



## Genetics

Teacher's  
Notes

OnBoard  
Resources

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## Mendel's Laws of Inheritance

**Gregor Mendel- Father of genetics**

**-Austrian Monk**

**-Worked with pea plants**

**P Generation - Parents**

**F<sub>1</sub> Generation - First generation of offspring**

**F<sub>2</sub> Generation - Second generation of offspring**  
(Think Grandkids of P generation)

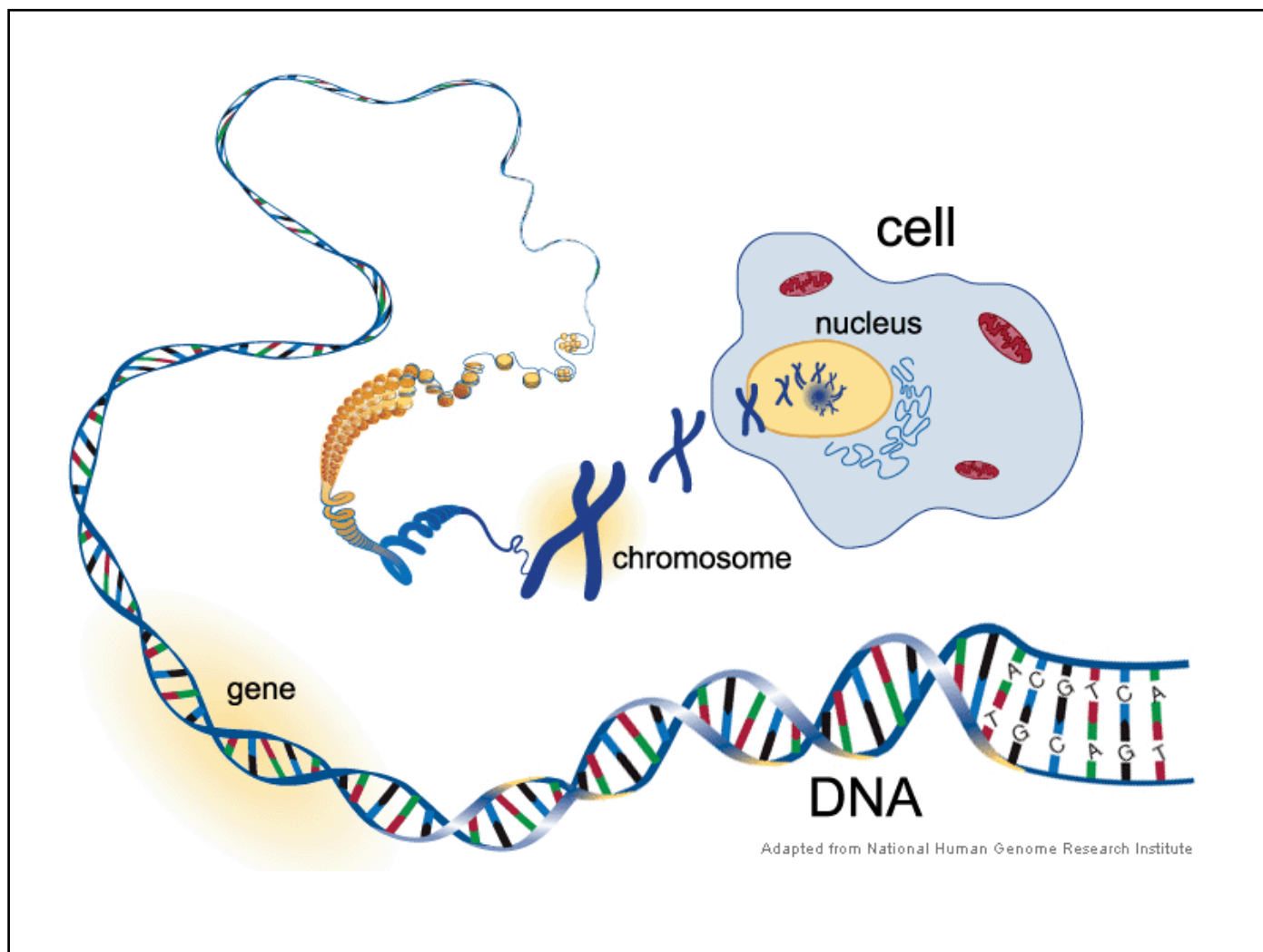
# Need to Know

Gene

DNA

Chromosome

What is the difference between these terms?



A. A long thread like structure that is made of genetic material and contains the instructions for many different parts of the organism

B. Molecule that stores genetic information in all organisms

C. A specific region of DNA that codes for a protein

1. DNA

2. Gene

3. Chromosome

**Gene- Region of DNA**  
**Factor that controls a trait**

**Different forms of a gene are:**

**Dominant Allele (Use capital letters)**

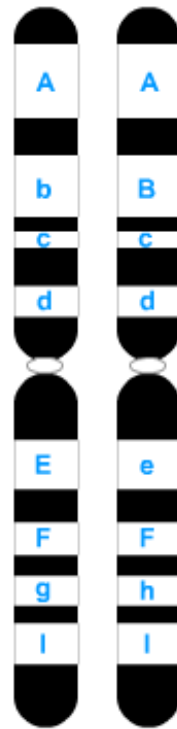
**Recessive Allele (Use lowercase letters)**



Compare to:

Baby ↗ Boy  
↘ Girl

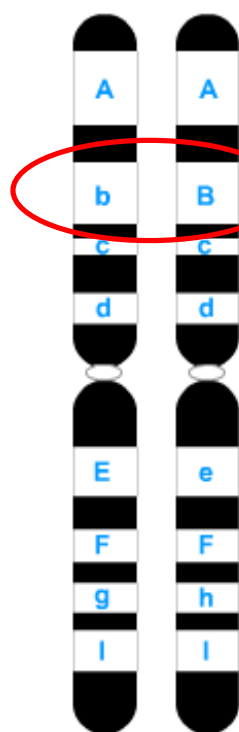
Gene ↗ dominant  
↘ recessive



alleles of the same gene occupy the same locus

From Mom

From Dad



Together they form what we call a gene.

Each gene represents one trait

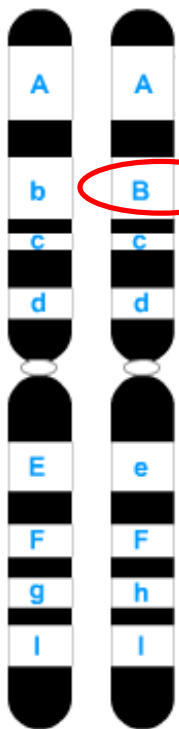
Example: Height

color

intelligence

From Mom

From Dad



Each letter is the allele

You can have different allele for the same gene

Example: tall height

short height

yellow flowers

white flowers

From Mom

From Dad

**Dominant trait = Capital Letter**

**Recessive trait = lower case letter**

In pea plants Green Peas are dominant to yellow peas

G= Green peas

g= yellow peas

## Simple “Mendelian” – Autosomal Dominant & Recessive

- Ability to taste phenylthiocarbamide (dominant)
- Ability to smell (bitter almond-like) hydrogen cyanide
- Albinism (recessive)
- Brachydactyly (shortness of fingers and toes)
- Immunity to poison ivy (dominant)
- Hitchiker's thumb (recessive)
- Wet (dominant) or dry (recessive) earwax

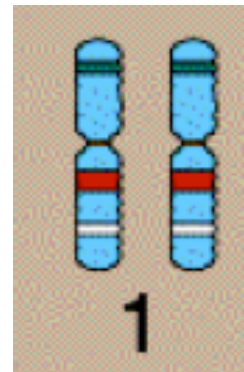
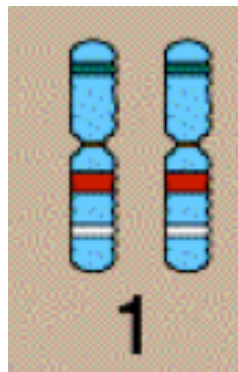
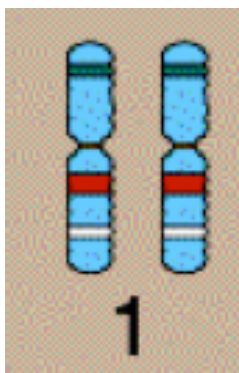


In pea plants Green Peas are dominant to yellow peas

G= Green peas

g= yellow peas

List all the possible combinations if  
you always get 2 alleles



## Genotype

The letters (alleles) that make up the gene pair

Example:

AA Gg tt

## Phenotype

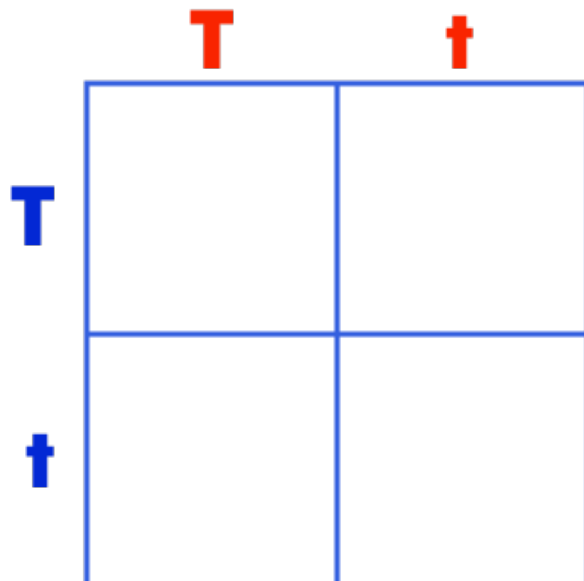
What a trait physically looks like because of the genotype

Example:

Tall plant      White flowers

Blue eyes





A Punnett square can be used to predict the possible outcomes of a genetic cross



The probability of producing a tall plant is \_\_\_\_\_.



## Genetics vocabulary

	<b>T</b>	<b>t</b>
<b>T</b>	 <b>TT</b>	 <b>Tt</b>
<b>t</b>	 <b>tT</b>	 <b>tt</b>

allele

homozygous

heterozygous

dominant

recessive

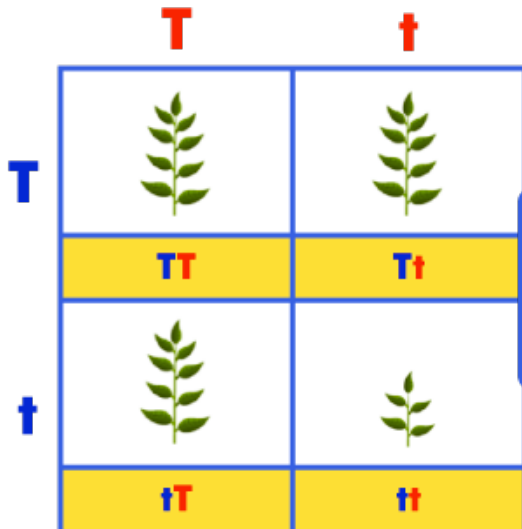
genotype

phenotype

# Genetics vocabulary

ANSWER

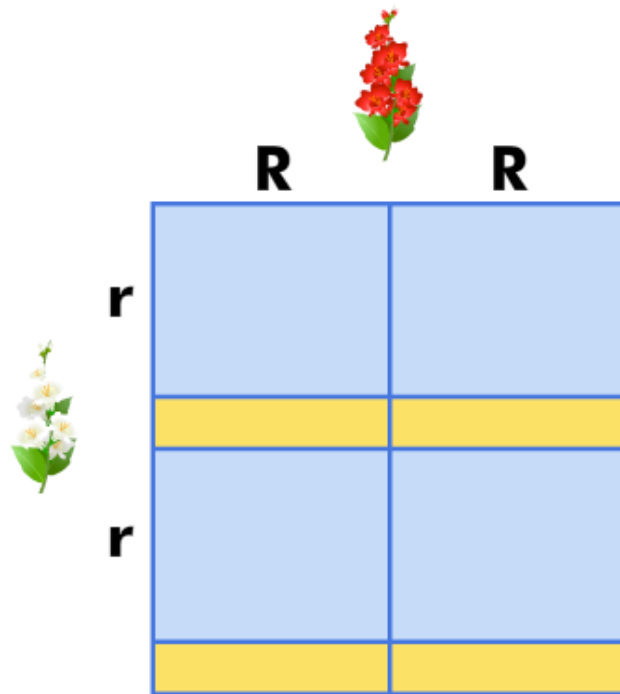
	
	
	
	
	
	



INSTRUCTIONS

Practice

## Incomplete dominance



INSTRUCTIONS

SUMMARY

## Multiple alleles and codominance



SUMMARY

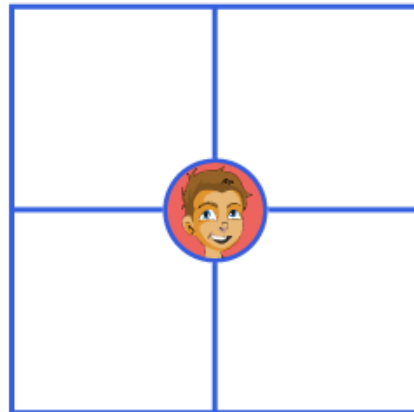


Determine the genotype and phenotype of this offspring

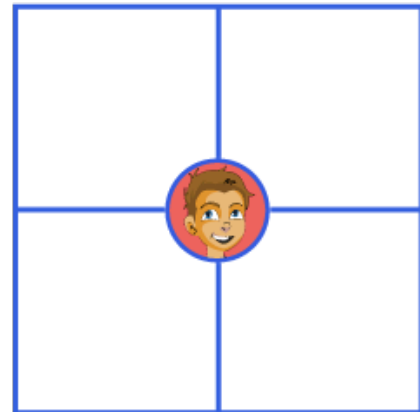
ANSWER

HINT

INSTRUCTIONS



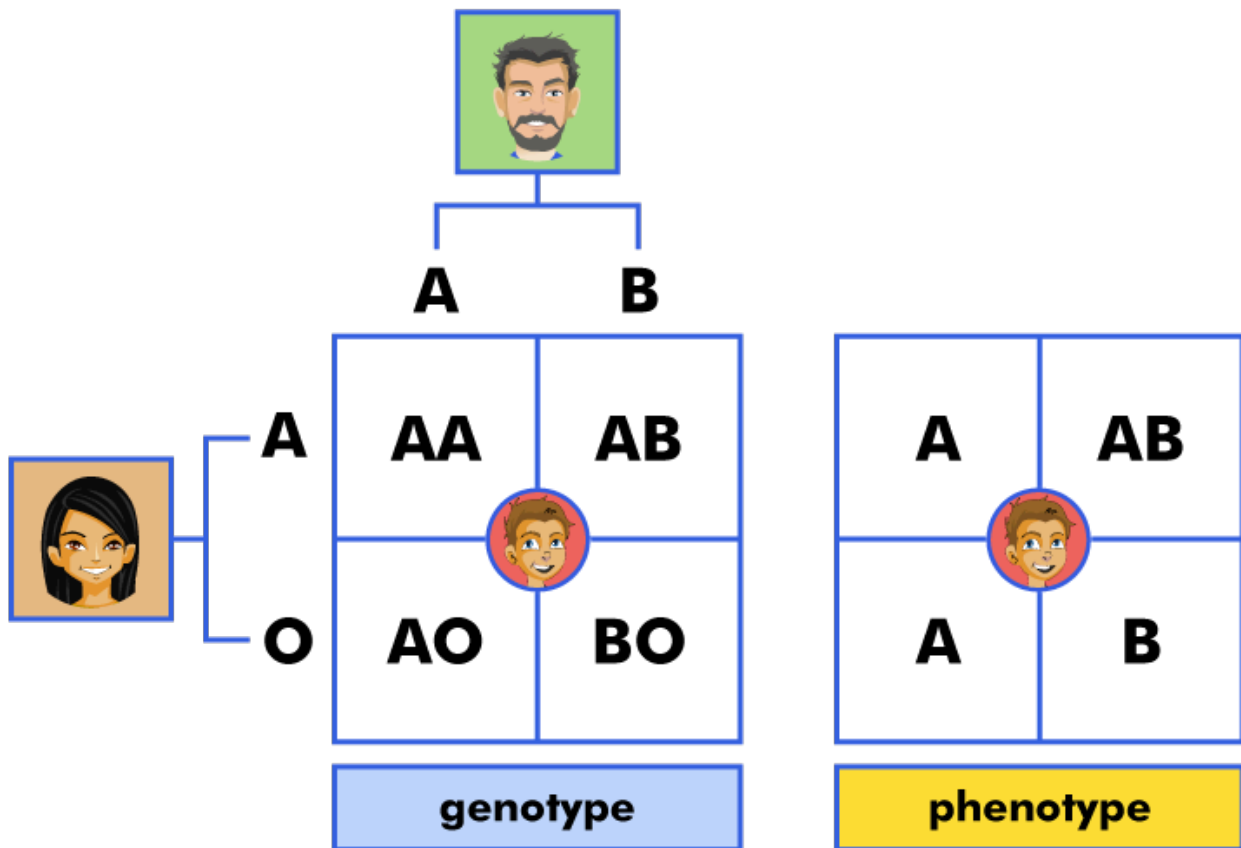
genotype



phenotype

# Solution

BACK



Determine the possible genotypes for the ogre offspring

ANSWER

nostrils		skin color		eye color		hair color	

INSTRUCTIONS



Mom:  
LL, GG, bb, PP



Dad:  
ll, gg, BB, RR

	dominant	recessive
nostrils	large (L)	small (l)
skin color	green (G)	brown (g)
	incomplete dominance	
eye color	blue (B)	yellow (b)
	codominant	
hair color	Red (R)	pink (P)



## Solution

BACK

<b>LI</b>	<b>LI</b>	<b>Gg</b>	<b>Gg</b>	<b>Bb</b>	<b>Bb</b>	<b>RP</b>	<b>RP</b>
<b>LI</b>	<b>LI</b>	<b>Gg</b>	<b>Gg</b>	<b>Bb</b>	<b>Bb</b>	<b>RP</b>	<b>RP</b>
<b>nostrils</b>		<b>skin color</b>		<b>eye color</b>		<b>hair color</b>	



**Mom:**  
LL, GG, bb, PP



**Dad:**  
ll, gg, BB, RR

	<b>dominant</b>	<b>recessive</b>
<b>nostrils</b>	large (L)	small (l)
<b>skin color</b>	green (G)	brown (g)
	<b>incomplete dominance</b>	
<b>eye color</b>	blue (B)	yellow (b)
	<b>codominant</b>	
<b>hair color</b>	Red (R)	pink (P)

## Drag parts to create the phenotype of the ogre offspring



ANSWER

<b>Ll</b>	<b>Ll</b>	<b>Gg</b>	<b>Gg</b>
<b>Ll</b>	<b>Ll</b>	<b>Gg</b>	<b>Gg</b>
nostrils		skin color	
<b>Bb</b>	<b>Bb</b>	<b>RP</b>	<b>RP</b>
<b>Bb</b>	<b>Bb</b>	<b>RP</b>	<b>RP</b>
eye color		hair color	

	<b>dominant</b>	<b>recessive</b>
<b>nostrils</b>	<b>large (L)</b>	<b>small (l)</b>
<b>skin color</b>	<b>green (G)</b>	<b>brown (g)</b>
	<b>incomplete dominance</b>	
<b>eye color</b>	<b>blue (B)</b>	<b>yellow (b)</b>
	<b>codominant</b>	
<b>hair color</b>	<b>Red (R)</b>	<b>pink (P)</b>

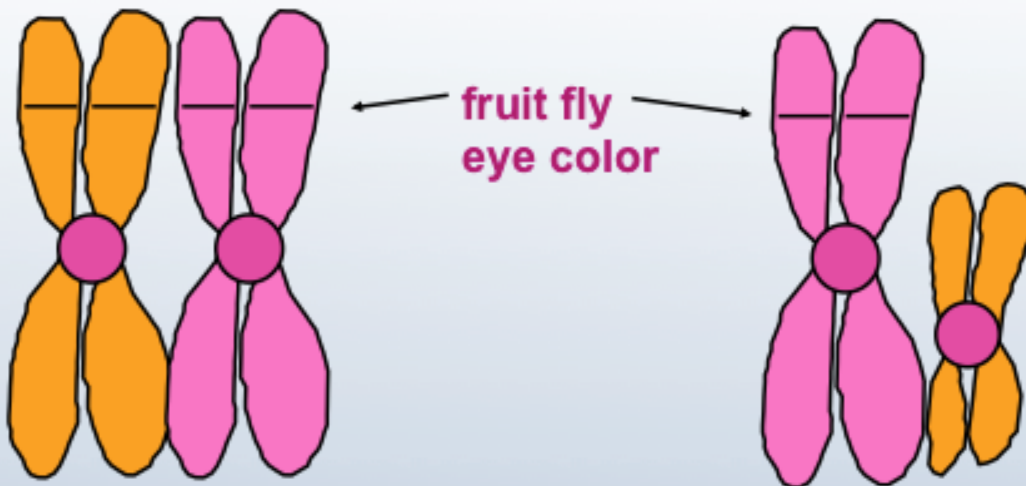
## Sex-linked Traits

- Traits (genes) located on the sex chromosomes
- Sex chromosomes are X and Y
- XX genotype for females
- XY genotype for males
- Many sex-linked traits carried on X chromosome

## Sex-linked Traits

**Example:** Eye color in fruit flies

Sex Chromosomes

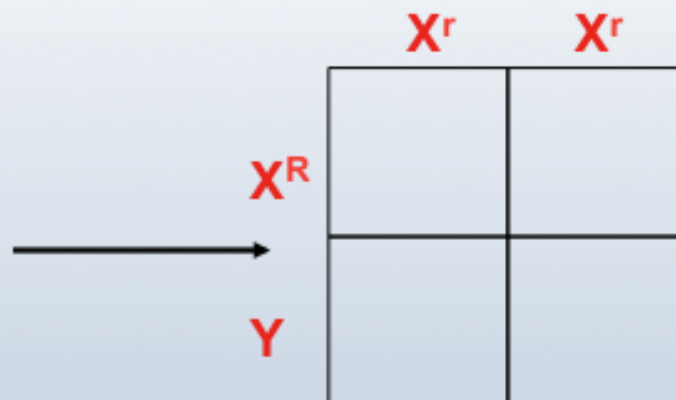


**XX chromosome - female**

**Xy chromosome - male**

# Sex-linked Trait Problem

- Example: Eye color in fruit flies
- (red-eyed male) x (white-eyed female)  
 $X^R Y$  x  $X^r X^r$
- Remember: the Y chromosome in males does not carry traits.
- RR = red eyed
- Rr = red eyed
- rr = white eyed
- XY = male
- XX = female

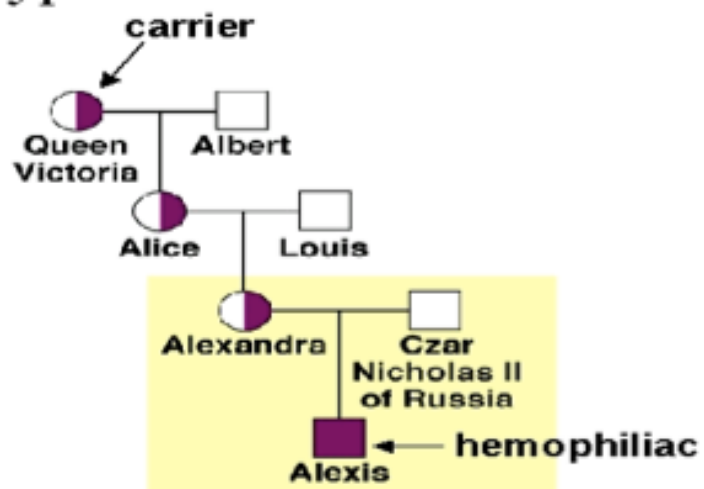


## Female Carriers

In a sex-linked trait (like hemophilia), women are carriers, and men have the phenotype more often.



CAROLUS YVES LORRAIN, 1842



# Content Quiz

# SMART Response Quiz



1. Click on the SMART Response tab
2. Click [Start this assessment now](#)
3. Questions begin on next page



SMART Response tab →



1 \_\_\_\_\_ is known as the father of genetics.

- A Stephen Coles
- B Gregor Mendel
- C Thomas Edison
- D James Watson



2 \_\_\_\_\_ are the factors that control a trait.

- A Cells
- B Characteristic factors
- C Genes
- D Similarities



**3 Scientists use upper case letters to represent \_\_\_\_\_ alleles.**

**A dominant**

**B recessive**



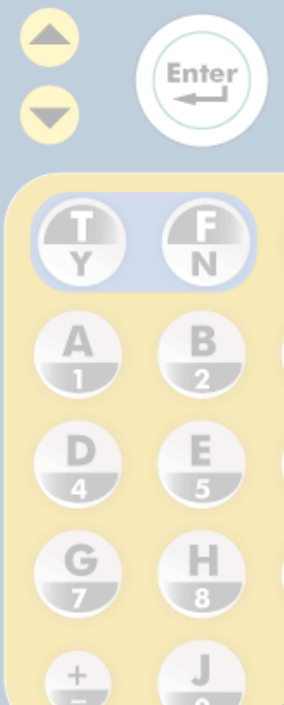
4 Organisms typically have \_\_\_\_\_ genes which code for a specific trait.

A 1

B 2

C 3

D 4



5 When an individual has two alleles which are different, we say that the individual is \_\_\_\_\_.

A homozygous

B heterozygous



6 \_\_\_\_\_ is the term that describes the allelic composition of an individual.

A Genotype

B Phenotype



**7 Incomplete dominance occurs when both alleles of a gene pair are completely expressed.**

**True**

**False**



8 When groups of gene pairs act together to produce a specific trait, we call this \_\_\_\_\_ inheritance.

- A dominant
- B recessive
- C co-dominant
- D polygenic





**9 A Punnett square is used to determine the possible outcomes of a genetic cross.**

**True**

**False**



10 Which of the following genotypes will produce a short pea plant?

A TT

B tt

C Tt

D tT



<http://sciencereviewgames.com/srg/games/hs.php?id=136>

<http://vital.cs.ohiou.edu/steamwebsite/downloads/FurryFamily.sw>

<http://tcet.unt.edu/tegs/chapter2/fires.html>