Genetics monohybrid questions:

1. In peas, green pods (G) are dominant to yellow pods (g). If a homozygous dominant plant is crossed with a homozygous recessive plant, what will be the phenotype of the F_1? If two F_1's are crossed what will be the genotype and phenotype of the F_2?

Answer:

G allele – green – dominant
g allele – yellow – recessive

Parent (P) cross: GG x gg

Gametes: G and g

F1 generation in a punnett square:

	G	G
g	Gg	Gg
g	Gg	Gg

F1 generation phenotype: green
F1 generation genotype: Gg

F1 cross: Gg x Gg

Gametes: G or g, G or g

F2 generation in a punnett square:

	G	g
G	GG	Gg
g	Gg	gg

F2 generation genotype ratio: 1 GG : 2 Gg : 1 gg
F2 generation phenotype ratio: 3 green : 1 yellow

2. In certain trees, smooth bark (S) is dominant over wrinkled (s). Two trees that are heterozygous for smooth bark are crossed. If there are 100 offspring produced, how many will have wrinkled bark?

Answer:

The cross is the same as the F2 generation above. Two heterozygous individuals are crossed.

S – smooth bark – dominant
s – wrinkled bark – recessive.

	S	s
S	SS	Ss
s	Ss	ss

Each square represents a 25% probability. Therefore, the probability of getting the homozygous recessive alleles, ss, is 25%.

3. In human beings, brown eyes (B) are usually dominant over blue eyes (b). Suppose a blue-eyed man marries a brown-eyed woman whose father was blue-eyed. What proportion of their children would you predict would have blue eyes?

Answer:

A blue eyed man, expressing the recessive trait (b), must have both recessive alleles: bb

The father of the brown-eyed woman was also blue eyed, so had both recessive alleles, and passed one of them to the daughter, making the daughter heterozygous: Bb.

Cross: bb x Bb

	b	b
B	Bb	Bb
b	bb	bb

50% of the offspring will have blue eyes.