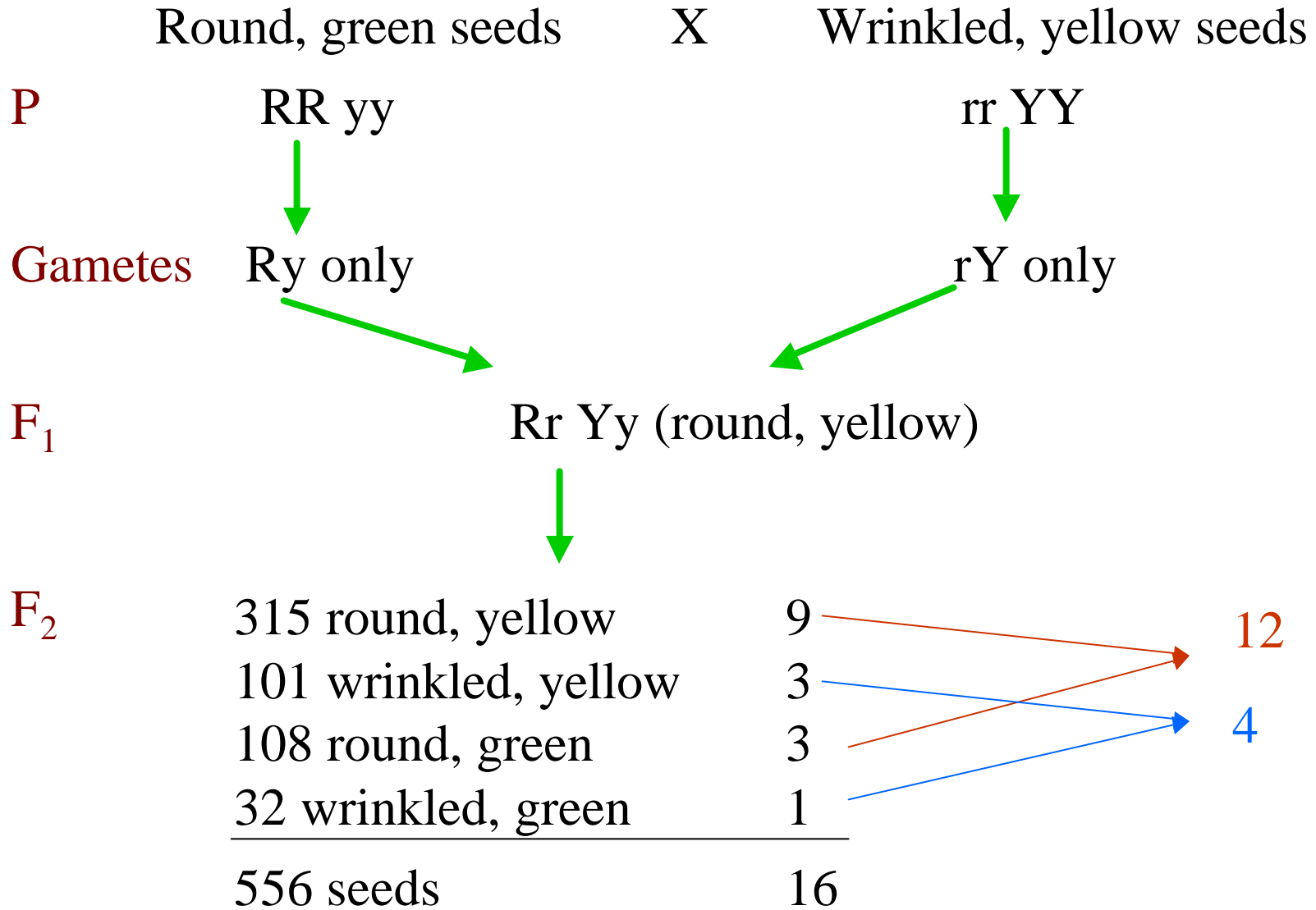


Plants differing in two characters



The rules of probability

1. *Definition of probability*

$$\text{Probability} = \frac{\text{The number of times an even happens}}{\text{The number of opportunities for it to happen}}$$

2. *The product rule*

The probability of two independent events occurring simultaneously is the product of each of their probabilities.

3. *The sum rule*

The probability of either one of two independent exclusive events occurring is the sum of their individual probabilities.

Plants differing in two characters

F_1

Rr Yy (round, yellow)



Gametes

p (of gamete being R and Y)=	$p(R, Y)$	= $1/2 \times 1/2 = 1/4$
p (of gamete being R and y)=	$p(R, y)$	= $1/2 \times 1/2 = 1/4$
p (of gamete being r and y)=	$p(r, y)$	= $1/2 \times 1/2 = 1/4$
p (of gamete being r and Y)=	$p(r, Y)$	= $1/2 \times 1/2 = 1/4$

Plants differing in two characters

F₁

Rr Yy (round, yellow)



F₂

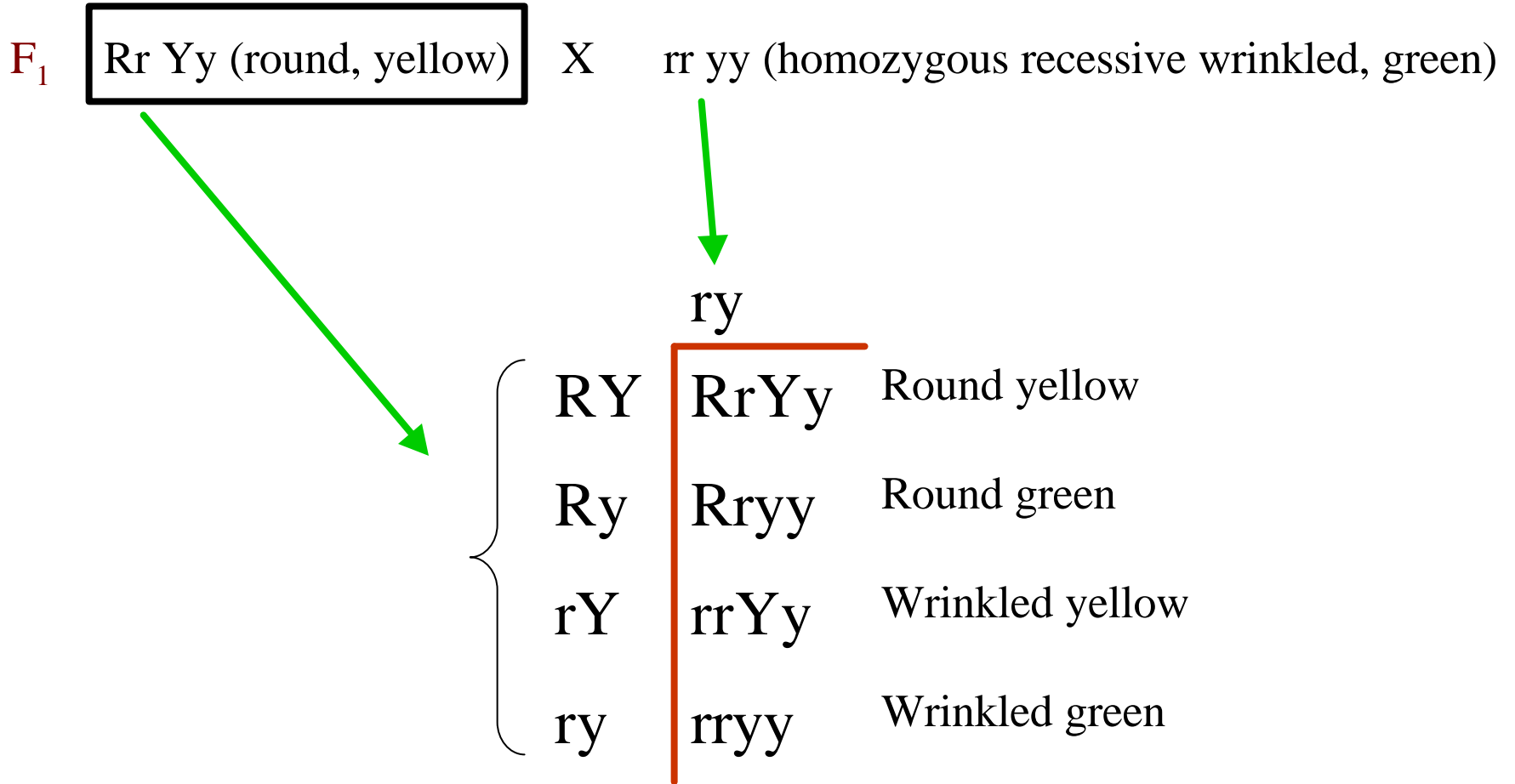
		♂			
		RY	Ry	rY	ry
♀		1/4	1/4	1/4	1/4
	RY	RRYY	RRYy	RrYY	RrYy
1/4	1/16	1/16	1/16	1/16	
Ry	RRYy	RRyy	RrYy	Rryy	
1/4	1/16	1/16	1/16	1/16	
rY	RrYY	RrYy	rrYY	rrYy	
1/4	1/16	1/16	1/16	1/16	
ry	RrYy	Rryy	rrYy	rryy	
1/4	1/16	1/16	1/16	1/16	

9 Round Yellow

3 Round Green

3 Wrinkled Yellow

1 Wrinkled Green



Testcross = A cross with homozygous recessive

AABBCCDD x aabbccdd

AaBbCcDd

⊗



$$p(\text{abcd}) = 1/2 \times 1/2 \times 1/2 \times 1/2 = 1/16$$

aabbccdd ?

$$p(\text{aabbccdd}) = 1/16 \times 1/16 = 1/256$$

AABBCcDD x aabbccdd

AaBbCcDd

⊗



$$p(\text{abcd}) = 1/2 \times 1/2 \times 1/2 \times 1/2 = 1/16$$

$$p(\text{aBCD}) = 1/2 \times 1/2 \times 1/2 \times 1/2 = 1/16$$

aaBbCcDd ?

$$p(\text{aaBbCcDd}) = 1/16 \times 1/16 = 1/256$$

Plants differing in two characters

F₁

Rr Yy (round, yellow)



9 Round Yellow
3 Round Green
3 Wrinkled Yellow
1 Wrinkled Green

$$p(\text{AB}) = 1/2 \times 1/2 = 1/4$$

All gametes with AB will produce A-B-

$$p(\text{AB from male and AB from female}) = 1/4 + 1/4 = 2/4 = 8/16$$

However, AABB counted twice so $8/16 - 1/16 = 7/16$

$$P(\text{Ab x aB}) = 1/4 \times 1/4 = 1/16$$

$$p(\text{aB x Ab}) = 1/4 \times 1/4 = 1/16$$

$$7/16 + 1/16 + 1/16 = 9/16$$

AABBCC x aabbcc

AaBbCc

⊗



Dominant phenotype ?

$$p(ABC) = 1/2 \times 1/2 \times 1/2 = 1/8$$

All gametes with ABC will produce A-B-C-

$$p(ABC + ABC) = 1/8 + 1/8 = 2/8 = 16/64$$

However, AABBCC counted twice so $16/64 - 1/64 = 15/64$

$$P(Abc \times aBC) + p(aBC \times Abc) + p(ABc \times abC) + p(abC \times ABc) + p(AbC \times aBc) + p(aBc \times AbC) = 1/64 + 1/64 + 1/64 + 1/64 + 1/64 + 1/64 = 6/64$$

$$15/64 + 6/64 = 21/64$$

Homework questions???

AABBCCDD x aabbccdd

AaBbCcDd



Recessive phenotype ?

Dominant phenotype ?