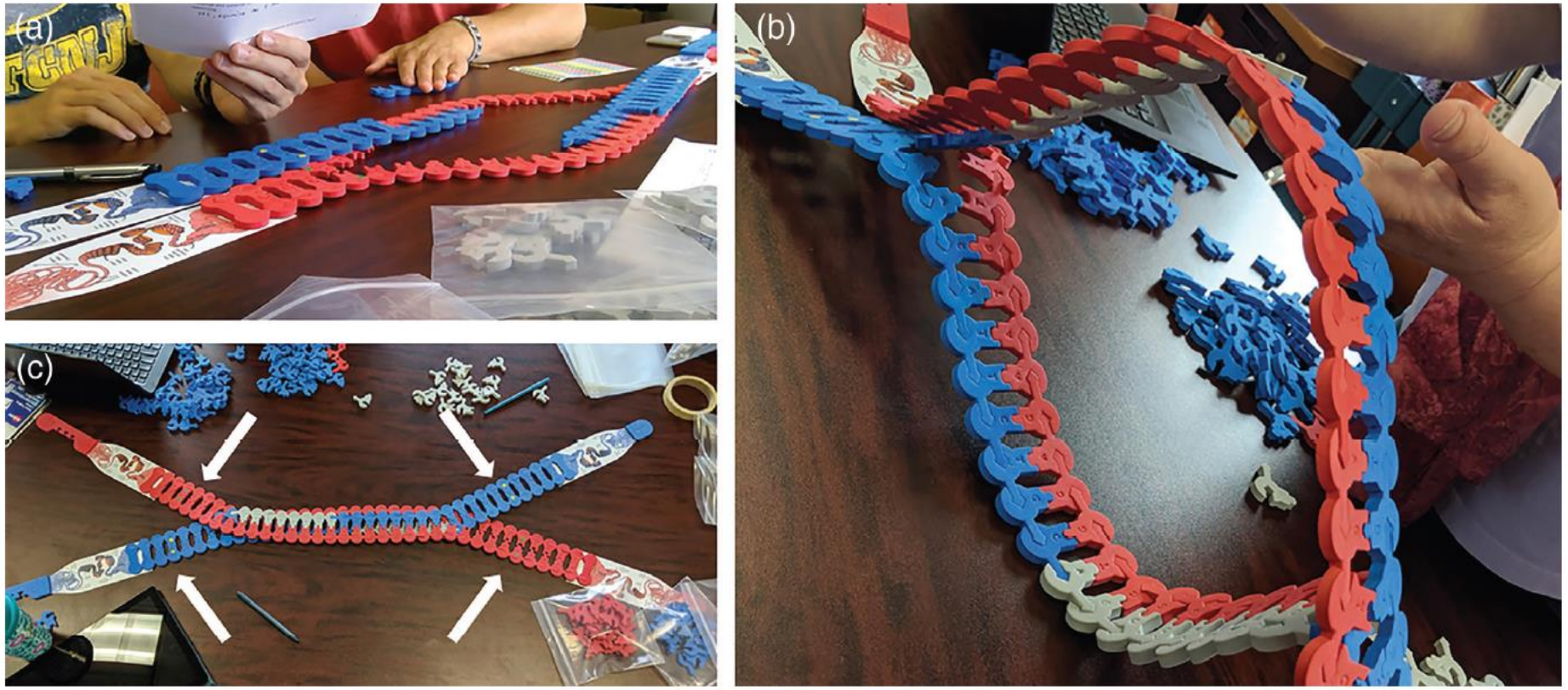
Crossing Over at the Molecular Scale





- Add a 4X scaling graphic to help students under the relationship between DNA and the chromosome.
- Helps students better understand scale and proportion.
- Can explore the Holliday junction

Crossing Over at the Molecular Scale



Wright, et al. 2022. Biochem Mol Biol Educ. 2022;50:44–54. https://doi.org/10.1002/bmb.21583

Crossing Over at the Molecular Scale

Workshop NGSS Connections

SEPs	CCCs	DCIs
Asking Questions and Defining Problems	Systems and System Models	HS-LS1-4
Developing and Using Models	Cause and Effect	HS-LS3-2
	Scale, Proportion, and Quantity	

We value your opinion! Let us know what you think.

Scan the QR Code and complete this short survey.

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