AP BIOLOGY
HEREDITY
ACTIVITY \#2

NAME $\qquad$
DATE $\qquad$ HOUR $\qquad$
P = purple a llele $p=$ white a llele

## Single Trait Cross



##  Generation



# Pp 

Heterozygous

$\mathrm{F}_{2}$ Generation:
$75 \%$ purple
25\% white
25\% PP
50\% Pp
25\% pp


LAW OF SEGREGATION:

## Allele pa irs segregate during gamete formation (meiosis)

| $\mathrm{T}=$ tall | $\mathrm{P}=$ purple |
| :--- | :--- |
| $\mathrm{t}=$ short | $\mathrm{p}=\mathrm{white}$ |

Two Trait Cross
Tall \&
Purple
TTPP

$P_{1}$ Generation
Short
\&
white
ttpp
公


## $F_{1}$ Generation



|  | TP | Tp | tP | tp |
| :---: | :---: | :---: | :---: | :---: |
| TP | TPPP | TPp | TtPP | TtPp |
| Tp | TPp | Tpp | TtPp | Ttpp |
| tP | TtPP | TtPp | ttPP | ttPp |
| tp | TtPp | Ttpp | ttPp | ttpp |

LAW OF I NDEPENDENT ASSORTMENT
Each allele pair segregates independently of other allele pairs during gamete formation

## Laws of Probability

## RULE OF MULTI PLI CATI ON:

Probability that two independent events will occur in combination (spontaneously) is equal to the PRODUCT of the probabilities they will occurndividually.

Example \#1: You have 2 coins, what is the probability that you will flip two heads?

Coin 1=1 in 2 chance heads $=1 / 2$
Coin $2=1$ in 2 chance heads $=1 / 2$
$1 / 2 \times 1 / 2=1 / 4$
Answer $=1$ in 4 chance

Example \#2: What is the probability that offspring of an $F_{1}$ generation cross will be homozygous recessive? ( $\mathrm{Pp} \times \mathrm{Pp} \rightarrow \mathrm{pp}$ )
$M$ om $=1$ in 2 chance for $p=1 / 2$
Dad $=1$ in 2 chance for $p=1 / 2$
$1 / 2 \times 1 / 2=1 / 4$
Answer $=1$ in 4 chance

## RULE OF ADDITION:

The probability of an event that can occur in two or more independent ways is equal to the SUM of the separate probabilities of those different ways.

Example \#1: You have 2 coins. What is the probability that you will flip a heads and a tails?

Possibility \#1
Coin 1=1/2 Heads
Coin $2=1 / 2$ Tails
$1 / 2 \times 1 / 2=1 / 4$

Possibility \#2
Coin 1=1/2 Tails
Coin $2=1 / 2$ Heads
$1 / 2 \times 1 / 2=1 / 4$

Answer:
$1 / 4+1 / 4=1 / 2$

Example \#2: What is the probability that two heterozygous parents will produce heterozygous offspring? ( $\mathrm{Pp} \times \mathrm{Pp} \rightarrow \mathrm{Pp}$ )

Possibility \#1
M om =1/ 2 P
$\mathrm{Dad}=1 / 2 \mathrm{p}$
Possibility \#1
M om =1/2 2 p
Dad=1/2 P
$1 / 4+1 / 4=1 / 2$
$1 / 2 \times 1 / 2=1 / 4 \quad 1 / 2 \times 1 / 2=1 / 4$
Example \#3: What is the probability that two parents heterozygous for both height and flower color will produce tall offspring with purple flowers?
Probability of Tt
Mom $=1 / 2 \mathrm{~T}$
Mom =1/2 T
Dad =1/2 t
$\mathrm{Dad}=1 / 2 \mathrm{t} \quad 1 / 4+1 / 4=1 / 2$
$\begin{array}{ll}1 / 2 \times 1 / 2=1 / 4 & 1 / 2 \times 1 / 2=1 / 4\end{array}$

Probability of $\mathrm{Pp}=1 / 2$
Answer =1/2 (Tt) x 1/2 (Pp) =1/4 chance

