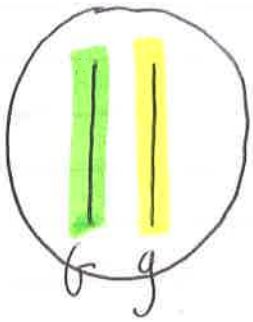
Meiosis (in shortened form) Revisited

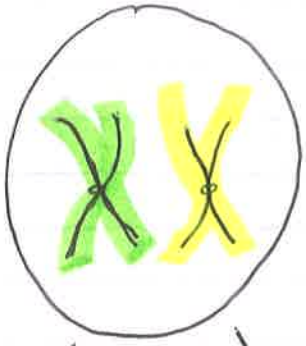
heterozygous
Gg

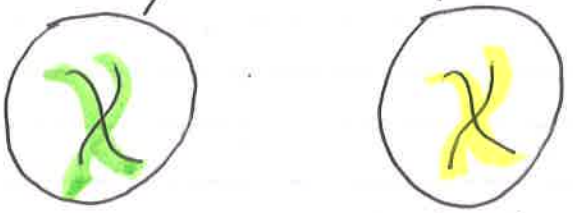


diploid parent cell

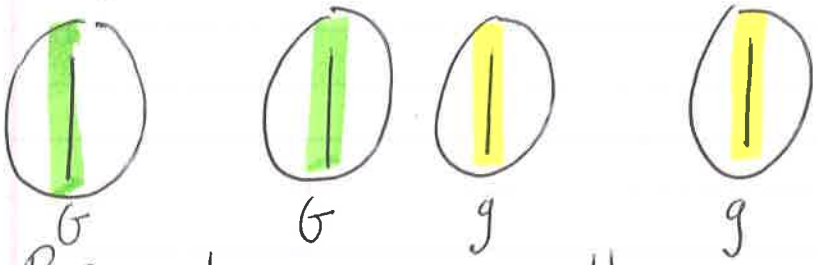
— green pea pod
— yellow pea pod

Prophase I





End of Meiosis I



End of Meiosis II

4 haploid cells

Represent egg or sperm cells =
gametes =
reproductive cells

homozygous = same alleles for a gene
heterozygous = different alleles for a gene

Punnett Square Cross for heterozygous

Green pea pod plants

(♂) Gg × Gg (♀)

	G	g
G	GG	Gg
g	Gg	gg

75% green pea pod
25% yellow pea pod

phenotype - observed physical trait

genotype - genetic composition or combo of alleles

independent assortment - genes for different traits can segregate independently during the formation of gametes

(12)

Punnett Squares Worksheet #2: Two-factor crosses

In pea plants, green pod color is dominant over yellow pod color. Tall plant height is dominant over short plant height.

Ex) A tall green pea plant (homozygous for both traits) is crossed with a short yellow pea plant.
TT or Tt = tall tt = short GG or Gg = green gg = yellow

P Generation genotypes: TTGG x ttgg

Possible gametes: TG x tg

	TG	TG	TG	TG
tg	TtGg	TtGg	TtGg	TtGg
tg	TtGg	TtGg	TtGg	TtGg
tg	TtGg	TtGg	TtGg	TtGg
tg	TtGg	TtGg	TtGg	TtGg

Phenotypic Ratio: 16 tall/green : 0 tall/yellow : 0 short/green : 0 short/ yellow
Genotypic Ratio: All TtGg

1) A tall green pea plant (homozygous for height, heterozygous for pod color) is crossed with a tall green pea plant (heterozygous for both traits).

P Generation genotypes: TTGg x TtGg

Possible gametes: TG Tg TG Tg x TG Tg tG tg

	TG	Tg	TG	Tg
TG	~~TTGG~~	~~TTGg~~	~~TTGG~~	~~TTGg~~
Tg	~~TTGg~~	~~TTgg~~	~~TTGg~~	~~TTgg~~
tG	~~TtGG~~	~~TtGg~~	~~TtGG~~	~~TtGg~~
tg	~~TtGg~~	~~Ttgg~~	~~TtGg~~	~~Ttgg~~

1 : 2 : 1 : 1 : 2

Genotypic Ratio: 2 TTGG : 4 TTGg : 2TTgg : 2TtGG : 4 TtGg : 2 Ttgg

3 : 1

Phenotypic Ratio: 12 tall/green : 4 tall/yellow : Ø short/green : Ø short/ yellow