Bio 21: Ch. 12 Pedigree Project 50 points

The study of genetics can be made more meaningful when the genetics of your own family is involved. This assignment entails your gathering data for **one inherited trait** for all of the members of your **immediate family** (which, for this project, will be defined as: you and your siblings, both of your parents and their siblings and your maternal and paternal grandparents). You should use the attached list of "single gene traits" to choose one trait.

You will create a pedigree for your family for 1 trait. Once you have plotted each individual's phenotype, you must then list each individual's genotype. A plotted family tree with phenotype and genotype will constitute 1 summative project grade. You must include a MINIMUM of 12 individuals in your pedigree. If this is not possible, then create an additional pedigree using the same family members for a second trait.

At least two members of your family (not an aunt or uncle that has married into the family and has produced no children), must have a phenotype that is different from the rest. If this is not the case, you should select another trait for your pedigree.

Include:
- List the name of each person on the pedigree
- List the genotype or possible genotypes of each person
- Only shade the pedigree for the recessive allele. This means any known carriers should be half shaded.
- A title that describes something about the pedigree
- A key that includes what the shading, shapes and letters for the genotypes represent.
- Typed words and letters

Grading:
- Each individual's correctly labeled with genotype (HH or Hh or hh) and correct shading for the phenotype- 3 points
- Overall style of pedigree including - 8 points
    a title for the pedigree
    a key
- Neatness of overall pedigree- full credit will only be given if the pedigree is created using straight lines and neat circles and squares or using a computer program and all words and letters are typed- 6 points

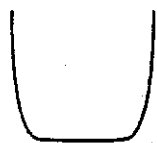**Final Due Date: Monday, March 16th**

FACT SHEET

1. Face shape
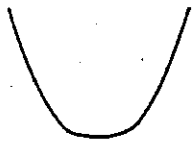
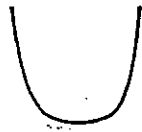   Round (RR, Rr)   Square (rr)

2. Chin shape: traits 2, 3 and 4.

   Very prominent (VV, Vv)   Less prominent (vv)

3. Chin shape: Flip coins for this trait only if trait 2 is genotype VV or Vv. The vv genotype prevents the expression of this and the following trait.

   Round (RR, Rr)   Square (rr)

4. Chin shape: Flip coins for this trait only if trait 2 was "very prominent."

   Cleft (AA, Aa)   No cleft (aa)

5. Skin color: We will assume that three gene pairs determine skin color. Flip your coins once to determine the genotype of the first pair of genes (AA, Aa, or aa). Flip your coins a second time to determine the genotype of the second pair of genes (BB, Bb, or bb). Flip the coins the third time to determine the third gene pair (CC, Cc, cc). Each capital letter represents an active allele for dark pigmentation, so all six capital letters is the darkest skin, and all six small letters is the lightest skin.

   6 capital letters—very dark brown, nearly black skin
   5 capital letters—dark brown skin
   4 capital letters—brown skin
   3 capital letters—light brown skin
   2 capital letters—tan skin
   1 capital letter—light tan/pink skin
   0 capital letters—cream, nearly white skin

6. Hair type.

   Curly (CC)   Wavy (Cc)   Straight (cc)
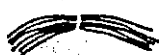
7. Widow's peak: down-pointing hairline over center of forehead.

   Peak (WW, Ww)   No peak (ww)
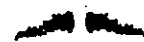
8. Eyebrow color: Combine traits 8, 9, and 10 before drawing.
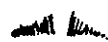
   Very dark (HH)   Medium (Hh)   Light (hh)

9. Eyebrow thickness.

   Bushy (BB, Bb)   Fine (bb)

10. Eyebrow placement

   Separated (NN, Nn)   Connected (nn)

11. Eye color: Eye color determination is similar to skin color determination. Having more active alleles leads to darker eye color. Capital letters are active, and small letters are less active. Assume that one gene pair places pigment in front of the iris, and the second gene pair places pigment in the back of the iris. First throw coins to determine AA, Aa, or aa; then throw coins to determine BB, Bb, or bb. Remember that in reality, the genetic determination of eye color is more complicated than this.

   AABB—dark brown   AAbb—dark blue
   AABb—brown   aaBB—dark blue
   AaBB—brown   Aabb—light blue
   AaBb—brown   aabb—pale blue

12. Eye separation.
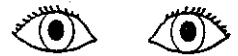
   Close set (EE)   Middle set (Ee)   Far apart (ee)

13. Eye size.

   Large (EE)   Medium (Ee)   Small (ee)

14. Eye shape.

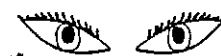   Almond (AA, Aa)   Round (aa)

15. Eye angle.

   Horizontal (HH, Hh)   Upward angle (hh)

16. Eyelashes.

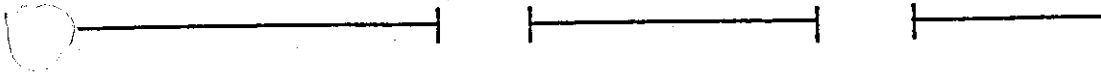   Long (LL, Ll)   Short (ll)

17. Mouth size: Mouth and lip characteristics are determined in traits 17, 18, 19, and 20.

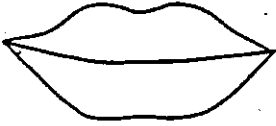Long (MM)   Medium (Mm)   Short (mm)

18. Lip thickness.

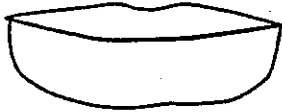Thicker (LL, Ll)   Thinner (ll)

19. Lip protrusion (pout).

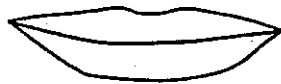Very protruding (HH)   Protruding (Hh)   Not protruding (hh)

20. Cheek dimples.

Dimples (DD, Dd)   No dimples (dd)

21. Nose size.

Large (NN)   Medium (Nn)   Small (nn)

22. Nose shape.

Rounded (RR, Rr)   Pointed (rr)

23. Nostril flare shape.

Rounded (RR, Rr)   Pointed (rr)

24. Earlobe attachment.

Free (FF, Ff)   Attached (ff)

25. Darwin's earpoint.

Present (DD, Dd)   Absent (dd)

26. Ear pits.

Pits (PP, Pp)   No pits (pp)

27. Ear hair: This trait is sex-limited. It is expressed only in males.

Less Hairy (HH, Hh)   Very Hairy (hh)

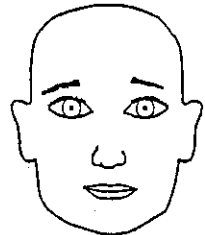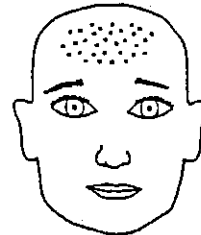28. Cheek freckles.

Freckles (FF, Ff)   No freckles (ff)

29. Forehead freckles.

Freckles (FF, Ff)   No freckles (ff)

Single-Gene Traits for Family Tree Investigation

Trait	Dominant	Recessive
ABO Blood Type	Type B	Type O
ABO Blood Type	Type A	Type O
Big Toe	Shorter than second toe	Longer than second toe
Chin Cleft	Present	Absent
Color Vision	Normal (on X chromosome)	Colorblind (on X chromosom
Dimples	Present	Absent
Ear Lobe	Free, hanging	Attached
Eye Color	Melanin present (brown, hazel)	Melanine absent (blue, gray)
Eyebrows	Not connected to each other	Connected at bridge of nose
Eyebrows	Bushy	Fine
Folded Hands	Left thumb on top	Right thumb on top
Freckles	Present	Absent
Hair Color	Absence of any red pigment	Presence of any red pigment
Hair Color	Dark	Light
Hair Texture	Wirey, curly	Straight
Hairline	Widow's peak present	Straight
Index finger	Shorter than ring finger	Longer than ring finger
Iris Ring	Dark circle around color present	No circle around color
Pinky fingertip	Bent inward	Straight
Rh Blood type	Rh+	Rh-
Thumb	Straight	Hitchhiker's
Tongue-Roll	Ability to roll	Cannot roll