THE SCIENCE OF COFFEE

Lesson 1

All about the coffee plant – Where does it grow, what kinds are there?

Answer the following questions, you may use the Uncommon Grounds book by Mark Pendergrast or Internet searching, including videos, but include your source page in book, or URL with your answers.

What is the scientific name for Coffee?

1. **Scientific name for the coffee plant (genus and species) _____**
   Source _____
2. **What are the two main varieties of coffee grown commercially _____**
   Source _____
3. **What biological conditions and resources does the coffee plant need to grow (minimum of 5 I.e. sunlight amount, water_____**
   Source _____
4. **What are the primary coffee growing regions (name at least 5)**
   _____
   Source _____
5. **What is shade grown coffee? _____**
   source_____
6. **Why is some coffee grown in full sun, not in the shade? _____**
   Source _____
7. **What animals live in and around shade grown coffee? _____**
   Source _____
8. **What insects or other animals eats or damages coffee plants when and where they are grown**
   _____
   Source _____
9. **How is the coffee cherry processed to get the green beans ready to roast (name two of the processes) _____**
   Source _____
10. **Why do coffee plants produce caffeine? _____**
    Source _____

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Lesson 2

The Chemistry of Coffee – Acids and coffee flavor.

Acidity is a desirable characteristic of coffee. It is the sensation of dryness that the coffee produces on the tongue and back of the palate. It provides a sharp, bright, vibrant quality that many people associate with a good cup of coffee, and others do not like. Without sufficient acidity, the coffee will tend to taste flat, and lack complexity of flavors. Acidity should not be confused with sourness, which is an unpleasant, negative characteristic that few people appreciate.

Watch the video "Acids Bases and PH" by Paul Anderson on the Bozeman Science You Tube channel and answer the following questions. https://www.youtube.com/watch?v=Xeuyc55LqiY

1. Draw a Hydroxide ion molecule
2. Draw a Hydronium ion molecule
3. What is the PH of Water?
4. Describe what an acid is?
5. What are bases?
6. What is a strong base?
7. What is strong Acid?

Look at the chart at www.coffeeresearch.org/science/sourmain.htm

8. How many acids are found in coffee (count them on table 1)?
9. What conclusion can you reach on the effect of grind size (table 2) and the amount of acids in coffee?
10. What trend do you see in the temperature of water extraction and acids (table 3)?
11. What trend do you see in the acid amounts at different temperatures (table 4) and why might the longer extraction time reduce the acid concentration?

Test the PH of coffee.

You will be making coffee to test or using the coffee provided by your instructor. If making your own you will prepare your two extracts of coffee by take regular ground coffee and brew it through an electric coffee maker follow manufacturers recommended amount of coffee and water to make one cup coffee extract. The second coffee will be a fine ground coffee brewed by mixing 10g coffee and 225 ml water (at 95 C) to make 100 ml coffee extract, and letting it extract for 5 minutes and then straining it through a coffee filter. Alternately if available you can make your second sample using a French press coffee carafe.

Test the PH of the coffee samples A and B

Coffee A PH? _____ Coffee B PH? _____
Why might grind size effect the PH of Coffee? _____

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Lesson 2 Continued

The Chemistry of Coffee – Roasting the beans and organic molecules

By Carl Staub (sourced from SCAA Roast Color Classification System developed by Agtron 1995.)

Online: https://legacy.sweetmarias.com/library/basic-chemical-reactions-occurring-in-the-roasting-process

"Many thermal and chemical reactions occur during the roasting process: decarboxylation, dehydration of quinic acid moiety, fractionation, isomerization, polymerization, and complex sugar reactions. The principal thermally reactive components are monosaccharides and sucrose, chlorogenic acids, free amino acids, and trigonelline. Both aravinose and calactose of polysaccharides are split off and the basic sulfur containing and hydroxyamino acids decompose. Carbohydrates both polymerize and degrade, liberating thermally unstable monosaccharides decomposing 20-30% of the polysaccharides, depending on the degree of roast.

Sucrose: Disaccharide of D-Glucosyl and D-Fructosyl Moieties

Sucrose is the principle sugar in coffee. The melting point of pure crystalline sucrose is in the 320-392 degrees F with 370 degrees F most commonly accepted. Degradation of dry sucrose can occur as low as 194 degrees F. and begins with the cleavage of the glycosidic bond followed by condensation and the formation of water. Between 338 and 392 degrees F, carmelization begins. It is at this point that water and carbon dioxide fracture and out-gassing begins causing the first mechanical crack. These are the chemical reactions, occurring at approximately 356 degrees F, that are exothermic. Once caramelization begins, it is very important that the coffee mass does not exothermic (lose heat) or the coffee will taste "baked" in the cup. A possible explanation is that exothermy of the charge mass interrupts long chain polymerization and allows cross linking to other constituents. Both the actual melting point of sucrose and the subsequent transformation, or caramelization, reaction are effected by the presence of water, ammonia, and proteinatious substances. Dark roasts represent a higher degree of sugar

caramelization than light roasts. The degree of caramelization is an excellent and high resolution method for classifying roasts.

Cellulose: A Long Linear Polymer of Anhydroglucose Units

Cellulose is the principle fiber of the cell wall of coffee. It is partially ordered (crystalline) and partially disordered (amorphous). The amorphous regions are highly accessible and react readily, but the crystalline regions with close packing and hydrogen bonding may be completely inaccessible. Native cellulose, or cellulose 1, is converted to polymorphs cellulose III and cellulose IV when exposed to heat. Coffees structure is a well developed matrix enhancing the mass uniformity and aiding in the even propagation of heat during roasting. Cellulose exists in coffee imbedded in lignocellulose (an amorphous matrix of hemicellulose and lignin containing cellulose), making up the matrix cell walls. Hemicellusloses are polysaccharides of branched sugars and uronic acids. Lignin is of special note because it is a highly polymerized aromatic. Severe damage occurs to the cell walls of the matrix at distributed temperatures above 446 degrees F and bean surface temperatures over 536 degrees F The actual temperature values will change due to varying levels of other constituents. Second crack, associated with darker roasts, is the fracturing of this matrix, possibly associated with the volatilization of lignin and other aromatics. Under controlled roasting conditions, the bean environment temperature should never exceed 536 degrees F. A wider safety margin would be achieved by limiting the maximum environment temperature to 520 degrees F. These temperature limits minimize damage to the cell matrix and enhances cup complexity, roasting yield, and product shelf life.

Trigonelline: A Nitrogenous Base Found In Coffee

Trigonelline is 100% soluble in water and therefore will end up in the cup. Trigonelline is probably the most significant constituent contributing to excessive bitterness. At bean temperatures of 445 degrees F, approximately 85% of the trigonelline will be degraded. This bean temperature represents a moderately dark roast. For lighter roasts there will be more trigonelline, hence bitterness, but also less sugar caramelization. Caramelized sugar is less sweet in the cup than no caramelized sugar, so when properly roasted these two constituents form an interesting compliment to each other. Trigonelline melts in its pure crystalline form at 424 degrees F Degradation

of trigonelline begins at approximately 378 degrees F. The degradation of trigonelline is one of the key constituent control flags for determining the best reaction ratio.

Quinic Acid: Member of the Carboxylic Acids Group

Quinic Acid melts in pure crystalline form at 325 degrees E, well below the temperatures associated with the roasting environment. Quinic Acid is water soluble and imparts a slightly sour (not unfavorably as in fermented beans) and sharp quality, which adds to the character and complexity of the cup. Surprisingly, it adds cleanness to the finish of the cup as well. It is a stable compound at roasting temperatures.

Nicotinic Acid: Member of the Carboxylic Acid Group

Nicotinic Acid melts in pure crystalline form at 457 degrees F. Naturally occurring Nicotinic Acid is bound to the polysaccharide cellulose structure. Nicotinic Acid is also derived in soluble form during roasting. Higher levels of Nicotinic Acid for any given degree of roast are associated with better cup quality. Since it is I 00% soluble, it will end up in the cup. Nicotinic Acid contributes to favorable acidity and clean finish. Its derivation rate is one of the key constituent control flags for determining the best reaction ratio temperature and chemistry propagation rates. Additionally, the interaction of melted Nicotenic Acid with other constituents contributes significantly to the intensity associated with darker roasts.

Environment Temperature

The temperature of the roasting environment determines the specific types of chemical reactions that occur. There is a window of temperatures that produce favorable reactions for the ideal cup characteristics. Temperature values outside of this window have a negative effect on quintessential cup quality. Even within the window values, different temperatures will change the character of the cup, giving the roaster the latitude to develop a personality or style desired, or to tame the rough signature of certain coffees while still optimizing relative quality. System Energy: At any given environment temperature, the amount of energy (BTU) and the roasting system's transfer efficiency will determine the rate at which the specific chemistry will occur. Higher levels of both energy and transfer efficiency will cause the reactions to progress more quickly. There is a window of reaction rates that will optimize cup quality. This is called the Best Reaction Ratio, or BRR.

Best Reaction Ratio (BRR)

The best cup characteristic are produced when the ratio of the degradation of trigonelline to the derivation of Nicotinic Acid remains linear. The control model of this reaction ratio is a time/temperature/energy relationship. The environment temperature (ET) establishes the pyrolysis region for the desired chemical reactions while the energy value (BTU) and system transfer efficiency (STE) determines the rate of reaction propagation and linearity of Nicotinic Acid derivation to degradation of trigonelline. Because green bean density varies dramatically, under any given ET / BTU / STE format, the reaction distribution will vary. It takes longer to obtain comparable uniformity for a higher density bean. Monitoring the bean temperature offers a good method of approximating the reaction distribution during this phase of the roasting. The ideal environmental temperature, ET, for best reaction ratio, BRR, is from -401-424 degrees F, with 405 degrees F as the default value. The BTU required is determined by the systems transfer efficiency, or ability to impart the energy to the charge mass.

Describe the following chemical compounds found in coffee: 1 to 2 sentences to describe each.

1. Caffeine
    a. What is a diuretic?
2. Water
3. 2-Ethylphenol
4. Quinic Acid
5. 3,5 Dicefeoylquinic Acid
    a. What is an antioxidant? Is it good for you? www.nlm.nih.gov/medlineplus/antioxidants.html
6. Dimethyl Disulfide
7. Acetylmethylcarbinol
8. Putrescine
9. Trigonelline
10. Nicacin
    a. What is it, why is it good for you? www.nlm.nih.gov/medlineplus/druginfo/natural/924.html
11. What does the caffeine molecule do to the brain? www.youtube.com/watch?v=QBK4SNSjnmY
12. How many mg of caffeine would a person have to consume before it would be “harmful”? https://www.drugs.com/dosage/caffeine.html
13. How many cups of coffee is this (from above)?

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Lesson 3

Roasting stages – Different types of coffee roasts

Materials

- 20 green coffee beans
- Temperature probe and timer
- Wired device to view images on coffee roasting website
- Coffee Roasting pan and hot plate, air popper, Whirly Pop, or electronic coffee roaster
- Crucible tongs and heat proof glove or hot pads.

Procedure **(Read through the full procedure and questions before beginning!)**

1. Heat up Whirley Pop or cast iron pan to 185° C. Keep Temperature between 175° C - 190° C the entire time! (~350° F. Keep temperature between 350-400° F for entire roast). OR Turn on air popper or electronic coffee roaster and record the temperature after 2 minutes of heating.

3. For Whirly Pop and pan place 15 beans inside and turn handle slowly, or stir beans with spoon (save the rest of the unroasted beans for later).

4. Remove one bean, using the tongs, at when it reaches the correct roast (observe the color, and descriptions using the online chart) and record the time and temperature during the roasting stages. *Caution hot air and hot metal can burn, so use tongs and heat gloves or hot pads to protect hands!* Keep the beans in specific order as you will need to know which bean belongs to each "take out time and temperature" at the end. (Times and temperatures may vary significantly, and care should be taken to observe the beans often to match to the roasting reference color and descriptions chart. Begin to process again with new beans if over roasted.

https://legacy.sweetmarias.com/library/using-sight-to-determine-degree-of-roast

Listen carefully for a cracking noise, this is called the "first crack", record the time and temperature at which you hear this happening.

Listening carefully for another cracking noise, this is called the "second crack", record the time and temperature at which you hear this happening.

Remove final bean before it burns too much and produces smoke!!!

5. Turn off heat or unplug the device, allow sufficient cooling before touching

Using a blank piece of paper, include a brief description, temperature, time roasted, and name of each stage/roast and create a chart with the 16 stages (from unroasted green to burned).

1. Green Unroasted Coffee
2. Pale stage
3. Early yellow stage
4. Yellow Tan stage
5. Light Brown stage
6. Brown stage
7. 1st crack begins
8. 1st crack underway
9. 1st crack finishes (City Roast)
10. City+ roast
11. Full City Roast
12. Full City+ roast (2nd crack begins)
13. Vienna – Light French Roast (2nd crack underway)
14. Full French roast

15. Fully Carbonize 16. Burned!!

7. Glue each bean into the appropriate spot on your chart. Show this to your instructor, then put in a safe place for later. Put all group members' names on your "roast chart".

Post Lab Questions

Compare your coffee bean chart with the one at the Sweet Marias website. Each person answers these questions on their own paper.

1. How do yours beans compare with #9, #10, #11, #12, #13, and #14 on the chart from website?
2. After comparing your beans for #9-14 (the different types of official coffee roasts), which roast would you prefer to make to sample in class and why?
3. Write a conclusion* for this lab, discuss advantages and disadvantages of using time, temperature, and color to obtain each of the coffee roasting stages?
4. What changes in procedure would you make to improve the process?
5. Coffee roasting has been called and art and a science, defend or refute the statement with reasons you experience and observed in the process in a few sentences.

*Your conclusion should be a short synopsis of what you learned. This may be different for everybody. There is no length limit but I would assume that it should take at least a short paragraph to communicate what you have learned. See me if you are confused or have questions.

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Lesson 4

Roasting Coffee – First Roast – Full City Roast

One cup of coffee requires 10.6g of beans per 170 ml of hot water. Today we are going to do a practice roast with for 2 cups of coffee which you can test to see how you need to make adjustments to your roasting process. We will attempt to a roast a "Full City Roast" – (remember bean is on verge of 2nd crack and has reached an internal temperature of 228 °C. Review your chart and online one for reference.)

1. Measure out 32 grams of green coffee beans (each cup requires ~10.6 g)

2. Turn on hot plate or electronic device for roasting and begin warming the pan/device.

3. Keep temperature above 175° C and below 190° C, stabilize this temperature or ensure device has reached peak temperature before adding beans.

4. Remove the beans when you determine they have reached Full City roast and carefully pour them on to an uncoated paper, glass, or metal plate that is placed on a hop pad or cooling rack. Stir the beans slowly to ensure even cooling and stop the roasting process. If you over roast, start again with new beans.

5. Clean up equipment while beans finish cooling.

6. Be sure to label your beans with group name and period number so you can place them in the location your instructor has told you to put them to degas (let off volatile aromatic compounds) over night.

7. Find mass of your roasted beans, record for comparison tomorrow. Store beans on plate overnight.

Post lab Questions

View the pictures of a Full City Roast (#11 on image) by Sweet Marias website, the authority on home coffee roasting, and answer the following questions.

https://www.sweetmarias.com/roastprocess-singlebean/roasting-allin1.jpg

1. Compare your beans with those in the pictures (must be viewed online to see the color) and explain if you think you've achieved a Full City Roast of your own beans? IE sheen, texture, etc.

2. We will be roasting again. List at least three things your group did well. List at least 2 things you can improve upon for the next roast.

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Lesson 5

Brewing and Cupping Your First Roast

We will be tasting your "First Roast" and determining which type of roast you would like to achieve in a larger batch which will be used to "judge" your skills against other groups.

Each 170 ml cup requires ~ 10.6 g of beans – You are making 2 cups today → ~ 21.2 g with 340 ml of water

1. Mass of Beans from Full City Roasting process ____ 2. Smell the beans today, describe what you smell (ex. smoky fruit, buttery popcorn, etc.)

3. Was there any difference in the mass from the day you roasted them to today? If so, what was the difference in mass? What does this difference tell us? (Think about the beans "degassing" CO2 after they roast)

4. Place your beans in grinder, depending on the type of grinder you may need to adjust time or grind size to get it correct for French press coffee extraction.

5. Smell again after grinding, describe what you smell and record.

6. Remove beans from grinder and pour contents into French Press carafe.

7. Wipe out grinder with dry paper towel for the next group.

8. Add 340 ml of hot water at about 95C, very hot but not boiling (use caution and ensure food safe measure device is used.

9. Place lid on Press with plunger in the UPRIGHT position, but above the liquid and coffee grounds. Observe what is called "the bloom" as the coffee absorbs the water.

10. Let coffee steep for 3.5 minutes, observe changes in the liquid.

11. While waiting: Put your name on a heat proof food safe cup, you will use this cup throughout the next few days. DO NOT THROW AWAY. RINSE AND STORE IN THE LICATION YOUR INSTRUCTOR TELLS YOU TO.

12. While waiting: Read "Coffee Cupping" handout to learn what to look for, smell and taste in your coffee.

13. When 3.5 minutes are up gently press plunger down to bottom to separate the liquid from the grounds. 14. Turn lid gently so that the slots in the lid are open to the pour nozzle and pour a small amount into your cup.

15. Use your senses to test the coffee according to the "Coffee Cupping" parameters on the handout. Record "coffee cupping" information. (If you choose not to taste the coffee, you have a group member, fellow student, or your instructor to taste the coffee for you and complete the chart).

16. Test the PH, describe the color, or if colorimetry or absorbance equipment is available test and record your results.

17. Try other group's coffee if they are willing to share, and compare.

Why does each group have a different flavor if you started with the same beans and roasted to the same stage?

Begin preparing for your Master Roasting – you need to decide which beans (instructor will provide the choices you have available), roast stage, grind size, extraction time, etc. you would like to achieve and write a procedure for roast (include temperature, time, reasons for procedures you choose, etc.).

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Lesson 5 continued

Coffee Cupping and Testing your Roast

Coffee Cupping Tasting a selection of coffees so that they can be inter-compared is called cupping. Each coffee is rated according to whatever evaluation guidelines you have, and the scores recorded on a form.

The criteria we have used are:

1. Aroma: Describe the smell of the coffee before tasting, and rate the intensity of the aroma.

2. Acidity: The pleasing brightness or sharpness in the coffee. Acidity can be intense or mild, round or edgy, elegant or wild, and everything in between. It is the high, thin notes, the dryness the coffee leaves at the back of your palate and under the edges of your tongue. It's the pleasant tartness, snap, or twist, combined with an underlying sweetness; it is bright, dry, sharp, brisk, and vibrant. A coffee that lacks acidity tastes flat. Acidity should be distinguished from sour or astringent.

3. Appearance: Does I look the right color, is it too light or too dark, is there oil floating on the surface. Is the overall appearance inviting, do you want to take a drink? Are there any grounds present?

4. Body/Mouthfeel: The sense of weight, tactile richness, thickness or heaviness that the coffee exerts in the mouth when you swish it around; how it coats the palate; its balance. Can be very difficult for beginning cuppers to identify – it is useful to think about the viscosity or thickness of the coffee, and concentrate on the degree to which the coffee has a physical presence. It also describes texture: oily, buttery, thin, etc.

5. Sweetness Balance: The extent to which the sweetness provides balance and eases the finish. The degree of harmony between the acidic and sweet flavors.

6. Aftertaste/Finish: Describes the immediate sensation after the coffee is swallowed; the coffee's finish in your mouth. Some coffees develop in the finish; they change in pleasurable ways. The ideal finish has enough endurance to carry the flavor for 10 seconds after swallowing, affirming with great clarity the principal flavor of the coffee, leaving a lingering, and pleasant, non-bitter and non-sour aftertaste.

7. Overall Taste: The catch-all for all the actual "tastes" the coffee gives. What does it taste like? Describe any directly identifiable fleeting flavor notes you may taste.

8. Personal Preference: Do I like it? Does it taste nice? What do you like or dislike about it?

Fill out the Cupping Card or have your taster fill it out.

Optional PH _____ Calorimetry Reading _____ Absorbance or transmittance _____

Cupping Card **Name of Taster _____** **Roast, Bean Type_____**

1. Aroma _____
2. Acidity_____
3. Appearance_____
4. Body/Mouthfeel_____
5. Sweetness/Balance_____
6. Aftertaset/Finish_____
7. How do you like it 1-10 _____

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Lesson 6

Master Roaster – Roasting With Your Own Vision

Day 1:

1. As a group, determine which type beans to use, roast you would like to achieve for your next larger batch roast.

2. You will be roasting a larger batch of 64 g beans.

3. Write a procedure for YOUR roast (include all necessary aspects but especially; temperature, time, reasons for choices and procedures).

4. Have instructor APPROVE your roast plan before beginning roasting.

5. Roast Beans CAREFULLY! Do not over roast as you may not be able to start again!

6. When roasted, pour onto food safe uncoated paper plate, glass or metal container on hot pad or rack.

7. Allow to cool completely, stir to stop the roasting process.

8. Measure the mass of the beans and record color, aroma, and any other description you choose.

9. Write roast type, country of origin, and group member's names on plate and store in the place instructed by your teacher to de-gas overnight.

Day 2:

Brewing

10. Follow Brewing/Cupping instructions from the last handout for one cup only (10.6 g beans to 170 ml water).

11. When cooled, determine the pH of your coffee.

Cupping

12. Pour remaining coffee (from above) into your group member's individual cups for testing/tasting.

13. Test optional parameters: Colorimetry, absorbance, transmittance if equipment is available.

14, Taste or have taster perform "Coffee Cupping" and fill out card below as you did for your first roast.

Cupping Card Name of Taster _____ Roast, Bean Type_____

1. Aroma _____
2. Acidity_____
3. Appearance _____
4. Body/Mouthfeel_____
5. Sweetness/Balance_____
6. Aftertaset/Finish_____
7. How do you like it 1-10 _____

Either fine tune procedure for Master Roasting competition or begin cycle again with new beans.

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MASTER ROASTING COMPETITION

Preparing your Entry for the Competition

For the competition you will prepare an 8-10 sentence description of your beans, your roast, your extraction and why you made the decisions you did on the procedure you used for your Coffee. The description should give the judges an idea of your thought process from choice of bean to finished product and should include a description of what you learned in the process. This must be written out so it may be read either by the judges themselves or by someone not in the competition like your instructor.

The order of competition will be predetermined and heat proof cups labeled with a code (such as letter or numbers) and the coffee product ready to serve to the judges at the appointed time. Because you do not want your coffee to cool down too much you will need to plan when to begin to have it ready for the judges as it just finishes the extraction and is ready to be poured into the cups for them. Plan your timing and procedure to be ready and prompt as you do not want the judges to have to wait for you to finish preparations when they are ready. Remember the judges will be performing the cupping and filling out the cupping card for each group's entry before they are ready for the next group's coffee to judge.

Good luck and may the best roasters win!!

Finish your lab report and prepare a one page conclusion about what you learned and what worked, what challenges you faced, what you liked about the lab, what you didn't like about the lab, and final thoughts.

Questions to ponder and maybe include in your conclusion of the Science of Coffee Project:

- What did you notice about the color differences in the roasted coffee and coffee extracts?
- What process or resources did you use to decide the beans your chose, roast you performed, etc.?
- What did you notice about the aroma, taste, or look of the different roasts, and others roasts of the coffee beans?
- What did you think about coffee before you began the activity, what has changed about our thinking about coffee after the lab?
- How did your coffee compare to others roasts and brews?
- How does the coffee we roasted and prepared in the lab compare to coffee from a store, or in a restaurant you have seen or tasted?
- Was there a relationship between your coffees acidity score (you're cupping, or judges cupping) and how well you did in the competition?
- Is there a relationship between the PH of your coffee and its color, aroma, (optional tests)?
- What are the variables that might effect a cup of coffee you make or you purchase from where it is grown, when it is poured into your cup?
- Now do you think the preparation of coffee is more of an art or more of a science?

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Extension activity

Do some research and find at least two articles for each side of the topic about the effects of caffeine on adolescents and be prepared to defend both sides of the topic. You may be doing this in pairs, or in a group, so be sure to highlight important points that you feel support each side of the topics below.

1. Caffeine is a dangerous drug and should be regulated for adolescents.
2. Caffeine is a product that either has minimal effect or that adolescents should be allowed to consume without any regulations.

Master Roast Competition Cupping Card **Judge name____________________**

Entry ____ Bean, Grind, Roast __________,____________.__________ Description Score 1-10 _____

1. Aroma 1-10 ___________
2. Acidity 1-10 ___________
3. Appearance 1-10 ___________
4. Body/Mouthfeel 1-10 ___________
5. Sweetness/Balance 1-10 ___________
6. Aftertaste/Finish 1-10 ___________
7. How do you like it 1-10 ___________

Overall score _________/80

Entry ____ Bean, Grind, Roast__________, ____________.__________ Description Score 1-10 _____

1. Aroma 1-10 ___________
2. Acidity 1-10 ___________
3. Appearance 1-10 ___________
4. Body/Mouthfeel 1-10 ___________
5. Sweetness/Balance 1-10 ___________
6. Aftertaste/Finish 1-10 ___________
7. How do you like it 1-10 ___________

Overall score _________/80

Entry ____ Bean, Grind, Roast__________, ____________.__________ Description Score 1-10 _____

1. Aroma 1-10 ___________
2. Acidity 1-10 ___________
3. Appearance 1-10 ___________
4. Body/Mouthfeel 1-10 ___________
5. Sweetness/Balance 1-10 ___________
6. Aftertaste/Finish 1-10 ___________
7. How do you like it 1-10 ___________

Overall score _________/80

Entry ____ Bean, Grind, Roast__________, ____________.__________ Description Score 1-10 _____

1. Aroma 1-10 ___________
2. Acidity 1-10 ___________
3. Appearance 1-10 ___________
4. Body/Mouthfeel 1-10 ___________
5. Sweetness/Balance 1-10 ___________
6. Aftertaste/Finish 1-10 ___________
7. How do you like it 1-10 ___________

Overall score _________/80

Entry ____ Bean, Grind, Roast__________, ____________.__________ Description Score 1-10 _____

1. Aroma 1-10 ___________
2. Acidity 1-10 ___________
3. Appearance 1-10 ___________
4. Body/Mouthfeel 1-10 ___________
5. Sweetness/Balance 1-10 ___________
6. Aftertaste/Finish 1-10 ___________
7. How do you like it 1-10 ___________

Overall score _________/80

Entry ____ Bean, Grind, Roast__________, ____________.__________ Description Score 1-10 _____

1. Aroma 1-10 ___________
2. Acidity 1-10 ___________
3. Appearance 1-10 ___________
4. Body/Mouthfeel 1-10 ___________
5. Sweetness/Balance 1-10 ___________
6. Aftertaste/Finish 1-10 ___________
7. How do you like it 1-10 ___________

Overall score _________/80

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Judges Cupping Card Guidelines

Coffee cupping or tasting a selection of coffees so that they can be inter-compared is called cupping. Each coffee is rated according to whatever evaluation guidelines you have, and the scores recorded on the judging form.

The criteria we suggest you use are:

1. Aroma: Describe the smell of the coffee before tasting, and rate the intensity of the aroma.

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4. Sweetness Balance: The extent to which the sweetness provides balance and eases the finish. The degree of harmony between the acidic and sweet flavors.

5. Aftertaste/Finish: Describes the immediate sensation after the coffee is swallowed; the coffee's finish in your mouth. Some coffees develop in the finish; they change in pleasurable ways. The ideal finish has enough endurance to carry the flavor for 10 seconds after swallowing, affirming with great clarity the principal flavor of the coffee, leaving a lingering, and pleasant, non-bitter and non-sour aftertaste.

6. Overall Taste: The catch-all for all the actual "tastes" the coffee gives. What does it taste like? Describe any directly identifiable fleeting flavor notes you may taste.