THE BJCP EXAM FOR DUMMIES

2010

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INTRODUCTION

The BJCP EXAM FOR DUMMIES has one purpose – to help you get a passing score on the BJCP examination. There are better texts available if you want to learn to brew better beer, learn world beer styles, or learn how to taste and evaluate beer. The best use of this guide is to help you cram in the last three weeks before the exam. It will help you reinforce and retain what you've already studied.

Here are several texts recommended to help you study for the BJCP exam:

- BJCP Style Guidelines http://www.bjcp.org/docs/2008_stylebook.pdf
- BJCP Study Guide http://www.bjcp.org/docs/Interim_Study_Guide.pdf
- BJCP Judge Procedures Manual http://www.bjcp.org/docs/Judge_Procedures_Manual.pdf
- BJCP Judge Instructions http://www.bjcp.org/docs/SCP_JudgeInstructions.pdf
- BJCP Beer Score Sheet http://www.bjcp.org/docs/SCP_BeerScoreSheet.pdf
- Competition Cover Sheet http://www.bjcp.org/docs/SCP_CoverSheet.pdf
- How to Judge Beer http://www.bjcp.org/docs/How_to_Judge_Beer.pdf
- BJCP Beer Faults Trouble-shooter http://www.bjcp.org/docs/Beer_faults.pdf
- BJCP Exam Preamble http://www.bjcp.org/forms/preamble_2008.pdf
- BJCP Exam Score Sheet http://www.bjcp.org/forms/exam_scoresheets.pdf
- BJCP FAQ http://www.bjcp.org/bjcpfaq.php
- BJCP Members Guide http://www.bjcp.org/membergd.php
- Classic Styles Spreadsheet http://www.bjcp.org/docs/classicstyles.xls
- Exemplary BJCP Score Sheets
  - http://www.bjcp.org/docs/examscore1.pdf
  - http://www.bjcp.org/docs/examscore2.pdf
  - http://www.bjcp.org/docs/examscore3.pdf
  - http://www.bjcp.org/docs/examscore4.pdf
  - http://www.bjcp.org/docs/examscore5.pdf
  - http://www.bjcp.org/docs/examscore6.pdf

- Homebrewing Vol. 1, by Al Korzonas
- Dave Miller's Homebrewing Guide or The Complete Handbook of Home Brewing, by Dave Miller
- How to Brew, by John Palmer (http://howtobrew.com)
- Beer Companion, by Michael Jackson
- Classic Beer Style Series, by Brewers Publications
- New Brewing Lager Beer, by Greg Noonan
- Principles of Brewing Science, by George Fix
- Designing Great Beers, by Ray Daniels
- Troubleshooting Special Issue, 1987 Zymurgy (vol. 10, no. 4)

Finally, this is NOT an official BJCP document – though it is based on my experience and the experience of many others I have had the pleasure to work with in the BJCP, including but not limited to Grand Master III Judge Steve Piatz, Grand Master Judge Kris England, National Judge Andrew Ruggles, National Judge Jonathan Crist, and National Judge Gera Exire LaTour, who have worked diligently over the last several years to make the Minnesota Home Brewers Association BJCP Exam Prep Course one of the best in the nation. Also thanks to Scott Bickham, GrandMaster III judge for editing this edition of this document. Finally, thanks to you all for your dedication in helping the hundreds of Beer Judges who have taken our class reach their goals in the BJCP.

- Al Boyce, September 22, 2010

HOW YOUR BJCP SCORE IS DERIVED

- 70% from your score on the Essay Portion (Essay score x 0.7)
- 30% from your score on the Taste Portion (Taste score x 0.3)

i.e. - 70% on essay, 60% on taste: (70 x 0.7) + (60 x 0.3) = (49) + (18) = 67 Total Score

"CURVE" Guidelines:

≤60: Little knowledge of brewing and/or styles, and/or insufficient communication skills to be a judge. Generally has weak tasting skills.

60s: A basic grasp of fundamentals. May have some big knowledge gaps, but still knows most of the basics. Has an acceptable minimum communication and judging skills.

70s: Knows basics well enough not to have to take the test again to be called "Certified." Test can have errors and small gaps in answers. Depth in answers is not necessary.

80s: Good knowledge of all subjects. Some errors allowable, but no significant gaps. Some depth indicated. Taste and essay portions should show similar ability.

90s: Excellent knowledge level. No significant errors, and no gaps. Good depth to answers. Obviously an experienced beer taster. Shows evidence of independent thought.

IN GENERAL:

- **Bring mechanical pencils, not a pen.** Wood pencils have an aroma that will mess up your senses. Bring an extra mechanical pencil or two in case you run out of lead. Erase cleanly if you make a mistake. If you used a pen, it makes it ugly to clean up mistakes. Cross-outs are very difficult to read when grading, and you're bound to lose points for legibility. Speaking of which….
- **Bring an Eraser.** See above. Fully erase all mistakes and the graders won't get confused.
- **Bring a simple calculator.** Cell phones, iPods, iPhones, and other gizmos with "memory" will not be allowed. Just bring one that can add, subtract, multiply and divide.
- **Bring a ruler** – draw quarter to half-inch borders on all of your pages and DON'T write outside of them. Use it to neatly draw your grids also. This can be done prior to the start of the exam.
- **Bring a watch**. Again, no devices with "memory". You have three hours, or 180 minutes. You have ten questions to answer and four beers to judge in that time. 180 divided by 14 equals about 12 minutes per item, giving you an extra 12 minutes at the end to double-check your work. Do not allow yourself to go over twelve minutes per item or you will run out of time.
- **Write Neatly!** Print, instead of using cursive if you can. If the graders can't read it, you're not going to get any points no matter HOW GOOD your answer is!

ESSAY PORTION

10 QUESTIONS (worth 70% of your total score)

- **Just before the exam: if you have time, cram on names of Commercial Examples.** It's only one point, but its one point on four different questions. Memorize only ONE for each style. There are no bonus points for two!

- **Don't sweat the statistics.** They're NOT required on the classic examples questions, and on the recipe question, the are only ONE point.
- **Pre-label your blank pages - write the question numbers at the top left hand corner of each page for Section 2, questions 1 – 8** (question 9 is a form that is provided for you, as are the questions for Section 1.) Write "Q.1. Page 1 of ___". This allows you to start easily at any question you like. This page incrementor is for the PAGE only, so if you only use one page, it will read "Q.1. Page 1 of 1". You can do this, and the next two hints, before the Exam Administrator tells you to start to help you get organized. (See "Sample Lined Page for Exam" in the Appendix.)
- **Pre-label the bottom-right corner of each page, inside your margins, with "PAGE ___ of ___".** Do NOT fill in either blank at this time! Do that last, after you've organized all of your questions in the proper order. (See "Sample Lined Page for Exam" in the Appendix.)
- **At the top right corner of each page write your participant number.** It will be the last two digits of the year, the two-digit month code, the two-character State Code abbreviation, a two letter city code and an incremental participant number. For example, an exam given in New York, NY on 6/17/2007 for examinee #3 would be 0706-NYNY-03. Your exam admin will assign you this number.
- **Start a new page for each question**. The Exam Admin will gladly give you more paper if you need it.
- **Spend a few seconds to underline each of the elements of each question on the test pages themselves.** This will aid you in constructing your grids, and will help you not to skip any details required by the question.
- **Try to answer each question on a single page**, but if you need more pages, don't forget to pre-label them with the characteristics listed above.
- **Don't write on the back sides of the paper.** This information may not be photocopied on the pages that are sent to the graders, and hence may not be graded.
- **Create Grids for your answers.** If there are three of a thing (styles, malt types, etc), put them across the top as column heads. Put the characteristics for those things down the side as row heads (i.e., Style Name, Aroma, Appearance, Flavor, Mouthfeel, Distinguishing Characteristics, Classic Example, Similarities, Differences)
- **Bullet answers to questions inside the grids** are not only allowed, but encouraged!
  - Shows organization in your answer
  - Allows you to answer more quickly than if you were writing lengthy descriptions
  - Can cram in more info than if writing full prose sentences
  - If you write SOMETHING in each cell of the grid, you're likely to get at least partial credit.
  - Much easier for the grader to review
  - See?
- **There are three types of questions on the BJCP Exam – "Program", "Technical" and "Style"**
- **Question One is the "Program" question.**
- **Style and Technical alternate, starting with Style**, so 2,4,6,8 and 10 are "Style" questions, 3, 5, 7 and 9 are "Technical" questions.
- **The "Style" questions REQUIRE that you address the four objective categories from the** tasting section about EACH BEER on the question:
  - Aroma
  - Appearance
  - Flavor
  - Mouthfeel
- **Use all of the sub-section "helper" words from the BJCP score sheet** when you are describing each of these elements. (HINT: If you are only taking the WRITTEN portion of the BJCP exam,

these helper words are found on the score sheet for Question 9 – the Classic Example question.) For example, for APPEARANCE, comment on:

- Color
- Head Clarity
- Head Color
- Head Texture
- Head Duration

- **Guessing – DO it!** Leaving a question blank guarantees that you'll get no points for it. You don't get negative points for guessing wrong, and you MIGHT get it right! Good things to guess:
  - Aroma: guess "grainy, sweet malty aroma, slight floral hop nose"
  - Appearance: guess "thin off-white head, small bubbles, yellow color"
  - Flavor: guess "grainy, sweet malty flavor, slight floral hop flavor"
  - Mouthfeel: guess "Medium body, moderate carbonation, mild alcohol warmth, faint astringency, no creaminess"

- **READ THE EXAM COVER SHEET CAREFULLY!** Some instructions for the test are stated in the Cover Sheet of the exam, and are equally valid as if they were asked in the question itself. (Cover sheet below is from the BJCP website as of 9/7/2008 – underlines are mine).

COVER SHEET
Exam Instructions

PARTICIPANT CODE NUMBER – YYMM-StCy__

Please mark the above number at the top of each answer sheet, do NOT write your name on your answer sheets.

Answer the questions completely, but don't be verbose. The challenge is to organize your thoughts and express them well in a three-hour period. Each essay question is worth 10 points. The written part of the exam is weighted 70% and the taste test, 30%.

For a passing score, beer style descriptions must include the aroma, appearance, flavor, and mouthfeel descriptions as in the BJCP Style Guidelines. If time permits, for maximum credit, a more complete answer should consider the history of the style, geography, commercial examples, style parameters, unique ingredients, and fermentation techniques and conditions. When a question asks for a *classic* commercial example of a style the correct answer is one of the styles listed in the BJCP Style Guidelines.

MANAGE YOUR TIME CAREFULLY. TRY TO FILL IN THE BASIC INFORMATION REQUESTED BY EACH QUESTION RATHER THAN CONSUMING MOST OF YOUR TIME PROVIDING GREAT DEPTH ON JUST ONE OR A FEW OF THE QUESTIONS.

Please read and then sign to indicate that you did read and understand the following:

- Only write on one side of the paper, back sides are not copied.
- Number all pages (1 of n, 2 of n. etc.).
- Start each question on a new sheet of paper.
- Write firmly (with dark pencil) to facilitate photocopying of your exam.
- Do not write to the very edge of the page since that will make it difficult to photocopy the answer sheets and portions of your answer may not get to the graders.
- Please write neatly; handwriting is meant to be read, and not to be solved.

_____

(signature)

On with the questions….

SECTION 1 (BJCP/ETHICS/JUDGING PROCESS)

Part 1: BJCP

The Primary Purposes part of section 1 is worth 2.5 of the 10 points possible in Section 1.

List three primary purposes of the BJCP as listed on http://bjcp.org and in the BJCP Study Guide.

1. Promote Beer Literacy
2. Promote the Appreciation of Real Beer
3. Recognize Beer Tasting and Evaluation Skills

ALE is a good mnemonic for this:
A = Appreciation
L = Literacy
E = Evaluation and tasting skills

This BJCP Style Grid part of section 1 is also worth 2.5 of the 10 points possible in Section 1.

Complete the grid with the 7 principal BJCP Judge Levels, excluding honorary ranks, and the requirements to earn each of them (for 2.5 points).

BJCP Level	Minimum Exam Score	Total Experience Points	Minimum Judging Points	GM Service Requirements
Apprentice	< 60	0	0	Yes / (No)
Recognized	60	0	0	Yes / (No)
Certified	70	5	2.5	Yes / (No)
National	80	20	10	Yes / (No)
Master	90	40	20	Yes / (No)
Grand Master	90	100	50	(Yes) / No
Grand Master II (+)	90	Addl 100/lvl	Addl 50/lvl	(Yes) / No

One mnemonic for remembering the levels is: "A Rauchbier Can Never Make Groovy Pudding"

A = Apprentice
R = Recognized
C = Certified
N = National
M = Master
G = GrandMaster
P = Plus (as in GrandMaster Plus…)

Note: Novice is not a rank, and will get you no points. Likewise Honorary Master and Honorary Grand Master will not get you any points. Circle "NO" for levels that do not require GM Service requirements.

Part 2. Judging Process & Ethics

The Process/Ethics part of section 1 is worth 5 of the 10 points possible in Section 1.

For the following 15 questions circle the "T" if the statement is true or circle the "F" if the statement is false. Each question is worth one third of a point or, in total, the 15 questions are worth 5 of the 100 points possible on the essay portion.

….15 T/F questions will be listed here…

There are a pool of 90 T/F questions in the on pages 21-25 of the Aug.7, 2010 revision of the BJCP Study Guide from which these questions will be drawn. Some of them may be rephrased to call for a FALSE answer instead of a TRUE answer, or vice versa – so read carefully! For example, the following question would have a TRUE answer:

T ***A competition organizer may serve as the judge director and may also serve as a judge, provided this person has no knowledge of entries and entrants.***

…but by negating the intent of the question, it would require a FALSE answer:

F ***A competition organizer may <u>not</u> serve as the judge director or as a judge, even if this person has no knowledge of entries and entrants.***

These are not "trick" questions – you just have to read them carefully. If you LEARN them (not just MEMORIZE them), you should get an easy five points on this section.

The Section I questions are ALWAYS the same, and they are on EVERY exam, and the answers are PUBLISHED in the BJCP study guide. This is a gimme – and every examinee should walk away from Section I with 10 points under their belt on the written portion of the exam.

SECTION 2

1. Describe and differentiate beers from similar styles

For each of the three sub-styles style-1, style-2 and style-3, provide a statement describing the sub-styles as well as the difference and similarities between them by addressing each of the following topics:

[i.e., Dry Stout / Strong Bitter / Robust Porter]

6 points	Describe the aroma, appearance, flavor and mouthfeel of each sub-style as in the BJCP Style Guidelines.
2 points	Identify at least one aspect of the ingredients (malts, hops, water chemistry) or background information (history, fermentation techniques and conditions, or serving methods) that distinguishes each sub-style.
1 point	For each of the sub-styles name at least one classic commercial example as listed in the BJCP Style Guidelines.
1 point	Describe the similarities and differences between the three sub-styles

Three beers will be given, usually from very similar categories of beer. The potential list of beers to be compared is in the appendix of this study guide, under "**COMBINED Possible (named) Section II Beers for Q.1,3,5,7 and 9**". Note: The "Classic Commercial Example" MUST BE one that is listed in the BJCP Style Guidelines to get credit (also listed in the August 2010 revision of the BJCP Exam Study Guide.)

The easiest way to make sure you address all of the elements asked for in the question is to create a grid, with the characteristics down the left side, and the three styles listed across the top. The elements of the question are underlined in the question grid above. (Again, underlines are MINE – they will not be underlined on the actual exam unless YOU do it – hint, hint.) Once you create your grid (a ruler helps…), then all you have to do is "bullet" the appropriate information in each cell. DO NOT LEAVE ANY CELL BLANK! It's better for the aroma cell to guess either "malty" or "low malt" and "hoppy" or "no hop aroma" than to skip it. The grader can't give you partial credit – if you didn't try to answer the question.

Another tip: USE THE CLASSIC EXAMPLE SCORESHEET INCLUDED IN YOUR EXAM FOR QUESTION 9! Under each major section (Aroma, Appearance, Flavor, Mouthfeel, Overall) will be several "key words" (i.e. under Aroma - malt, hops, esters, and other aromatics. Try to address EACH of those key words in your bullets for maximum points. On the next page is a sample answer to this question:

STYLE	Dry Stout	Strong Bitter (EPA)	Robust Porter
AROMA	* Roast accentuated * Some coffee * Slight chocolate * No diacetyl * Esters low to none * Hops low to none	* Mod high to mod low hops * Med to Med high malt * Low to moderately strong caramel * Med low to Med high fruitiness * Low diacetyl OK * Slight sulfur/alcohol OK	* Roasty, "burnt" malt * Grainy, bready, toffee-like, caramel, chocolate, coffee OK * Rich, sweet * Hops low to high * Fruitiness mod to none * Diacetyl low to none

APPEARANCE	* Black to Brown * Can be opaque, else clear * Thick, creamy tan head, long lasting	* Golden to deep copper * Brilliantly clear * White/off-white head * Low head, dissipates gradually	* Med to dark brown or black * Can be opaque, else clear * Full, tan head, lingering
FLAVOR	* Moderate roast * Optional acidic sour * Med to high bitterness * Dry, coffee like finish * Bittersweet chocolate * Med low to no fruitiness * Med low to no hop flavor * No diacetyl	* Med to med-high bitterness * Even balance malt-to-hops, or slightly to bitter * Supporting malt * Moderately low to strong caramel sweetness * Moderate to moderately high hops * Hops should not dominate malt * Nutty, biscuity * Low sulfur, alcohol, mineral OK * Slight diacetyl OK	* Strong malt flavor * Burnt, black malt * Chocolate, coffee ok * Roasty dry finish * Dry to medium sweet * Med to high bitterness * Hop flavor low to moderately high * Diacetyl low to none *Fruitiness moderate to none
MOUTHFEEL	* Med light to full body * Creamy * Low to Moderate carbonation * Light astringency from roast grains * Low alcohol warmth	* Med light to med full body * Low to moderate carbonation * Slight alcohol warmth * No astringency * No creaminess	* Med to med full body * Moderately low to mod high carbonation * Slight alcohol warmth * Slight astringency from roast grains * Slight creaminess OK
DISTINGUISH	* Originally a fuller, creamier version of London Porter – no longer true * Sometimes called “Irish” Stout	* High gravity Bitter * Often bottled vs. casked * Broad style, open to interpretation	* Stronger, hoppier, roastier version of Porter * English version have subtle English hops * Malty, complex and flavorful
CLASSIC	Guinness Draught Stout	Fuller’s ESB	Anchor Porter
SIMILARITIES	* 30+ IBU levels * English Ingredients * Malt emphasis * Dark like Porter	* 30+ IBU levels * English Style, like Porter * English Ingredients * Malt emphasis	* 30+ IBU levels * English, like Bitter * English Ingredients * Malt emphasis * Dark like Stout
DIFFERENCES	* Irish Style, not English * Darker than Bitter * Less alcohol than others * Less Chocolate than Stout * More Roast than Stout * Less Hop Flavor/ Aroma than Bitter	* Lighter than Stout or Porter * More Hop Flavor/ Aroma than others * More Caramel * Roast or Chocolate inappropriate	* Darker than Bitter * More Chocolate than Stout * Less Roast than Stout * Less Hop Flavor/ Aroma than Bitter

2. Create an all-grain recipe

This is **NOT** the best demo for how to create a recipe. The purpose of this demo is how to get the best score on the Recipe Creation question on the BJCP Exam. First, let's look at the question:

Provide a complete ALL-GRAIN recipe for a _____, including

1 point	Target statistics (starting specific gravity, final specific gravity, and bitterness in IBUs or HBUs) and color (as SRM or a textual description of the color)
2 points	Batch size, ingredients (grist, hops, water, and yeast) and their quantities
3.5 points	Mashing, boil, fermentation, packaging, and other relevant brewing procedures
3.5 points	Explain how the recipe fits the style's characteristics for aroma, appearance, flavor, mouthfeel, and other significant aspects of the style and describe how the ingredients and processes used impact this style.

The recipe creation question is worth 10 points of the total written part of the exam and is divided into four sections. Let's call them:

1. Statistics - 1 point maximum (4 items - 0.25 points each)
2. Ingredients - 2 points maximum (4 items - 0.5 points each)
3. Techniques - 3.5 points maximum (4 items - 0.875 points each)
4. Profile - 3.5 points maximum (5 items - 0.7 points each)

Note: You can get up to seven points on this question if you don't list any statistics or ingredients! (I'm not saying you shouldn't know statistics or ingredients – it's just an interesting point.)

When you read the question, take a minute to underline all of the items the question is asking for (as I have done in the question above). Before answering the question, if you take a moment to organize the task by making a form (like the form on Section 2 – Number 2 in the appendix), then your work is cut out for you. Just fill in the blanks. Just WHAT to put in the blanks is another story…. In this discussion I will number each item by the number it is given in the form in the appendix.

One more thing which will prove useful - here's a table of commonly tested beers. I have "dumbed it down" by looking for average common statistics amongst the styles. The exceptions have been shaded.

STYLE	OG	FG	IBU	SRM/COLOR
American IPA	**1075**	1010	40	6
Belgian Tripel	**1075**	1010	**25**	6
Doppelbock	**1075**	**1016**	**25**	6
Bohemian Pilsner	1050	**1016**	40	6
Robust Porter	1050	**1016**	40	**25**
Oktoberfest	1050	**1016**	**25**	**7**
Dry Stout	1050	1010	40	**25**
German Pilsner	1050	1010	40	**5**
Classic American Pilsner	1050	1010	40	6
English Pale Ale	1050	1010	40	6
Weizen/Weissbier	1050	1010	10	6

1. **OG** – Original Gravity. 1.050 is OK for most beers that are commonly used for this question (not IPA, Tripel or Doppelbock – they are 1075.) These are defined by the style; they just have to be memorized. Just write down 1050 or 1075!

2. **FG** – Final Gravity. 1.010 is OK for most beers, except for Bohemian Pilsner, Doppelbock, Robust Porter and Oktoberfest – use 1.016 for them. (Think: "sweeter beers")

CALCULATING FINAL GRAVITY:
NOTE: *You don't need to know the stuff in this box for the test. This is just to explain why we're using 1010 and 1016*

Final gravity is determined by several things, but key amongst them is yeast attenuation. This means how much of the sugar in the beer will the yeast consume, and they differ a bit from one variety of yeast to another. The average attenuation rate of most yeast, however, is 75%. If you have a starting gravity of 1.050 (really, 1.050 – just think "50") and take 75% of that

50 x .75 = 37.5

50 – 37.5 = 12.5 is the gravity of what remains. 1.0125 is your final gravity

1.010 is the low end of the scale by the guidelines, and it happens to be the number that is common to most of these styles, and is easier to remember.

3. **IBUs** – "International Bittering Units" - shorthand for "How bitter do you want your beer?" 40 IBUs will work for most of the commonly tested beers. The Tripel, Doppelbock, and Oktoberfest need 25 IBUs, the Weissbier only needs 10. IBUs, like Original Gravity, is a characteristic of the style, and must just be memorized.

4. **SRM** – "Standard Reference Method" - shorthand for "Color".
   5 SRM will work for German Pilsner ("Pale Straw".)
   6 SRM will work for most of the commonly tested beers. (Think "Pale Gold".)
   7 SRM will work for Oktoberfest (Think "Yellow".)
   25 SRM will work for Dry Stout and Robust Porter (Think "Dark Brown".)
   Why not 6 for German Pilsner and Oktoberfest? That would be just too easy then, wouldn't it?

5. **BATCH SIZE** – 5 Gallons. You could pick any number you want for this, as long as you list something. But 5 gallons makes the rest of this demo work – so USE FIVE GALLONS!

6. **GRIST** – first. Start with EFFICIENCY – an easy one – always 75%. Why?
   Because you're going to use 10 pounds of grain (except for the IPA, the Tripel, and the Doppelbock – those use 15 lbs.) Why 10 lbs? Because….

CALCULATING ORIGINAL GRAVITY:
NOTE: *You don't need to know the stuff in this box for the test. This is just to explain why we're using an efficiency of 75% and 10 lbs of grain.*

There is a fancy formula for figuring out your potential original gravity. It relies on your knowing the extraction rates for different types of grain. Sugar itself yields 46 gravity points. Base malt yields 33. There are others, but that's going to be close enough for our purposes.

- 10 pounds of grain times 33 points per pound equals 330 points.
- We divide 330 points by the total gallons (5, remember?)

• 330 / 5 = 66 (or an original gravity of 1.066).
• But 66 is our MAXIMUM potential. We're only getting 75% efficiency, remember?
• 75% x 66 = 49.5… round up to 50 – or an OG of 1050.

THAT'S why we always say 75% efficiency!

- Keep the actual grain bill VERY simple!
- Forget "special ingredients" for the purposes of the test.
- Use malts from the country of origin of the beer.
- If you don't know malts from that country, remember most beers will start with "pale malt".

Here are the grain bills for the most commonly tested styles.

STYLE	GRIST
American IPA	2-Row 80%, Crystal 20L 15%, Crystal 60L 5%
Belgian Tripel	Pilsner Malt 100%, Candi Sugar
Doppelbock	Munich 75%, Vienna 25%
Bohemian Pilsner	100% Moravian Pilsner
Robust Porter	Maris Otter 85%, Roast 5%, Black 5%, Chocolate 5%
Oktoberfest	Vienna 50%, Munich, Pils 45%, Crystal 15L 5%
Dry Stout	Maris Otter 65%, Roast Unmalted Barley 8%, Flaked Unmalted Barley 20%, Black 7%
German Pilsner	Pilsner 100%
Classic American Pilsner	6-Row 70%, Flaked Maize 30%
English Pale Ale	Maris Otter 90%, Crystal 60L 10%
Weizen/Weissbier	Wheat 70%, Pilsner 30%

Now, just multiply the percentage listed by 10 lbs (we always use ten pounds, remember, except for 15 lbs for IPAs, Tripels and Doppelbocks) and you have your quantity!

7. HOPS

- Always 5% Alpha Acid (AA), regardless of what hops you choose (see box below)
- Stick to Bittering, Flavor, and Aroma additions for the purposes of the test
- Ignore Mash hop, First Wort Hop and Dry hop techniques for the purposes of the test
- Mention "Assumed Utilization Rates" - 25% Bittering, 5% Flavor, 0% Aroma

IN GENERAL

TYPE:

Use hops from the country of origin for the beer:

COUNTRY OF ORIGIN	HOP VARIETIES
England	Continental hops (East Kent Goldings, Fuggles)
Germany	Noble Hops (Hallertauer, Spalt, Tettnanger)
Czechoslovakia	Saaz
USA	Pacific Northwest "C" Hops (Centennial, Chinook, Cascade)
Belgium	Styrian Goldings

HOW MUCH:

Use 2 oz BITTERING hops for 40 IBUs

Use 1 oz BITTERING hops for 25 IBUs
Use 0.5 oz BITTERING hops for 10 IBUs

Use one-half to one ounce of flavor and/or aroma hops – if a beer is supposed to have hop flavor or aroma. They're FREE (Utilization-wise)!

CALCULATING HOP AMOUNTS:
NOTE: *You don't need to know the stuff in this box for the test. This is just to explain why we're using a utilization of 25% and AA% of 5%*

There is a fancy formula for figuring out the weight of your hops. It relies on your knowing your target IBUs:

• For beers commonly tested, usually 40, sometimes 25, rarely 10)
• The volume of your beer (always 5)
• Your alpha acid (always 5%)
• Your utilization (bittering always 25% - since flavor is only 5% and aroma is 0%, we're not going to bother with them.)

The formula is:

Weight= IBU * V(Gallons) / (AA% * 7490 * Utilization)

Why 7490? Because this formula was originally figured out in all METRIC units, and 7490 covers the conversion. Skip that unless you're going for the MASTER score!

So to figure out how much BITTERING hops to use for 40 IBUs:
40 IBUs x 5 Gallons / (.05 AA% x 7490 x .25 Utilization)
200 / 93.626
2.13 oz (round down to 2 oz. for memorization sake)

Based on these GENERALITIES, here are some potential hop bills for the commonly tested styles:

STYLE	BITTERING HOPS	FLAVOR HOPS	AROMA HOPS
American IPA	2 oz Centennial	1 oz Cascade	1 oz Cascade
Belgian Tripel	1 oz Styrian Goldings	1 oz Styrian Goldings	
Doppelbock	1 oz Hallertauer	0.5 oz Tettnanger	
Bohemian Pilsner	2 oz Saaz	1 oz Saaz	
Robust Porter	2 oz East Kent Goldings	1 oz Fuggles	
Oktoberfest	1 oz Hallertauer	1 oz Hallertauer	
Dry Stout	2 oz East Kent Goldings	1 oz Fuggles	1 oz Fuggles
German Pilsner	2 oz Hallertauer	1 oz Hallertauer	1 oz Hallertauer
Classic American Pilsner	2 oz Hallertauer	1 oz Hallertauer	
English Pale Ale	2 oz East Kent Goldings	1 oz Fuggles	1 oz Fuggles
Weizen/Weissbier	0.5 oz Hallertauer		

8. **WATER** – Always:
   9 total gallons of water
   3.5 gallons of strike water at 163F for a mash temperature of 150F

5.5 gallons of sparge water at 168F, acidified with 1 tsp phosphoric acid.
…**UNLESS**, you're doing an IPA, Tripel or Doppelbock. Then use 1.5 times these amounts

Why?....

CALCULATING WATER VOLUMES AND TEMPERATURES:
NOTE: *You don't need to know the stuff in this box for the test. This is just to explain how we're getting the water volumes and temperatures.*

VOLUMES OF WATER:
There is a fancy formula for figuring out how much water you need for mashing and sparging. It relies on your knowing:

- The amount of grain you'll be mashing (always 10 lbs)
- The target volume of your batch (always 5 gallons)

THE FORMULA FOR MASH WATER VOLUME:

Volume= Weight x 1.25 quarts

THE FORMULA FOR TOTAL WATER VOLUME NEEDED:

- (BatchVolume plus TrubVolume)
- divided by
- 1 minus (WortShrinkagePct divided by 100
- divided by
- (1 minus (BoilTime times (BoiloffPct divided by100)))
- plus
- EquipmentLossVol
- plus (GrainVolume times AbsorptionRate)

You'll have to trust me on these numbers:
BatchVolume = 5
TrubVolume = .5
WortShrinkagePct = 4
Boil Time = 1
BoilOffPct = 10
EquipmentLossVol = 1
GrainVolume = 10
AbsorbtionRate = .13

Thanks to Brew365 for this formula! http://www.brew365.com/mash_sparge_water_calculator.php

FORMULA FOR SPARGE WATER VOLUME:

Volume= Total Water needed – Mash Water

TEMPERATURES OF WATER:

There are two temperature ranges where a single infusion mash can convert starches in the grain to sugars: the Beta Amylase range (130-150F), and the Alpha Amylase range (149-158F). Mashing in

the Beta Amylase range will convert more of the starches to sugar, and will produce thinner beers with more alcohol (use the mnemonic M.A.L.T. – More Alcohol, Lower Temperature.) Mashing in the higher, Alpha Amylase range will convert less of the starches to sugar, yielding sweeter beers with a thicker body. We chose 150F for our mash temperature because it's at the point where the beta and alpha amylase temperature ranges overlap.

STRIKE TEMPERATURE FORMULA

The formula for determining the "strike temperature" of water for a specified target temperature is as follows:

Tw = (0.2 ÷ R) X (T2 – T1) + T2

Tw = the actual temperature of the infusion water (what we're solving for…)
R = the ratio of water to grain in quarts per pound (1.25)
T1 = the initial temperature of the mash (or dry grain) (70F – room temperature)
T2 = the target temperature of the mash (153F)

Using our weights and volumes, we get:

Tw = (0.2 ÷ 1.25) x (150 – 70) + 153F
Tw = (0.16) x (80) + 150F
Tw = 12.8 + 150F
Tw = 162.8F (rounded to 163F)

There is another formula for figuring out what temperature of water to ADD to a mash to get to the next temperature rest, but fortunately we're only doing a SINGLE INFUSION mash, so we don't need to know that….

What? You want to know it ANYWAY? (sigh…) OK, here it is…

INFUSION TEMPERATURE FORMULA:

Wa = (T2 – T1) X (0.2 x G + Wm) ÷ (Tw – T2)

We need a few new variables, in addition to the ones above

Wa = the amount of boiling water added in quarts (what we're solving for)
Wm = the total amount of water in the mash in quarts (1.25 qts/lb x 10 lbs grain)
G = the amount of grain in the mash in pounds (10)

Let's say we want to have a MASH-OUT for our single-infusion mash at 168F (mash-outs are not necessary, and you won't lose points for not describing them.). 168F is the highest temperature you can use without the risk of extracting tannins. We need to figure out how much boiling water to add to get the mash temperature to 168F. Our formula is:

Wa = (T2 – T1)	X (0.2 x G + Wm)	÷ (Tw – T2)
Wa = (168 – 150)	X (0.2 x 10 + (1.25 x 10))	÷ (212 – 168)
Wa = 18	X (2 + 12.5)	÷ (44)
Wa = (18 X 14.5)		÷ (44)

Wa = 261	÷ 44
Wa = 5.93 quarts	

9. YEAST

Remember three things:

- Ale or Lager,
- Country of origin
- "Create a 1 quart starter"

If you can't think of a specific yeast name, just say [Country] [Type]… i.e. "German Lager". This question should be a gimme - <u>every</u> yeast will get the job done! :-D

STYLE	BEER TYPE	COUNTRY	YEAST
American IPA	Ale	America	American Ale
Belgian Tripel	Ale	Belgium	Trappist HighGravity
Doppelbock	Lager	Germany	Bavarian Lager
Bohemian Pilsner	Lager	Czechoslovakia	Budjevoice Lager
Robust Porter	Ale	England	London Ale III
Oktoberfest	Lager	Germany	Munich Lager
Dry Stout	Ale	Ireland	Irish Ale
German Pilsner	Lager	Germany	German Lager
Classic American Pilsner	Lager	America	Budjevoice Lager
English Pale Ale	Ale	England	London Ale
Weizen/Weissbier	Ale	Germany	Weihenstephan Ale

10. MASH

Techniques: (choose one)
- Single Infusion
- Multi-Step
- Decoction
- Double Mash (also called a Cereal Mash)

Rests:

Acid Rest	(95-120F – 60-120 minutes)
Protein Rest	(122F – 20 min)
Beta Amylase Saccharification Rest	(130-150F – 30 min)
Alpha Amylase Saccharification Rest	(149-158F)
Mash-Out	(168F 15 min)

Vorlauf (recirculate.): 30 minutes

Sparge/Lauter: 168F, 5.5 gallons, 45 minutes

BIG HINT: ALL of these styles can be made with a <u>Single-Infusion mash!</u> But to get all the points, you need to say:

"The CLASSIC mash style used for this beer would be the ____ mash technique, but due to the highly modified malts available today, I'll use the Single Infusion mash." *(**NOTE**: There are some styles such as Doppelbock where a decoction mash can significantly enhance the flavor and aroma profile, and some graders may not award all possible points without a description of the decoction.)*

If you DO decide to use one of the other mash types, be SURE to detail all the steps!

STYLE	CLASSIC MASH TYPE
American IPA	Multi-Step
Belgian Tripel	Multi-Step
Doppelbock	Decoction
Bohemian Pilsner	Decoction
Robust Porter	Single Infusion
Oktoberfest	Decoction
Dry Stout	Single Infusion
German Pilsner	Decoction
Classic American Pilsner	Double-Mash (Cereal)
English Pale Ale	Multi-Step
Weizen/Weissbier	Decoction

11. BOIL/CHILL

Boil: ALWAYS: "75 minutes, full rolling boil to facilitate hot break, adding hops according to schedule above.

Finings: Irish Moss, added at 5 minutes before the end of the boil.

Chill: Counter-flow method, to facilitate cold break, to 70F prior to pitching yeast (cooler temperatures for lagers.)"

EXCEPT FOR: Weizen – state "NO FININGS due to desired cloudiness in finished beer."

12. FERMENTATION: Ales or Lagers (see yeast chart above)

Ales:

Primary: 68F for 7 days
Secondary: 68F for 21 days

Lagers:

Primary: 55F for 14 days
Diacetyl Rest: 65F for 2 days
Secondary: 32F for 60 days

13. PACKAGING

Always: Bottle condition: ¾ cup of corn sugar at bottling.
(Using kegging requires knowing the pressures of the various beers – you already have enough to remember!)

For the next four points, read and use the "helper words" from the beer score sheet. (They are on the "Classic Example" score sheet for Question #9.) Say something on each of these attributes. If it DOESN'T have that characteristic – SAY SO! (i.e. – "No alcohol warmth.")

14. AROMA

Comment on malt aroma, hop aroma, esters, and other aromatics

15. APPEARANCE

Comment on color, clarity, and head retention, head color, and head texture

16. **FLAVOR**
    Comment on malt flavor, malt sweetness or dryness, hop flavor, hop bitterness, fermentation Characteristics (esters/phenols), balance between sweetness and hop bitterness, finish/aftertaste, and other flavor characteristics

17. **MOUTHFEEL**
    Comment on body, carbonation, alcohol warmth, creaminess, astringency, and other palate sensations

18. **HOW INGREDIENTS/PROCEDURES IMPACT THE STYLE?**
    Easy way: "The malt, hops, and yeast used in this recipe work together to produce the aroma, appearance, flavor and mouthfeel representative of a _____ style." If you've got LOTS of time at the END of the test, come back to this part and elaborate more, if you know it.

See the appendix for a sample "grid" with which to answer this question.

3. Describe and compare different beer styles.

Identify three _____ beer styles where _____. Beer styles that are variations of each other based on color, strength or other subtle differences do not count as distinctly different for the purposes of this question. For each style provide a statement describing the style as well as the differences and similarities between the styles by addressing the following topics.

6 points	Describe the aroma, appearance, flavor and mouthfeel of each sub-style as in the BJCP Style Guidelines.
2 points	Identify at least one aspect of the ingredients (malts, hops, water chemistry) or background information (history, fermentation techniques and conditions, or serving methods) that distinguishes each sub-style.
1 point	For each of the sub-styles name at least one classic commercial example as listed in the BJCP Style Guidelines.
1 point	Describe the similarities and differences between the three sub-styles

THE QUESTION MIGHT BE:

- Distinct top-fermenting beer styles where original gravities are 1.070 or higher
(Russian Imperial Stout / Tripel / English Barleywine)

- Distinct German bottom-fermenting beers
(German Pilsner / Oktoberfest / Munich Dunkel)

- Distinct styles that contain wheat as at least 25% of the grist
(Weizenbock / Witbier / American Wheat Beer)

- Distinct Belgian beer styles
(Lambic / Witbier / Dubbel)

- Distinct top-fermenting beer styles with original gravities that do not exceed 1040
(Standard/Ordinary Bitter / Mild / Scottish Light 60/-)

Hint: for maximum points, make sure that all of the beers are from different categories of beer (i.e., in the case below, I chose one each from the "Sour Beers", "Belgian/French Ales", and "Strong Belgians" categories. Do yourself a favor – pick out the MOST different ones!)

i.e., **BELGIAN (***See question #2 above for example on how to fill out grid*)

IDENTIFY	Lambic	Witbier	Dubbel
AROMA	* Horse-blanket, Sweaty, Barnyard aromas, * Sour/acidic * No hops, little malt aroma * Some fruitiness OK	*Mod. Sweetness, * Grainy, spicy wheat, tart * Perfume- Coriander * Orange fruitiness	* Rich, malty sweetness * Caramel, chocolate, toast * Raisin, plum fruitiness * High alcohols common * Some spiciness. * Usually no hop aroma
APPEARANCE	* Pale yellow – Deep gold * Cloudy or clear ok * Poor head retention	*Pale straw-Light gold. * Cloudy * Dense white moussy head * Retention very good	* Dark amber-copper * Clear * Dense, creamy, long-lasting off-white head
FLAVOR	* Horse-blanket, Sweaty, Barnyard flavors, sour/acid * Fruity, oak, citrus * No hop flavor, little to no bitterness	* Sweet, Orange/citrus, crisp, dry, tart * Slight lactic sourness * Moderate spiciness * Hop flavor low to none, bitterness low/med-low	* Med-med full maltiness * Sweet, finishes dry * Raisiny, dried fruit, clovey spiciness * Low Noble hop flavor optional, med-low bitterness
MOUTHFEEL	Light to Med body. Fairly tart, puckering. Little to no carbonation.	Med. light to med body, smooth, light creaminess. Dry, tart finish. Effervescent carbonation.	Med full body. Med high carbonation. Low alcohol warmth, smooth, not solventy.
DISTINGUISH	* Fermented with wild yeasts * Use aged hops * Extended aging * 30-40% Wheat * Senne Valley	* 50% Unmalted wheat * Coriander, Orange Peel * Yeast produces spicy esters * Served young	* Complex grain bill * Dark Candi sugar added * No spices added * Yeast produces higher alcohols, esters, phenolics * Monastic origins
CLASSIC	Cantillon Grand Cru Bruocsella	Hoegaarden Wit	Westmalle Dubbel
SIMILARITIES	* Similar to Wit in both can be cloudy * Similar OG to Wit. * Uses Wheat similar to Wit * NOT similar to Dubbel	* Similar to Lambic in both can be cloudy * Similar OG to lambic * Uses Wheat similar to Lambic * NOT similar to Dubbel	* Not similar to Lambic or Wit
DIFFERENCES	* From SOUR BEER family * Most intensely sour aroma of 3 * Less malty than Dubbel	* From FRENCH/ BELGIAN family * Most carbonated of 3 * Most citrusy of 3 * Only one with spice additions	* From STRONG BELGIAN family * Most malty of 3 * Most dark fruit aromas and flavors of 3 * Most alcohol of the 3

4. Troubleshooting

Describe and discuss the following beer characteristics. What causes them and how are they avoided and controlled? Are they ever appropriate, and if so, in what beer styles?

Start by building a grid like this that takes up the entire page. Fill in the characteristics you're describing in place of #1, #2, and #3:

	#1	#2	#3
Describe/Discuss			
Ever Appropriate			
If so, Which Styles?			
How caused?			
How Avoided/Controlled?			

The grid below has been turned the other way, in order to more easily over all the troubleshooting categories:

Characteristic	**Describe/ Discuss**	**Ever Approp?**	**If so, which styles?**	**How is it caused?**	**How can it be avoided/controlled?**
Acetaldehyde	* Green apples * Grassy	Yes	Light American Lagers	* Premature removal from yeast * Bacterial Spoilage, * Oxidation	* Allow ferment to complete, * Practice good sanitation and beer handling to avoid O2 contact
Alcoholic	* Spicy * Vinous * Prickly mouthfeel	Yes	Strong Ales and Lagers	* High amt of fermentables * Under pitching * Low O2 or FAN	* Pitch sufficient yeast quantity * Aerate wort pre-pitching
Astringency	* Mouth-puckering * Flavor * Mouthfeel	No	N/A	* Extraction of tannins – over crushing, oversparging * alkaline water * Lengthy hop immersion times * Polyphenols from acetobacter * Oxidation * Spices	* Don't over crush * Keep sparge temp low * Use acidified water in sparge, * Reduce hop immersion time * Practice good sanitation * Reduce spice additions
Bitterness	* Mouth-puckering * Bitter * Aroma	Yes	* IPAs * Pale Ales * English Bitters	* High AAU hops * Lengthy hop boil times	* Use hops with lower alpha acids * Reduce hop boil times

	* Flavor * Mouthfeel				
Buttery	* Butterscotch * Diacetyl * Aroma * Flavor * Mouthfeel	Yes	* Scotch Ales * Bitters * Czech Pils * Oktober-fest (very low levels)	**Diacetyl:** * Premature racking * Low ferment temps * Mutant yeast * Lactic acid bacteria	* Reduced by yeast - allow complete fermentation * Properly aerate wort prior to pitching * Do a diacetyl rest (2 days at the end of primary @ 65 F) * Use healthy pure yeast, * Practice good sanitation
Cardboard	* Papery * Stale * Flavor * Aroma	No	N/A	* Aeration of hot wort * Exposure of higher alcohols in finished beer to oxygen * Old beer	* Avoid splashing hot wort * Carefully package beer to avoid oxygen contact * Serve beer in an appropriate amount of time
Cloudiness	* Cloudy * Appearance	Yes	* Wheat Beers * Lambic * American Wheat	**Chill Haze:** Insufficient conversion time **Permanent Haze:** High Sparge temps **Bacterial Haze**: Poor Sanitation **Powdery yeast**	* Longer mash * Use Protein rest * Use finings * Use filtration * Reduce Sparge Temps * Practice better sanitation * Choose a less powdery yeast
Cooked Corn	* DMS (dimethyl sulfide) * Vegetal * Aroma * Flavor * Precursor (dimethyl sulfoxide) occur naturally in malt, turned into DMS with heat, evaporates	Yes	* American lagers * Cream ales	* Covered boil * Zymomonas bacteria * High level of adjuncts	* Use uncovered full-rolling boil * Practice good sanitation * Reduce adjuncts in mash
Fruitiness	Esters: * Strawberries * Plums * Apricots etc * Flavor * Aroma	Yes	* Ales	* Alcohols combining with acids at higher ferment temps (Ethyl acetate, Isoamyl acetate,	* Reduce fermentation temperatures * Choose a different yeast strain

				Ethyl Hexanoate)	
Light Body	* Watery * Weak * Mouthfeel * Flavor	Yes	* American Light Lagers * Lambics	* Lack of dextrins * Poor quality malt * Large pct of sugar * Over-long protein rest * High mash temperature	* Use quality malt * Keep percentage of sugar small * Reduce length of protein rest * Use dextrin or wheat malt, flaked wheat * Lower mash temperature
Low Head Retention	* Flat * Appearance * Mouthfeel	Yes	* Lambics * High Alcohol Beers	* Insufficient proteins in beer causes high surface tension * Dirty/oily glasses * Low protein grist	* Shorten protein rest * Use clean well-rinsed glasses * Use flaked wheat or barley * Lower alcohol by lowering grist bill * Use hops with high isoalpha acids
Phenolic	* Band-aid * Medicinal * Clove-like * Plastic * Smoky * Aroma * Flavor	Yes	* Some Belgian Ales * Smoke beers * Some Wheat beers	* Wild yeasts * Improper sanitation * Some malt types * Some yeast types	* Use pure yeast strains * Practice good sanitation * Use “clean” malt * Use yeast less prone to phenol production
Sherry-like	* Sherry * Vinous * Wine-like * Paper like * Old	Yes	* Barleywines * English Old Ales	* Oxidative yeasts acting on higher alcohol beers creates aldehydes (i.e. 2-trans-nonenal)	* Use a different yeast strain * Create less alcohol by lowering grist bill * Serve beer younger * Ferment cooler
Sourness	* Tart * Sour * Aroma * Flavor * Mouthfeel	Yes	* Lambics * Flanders Ale * Berliner Weisse	* Lactic Acid (from lactic acid bacteria) * Acetobacter (from Acetic acid)	* Practice proper sanitation * Don’t employ over-lengthy mash or low temp mash

5. Beer Geography Question

Identify, describe, and give at least one classic commercial example as listed in the BJCP Style Guidelines of a major beer style commonly associated with three classic brewing centers… [THREE CITIES].

HINT: Country, Water, Malt, Hops and Yeast, plus technique. Aroma, Appearance, Flavor and Mouthfeel REQUIRED per cover sheet! History and ingredients are a bonus – put them in the "Describe" section.

Best to format your table the same as all the other "Style" question tables. You DO NOT have to list Similarities and Differences for the Geography question.

i.e.… **[Dusseldorf | Edinburgh | Newcastle]**
(*See question #2 above for example on how to fill out grid*)

CITY	Dusseldorf	Edinburgh	Newcastle
IDENTIFY (style)	Dusseldorf Alt	Scottish 60/	Northern English Brown Ale
DESCRIBE			
AROMA			
APPEARANCE			
FLAVOR			
MOUTHFEEL			
COMMERCIAL	Zum Uerige	Belhaven 60/	Newcastle Brown Ale

Three will be given from this list! The grid below has been turned sideways so as to list all the possible examples.

CITY	STYLE	COMM. EXAMPLE	DESCRIBE	AROMA, APPEARANCE, FLAVOR, MOUTHFEEL
Bamberg	Rauchbier	Schlenkerla Rauchbier	**Country**: Germany (Franconian region) **Water**: Alkaline, carbonate **Malt**: Beechwood-kilned 5-50% of grist **Hops**: German or Czech **Yeast**: German LAGER Smoky character NOT from peated malt. Underlying style: Oktoberfest – malty. **Stats: OG**: 50-64, **FG**: 12-16, **IBU**: 20-30, **SRM**: 7-16, **ABV**: 4.8-6.5% **Technique:** Use of beechwood-kilned malt, often decocted.	**Aroma:** Sweet, toasty malt. Bacon-like smoke. Low to no hops. No esters, diacetyl, DMS. **Appearance:** Light copper to brown, very clear, large creamy tan head that lingers. **Flavor:** Rich malty, toasty. Beechwood smoke. Noble hop flavor low to none, even balance. Medium dry to dry finish. No esters, diacetyl, DMS. **Mouthfeel:** Med body, med to med high carbonation, high astringency, moderate alcohol warmth, no creaminess.

Berlin	Berliner Weisse	Berliner Kindl Weisse	**Country:** Germany. **Water**: Significant Hardness **Malt:** 50% or less wheat malt, balance pale **Hops:** Continental **Yeast:** Sour from Lactobacillus Delbruckii, ALE yeast Sparkling, Pale, low alcohol – served w/ sweet syrups: woodruff, raspberry. **Stats: OG**: 26-36, **FG**: 06-09, **IBU**: 3-8, **SRM**: 2-4, **ABV**: 2.8-3.6% **Technique:** Sour mash at very low mashing temps for lengthy period of time	**Aroma:** Sharp sour, acidic, moderate fruitiness, low malt, no hops. No diacetyl, DMS. **Appearance:** Very pale straw, clear to hazy, large dense white head with poor retention. **Flavor:** Lactic sourness, bready, grainy malt. Low fruitiness. Very low hop bitterness, no hop flavor. Balance to the sour. No DMS or diacetyl. **Mouthfeel:** Light body, very high carbonation. No alcohol warmth. No creaminess or astringency.
Burton-On-Trent	English Pale Ale	Fuller's ESB	**Country**: England **Water**: Medium sulfates, hard water **Malt**: British 2-row, crystal **Hops**: English Hops – even to very bitter **Yeast**: English ALE yeast Malty. Fruitiness, Diacetyl OK. Low carbonation. **Stats: OG**: 46-65, **FG**: 11-20, **IBU**: 30-65, **SRM**: 6-14, **ABV**: 4.4-6.2% **Technique:** English bitters, cask conditioned, traditionally served fresh with gravity feed or hand-pulled beer engine.	**Aroma:** Med to med high malt, moderate caramel. Mod high to mod low UK hops. Med low to med high fruitiness. Very low diacetyl acceptable. **Appearance:** Gold to deep copper, good to brilliant clarity. Low to mod creamy off-white head, dissipates slowly. **Flavor:** Caramel, nutty, biscuity malt, med to med high UK hop bitterness and flavor, low to high fruitiness. Med dry finish, very low diacetyl ok. **Mouthfeel:** Med body, low carbonation & alcohol warmth, no creaminess or astringency.
Dublin	Dry Stout	Guinness Draught Stout	**Country**: Ireland **Water**: High carbonate hardness **Malt**: Pale, Roasted unmalted barley **Hops**: English hops **Yeast**: English ALE yeast A "stout" version of porter. Dry and roasty, some creaminess. Relatively low alcohol. **Stats: OG**: 35-50, **FG**: 07-11, **IBU**: 30-50, **SRM**: 35+, **ABV**:3.2-5.5%	**Aroma:** Roast, coffee, chocolate, grainy malt. Hops low to none. Esters med low to none. No diacetyl. **Appearance:** Black to brown, may be opaque, else clear. Creamy tan head – long lasting. **Flavor:** Roast, coffee, chocolate grainy. Med to high UK hop bitterness, medium to no hop flavor and fruitiness. No diacetyl. **Mouthfeel:** Med to med full

			Technique: Dark ROAST grains (not black!) due to need to acidify high carbonate Dublin water	body, high creaminess. Light roast astringency. Low alcohol warmth and carbonation.
Dusseldorf	Dusseldorf Altbier	Zum Uerige	**Country:** Germany. **Water:** Moderate sulfate **Malt**: Munich & Vienna malt **Hops**: Assertively bitter, Continental hops **Yeast:** German ALE Restrained fruitiness, Copper to brown **Stats: OG**: 40-55, **FG**: 12-19, **IBU**: 40-60, **SRM**: 11-19, **ABV**: 5-5.5% **Technique:** Cool ferment, then extended near-freezing lagering	**Aroma:** Complex German maltiness, restrained fruitiness. Noble hops moderate to low – peppery, floral or perfumy. No diacetyl.
				Appearance: Amber to deep copper, brilliant clarity. Thick creamy off-white head, persists.
				Flavor: Rich malt – no roast, assertive hop bitterness. Low-mod hop flavor. Med dry finish.
				Mouthfeel: Med body, med carbonation, astringency low to none, no creaminess, med alcohol warmth.
Edinburgh	Scottish 60 /	Belhaven 60/	**Country**: Scotland **Water**: High carbonate **Malt**: Scottish or English, some Roast, Crystal, or chocolate – Peated optional! **Hops**: Sparse – English. low to not evident **Yeast**: Scottish Ale Malty, smoke esters from yeast **Stats: OG**: 30-34, **FG**: 10-13, **IBU**: 9-15, **SRM**: 12-34, **ABV**: 2-5-3.3% **Technique:** High mash temp causes malty backbone; cool ferment (60 F) sometimes causes smoky esters (not required)	**Aroma:** Low-med malt sweetness, kettle caramelization, low hops, light fruit, low diacetyl, peaty aroma optional
				Appearance: Amber to copper, clear, low-mod creamy off-white to tan head.
				Flavor: Mod malt, kettle caramelization. Low to mod hop bitterness, low to no hop flavor. Bal toward malt. Opt low diacetyl, peaty flavor. Grainy, dry finish.
				Mouthfeel: Med body, low carbonation, may be creamy, no astringency, low to no alcohol warmth.
Einbeck	Traditional Bock	Einbecker Ur-Bock	**Country:** Germany. **Water:** Hardness can vary **Malt:** Dark, Caramel from Munich & Vienna **Hops**: Continental hops **Yeast**: LAGER yeast, **Stats: OG**: 64-72, **FG**: 13-20, **IBU**: 20-35, **SRM**: 14-30, **ABV**: 6-7.5% **Technique:** Lager beer,	**Aroma:** Strong malt, melanoidins, toasty. No hops. Low to no fruity esters. No diacetyl.
				Appearance: Copper to brown, good clarity. Creamy off-white head persists.
				Flavor: Rich, complex Munich & Vienna malt, melanoidins, toast. No roast or burnt. Hop

			emphasizing malt with hops just enough for balance. Often decocted.	bitterness just to support malt, no hop flavor. Sweet finish. No esters or diacetyl.
				Mouthfeel: Med body, mod carbonation, some alcohol warmth. No astringency. Mod creaminess.
Köln (Cologne)	Kölsch	PJ Früh	**Country:** Germany. **Water:** Some sulfate in water. **Malt:** Pils Malt **Hops**: Continental hops **Yeast**: LAGER yeast Fruity, dry, crisp. **Stats: OG**: 40-48, **FG**: 08-13, **IBU**: 16-30, **SRM**:3.5-5, **ABV**:4-5% **Technique:** Ferment at low Ale temps, then lager at near-freezing temps.	**Aroma:** Low-no Pils malt, apple, pear or cherry, low noble hops, winey/sulfury optional.
				Appearance: Pale gold, clear, delicate white head dissipates.
				Flavor: Soft malt, delicately fruity. Medium hop bitterness, low to high noble hop flavor. No diacetyl or fusels. Mineral, sulfur optional.
				Mouthfeel: Med-light body, Med carbonation. Low alcohol warmth. No creaminess or astringency.
Newcastle	Northern English Brown	Newcastle Brown Ale	**Country**: England **Water**: Moderate carbonate **Malt**: Mild or Pale, Caramel, scant dark malts **Hops**: English varieties **Yeast**: English ALE yeast Restrained fruitiness, some diacetyl OK. Often a nutty character. **Stats: OG**: 40-50, **FG**: 10-13, **IBU**: 15-30, **SRM**: 12-30, **ABV**: 4-5% **Technique:**	**Aroma:** Light malt w/ toffee, nutty, caramel. Light UK hop aroma. Light fruit. Low to no diacetyl.
				Appearance: Dk Amber to Red-brown, clear. Low off-white to tan head lingers.
				Flavor: Mod malt sweetness, nutty, caramel, toast, toffee. Med bitterness, low UK hop flavor, Balance even. Some fruit OK. Low diacetyl OK.
				Mouthfeel: Med body, med carbonation. Low alcohol warmth, some creaminess, no astringency.
San Francisco	California Common	Anchor Steam Beer	**Country**: USA **Water**: Low sulfate and low to moderate carbonate hardness **Malt**: Pale, Caramel, Toasted **Hops**: Rustic, Northern Brewer hops **Yeast**: ALE yeast Malty balance, pronounced hop bitterness, mild fruitiness.	**Aroma:** Low-mod caramel, toast. Mod to high Northern Brewer hops (woody, rustic), light fruit OK. No diacetyl.
				Appearance: Amber to copper, clear. Mod off-white head, good retention.
				Flavor: Toasty, caramel, grainy malt. Pronounced bitter, woody, rustic, minty hop flavor – bal towards bitter. Light fruit OK, No diacetyl.

			Stats: OG: 44-55, **FG**: 11-14, **IBU**: 35-45, **SRM**: 8-14, **ABV**: 4-5.5% **Technique:** Fermented at low temps (50-60 F) in open fermenters	**Mouthfeel:** Med body, med carbonation. No creaminess. Moderate alcohol warmth, no astringency.
Senne Valley	Lambic	Cantillon Grand Cru Bruocsella	**Country**: Belgium **Water**: varies **Malt**: 30-40% Unmalted wheat **Hops**: Aged, variety doesn't matter **Yeast**: Ale yeast, Brettanomyces, Pediococcus, Lactobacillus bacteria Horse-blanket, Sweaty, Sour from bacteria, sometimes fruity. No hop aroma or flavor. **Stats: OG**: 44-56, **FG**: 06-12, **IBU**: 10-15, **SRM**: 4-15, **ABV**: 4.7-5.8% **Technique:** Lengthy ferment with deliberate bacterial inoculation –often in wood barrels harboring bacterial strains, old hops	**Aroma:** Sour/acidic, barnyard, earthy, hay, horse blanket. Oak/citrus. Fruity: apples, honey. No hop. No diacetyl. **Appearance:** Pale yellow-deep gold. Hazy to good clarity. White head, poor retention. **Flavor:** Sour/lactic, some malt and wheat. Apples, rhubarb, honey, oak, citrus. Hop bitter low to none, no hop flavor. No diacetyl. **Mouthfeel:** Light-med body. Tartness without being astringent. Low to no carbonation. No creaminess, no alcohol warmth.
Vienna	Vienna Lager	Negro Modelo	**Country**: Vienna **Water**: Hard, carbonate rich **Malt**: Vienna, Toasted **Hops**: Continental hops **Yeast**: German Lager Soft elegant maltiness, firm hop presence. **Stats: OG**: 46-52, **FG**: 10-14, **IBU**: 18-30, **SRM**: 8-12, **ABV**:4.6-5.5% **Technique:**	**Aroma:** Rich Vienna, Munich malt, toasty. Noble hops low to none. No fruit, no diacetyl. **Appearance:** Light red-Copper. Bright clarity. Lg off-white head, persists. **Flavor:** Elegant, complex toasty malt. Hop bitterness to balance. Noble hop flavor low to none. Dry finish, malt and hops in the aftertaste. **Mouthfeel:** Med body, gentle creaminess. Mod carbonation. Slight alcohol warmth, no astringency.

6. Brewing questions

WATER

6. Discuss the importance of water characteristics in the brewing process and how water has played a role in the development of world beer styles.

In my opinion, this is one of the more difficult questions that could possibly be on an exam. Water is obviously a VERY important part of brewing, and books have been written about it. The example below is one way of answering this question that SHOULD get you a fairly decent score.

WATER TREATMENT METHODS

METHOD	IMPORTANCE
Boiling	* Removes chlorine, kills bacteria
Charcoal Filtration	* Removes chloramines
Reverse Osmosis	* 100% r/o not recommended – strips out needed minerals
Minerals	Essential for healthy fermentation * Iron * Manganese * Copper * Zinc
Salts	Commonly used: Gypsum, Calcium Carbonate (CaCO3), Magnesium Sulfate (MgSO4) Cations * Calcium – 10-20ppm needed for yeast nutrition * Sodium – Accentuates sweetness at low levels Anions * Bicarbonate – Neutralizes acids in dark malt * Chloride – Accentuates sweetness at low levels * Sulfate – Accentuates hop bitterness
Acids	Used to reduce alkalinity (if necessary) * Lactic acid * Sulfuric acid

pH (Power of Hydrogen):

WATER TYPE	pH
Pure Water	7.0
Acidic	0 – 6 pH
Alkaline	8-14 pH
Proper mashing level	5.2 – 5.7 pH

FAMOUS BREWING WATERS (choose 3 or 4)

CITY	BEER STYLE	IMPORTANCE OF WATER
Plzen	Bohemian Pilsner	Soft, low mineral content across the board, tends to decrease the perception of hop bitterness. The most ion-free brewing water in the world. Decoction mashing needed due to lack of minerals to aid enzymatic reactions.
Dortmund	Dortmunder Export	High sulfates accentuate hop bitterness. Tastes “minerally”.

Munich	Oktoberfest	High alkaline and carbonate water balances acidifying effect of dark malts.
Munich	Dunkel	High in carbonates, Carbonates increase color extraction during sparging which makes production of light colored worts difficult, hence the development of Munich Dunkel. Waters high in carbonate tend to be alkaline and make a shift to a more acidic pH, favorable for mash conditions, difficult. Additions of small amounts of dark roast malts help shift the pH to more acidic conditions. This again favors the Dunkel style.
Vienna	Vienna Lager	Hard, carbonate-rich water extracts the color from Vienna malt.
Burton	English Bitters	Extremely hard water - CaSO4 (Calcium Sulfate) & HCO3- (Hydrocarbonate), accentuates bitterness, gives drier and fuller flavor, and emphasizes hop bitterness.
Dublin	Dry Stout	High in Ca++(Calcium) & HCO3-(Hydrocarbonate), similar to Munich but slightly higher in mineral content across the board. Waters high in carbonate tend to be alkaline and make a shift to a more acidic pH, favorable for mash conditions, difficult. Additions of small amounts of dark roast malts help shift the pH to more acidic conditions.
Edinburgh	Scottish Ales	Local water often lends a “smoky” character when combined with yeast and lower fermentation temperatures.
London	Porter	High alkaline and carbonate water balances acidifying effect of dark malts. Very similar to Dublin.

MALT

6. Explain the malting process, identifying and describing the different types of malts by their color and the flavor they impart to the beer. Give the styles with which they are associated.

A. Explain the malting process

Phase	Explanation
Steeping	Barley soaked 50-65F water for 2-3 days
Germination	Allowed to sprout for 6-10 days at 50-70F. Enzymes work on proteins and carbohydrates in barley corn to convert insoluble starch chains to water-soluble starch. Grains are raked or agitated to aerate, reduce heat, and separate rootlets.
Heating	Raised to 90F for 24 hours to promote enzyme activity, then to 120F for 12 hours to dry.
Kilning	Heated from 130F to 450F for various times depending on the type of malt desired. Temperature, moisture content, and time determine type of malt.
Cooling	Cooled to below 100F, then rootlets are removed.
Resting	Malt should be rested for 1 month or longer prior to mashing.

B. Identifying and describing the different types of malts by their color and the flavor they impart to the beer. Give the styles with which they are associated.

Identify	Describe	Color	Flavor	Styles
Base Malts	• 2 and 6 row barley • Fully modified • Kilned at 130-180F	• Straw • Gold • Yellow	• Bread crumbs • Crackers	• Pale Ales • Pilsner • Tripel
Toasted Malts	• Victory, Vienna, Munich	• Amber • Copper • Red	• Biscuit • Toasted Breadcrumb • Baking Bread	• California Common
Crystal Malts	• Various Lovibond-rated Crystal and Caramel • Fully modified • Heated at 50% moisture content to 150-170F • Mashes starches inside husk • Kilned to desired color	• Amber • Copper • Red	• Caramel • Toffee • Cookies	• Dark American Lager • Munich Dunkel
Roast Malts	• Chocolate, Black, Roast • Under modified • Kilned at 5% moisture • Kilned at 420-450F for up to 2 hours • No diastatic ability	• Brown • Black	• Chocolate • Coffee	• Stouts • Porters
Non-Barley	• Wheat, Rye, Corn, Rice • May require more intensive mash process	• May cause cloudiness	• Bready, wheat, corn • Minty • Peppery	• Weizen • Roggenbier • American Lagers • Cl. American Pilsner

HOPS

6. Discuss hops, describing their characteristics, how these characteristics are extracted, and the beer styles with which the different varieties are normally associated.

Discuss hops:

1. Active ingredient: Lupulin, gland of the female plant of Humulus Lupus
2. Oils and Resins: Resins contain Alpha and Beta acids, Oils contain aromatics
3. Humulone and Cohumulone
4. Alpha and Beta acids – Alpha cause the bittering to occur in beer, Beta do not isomerize, but contribute to aroma
5. Isomerization
6. IBUs/Formula: $IBU = \frac{7490 \times Weight(oz) \times AA\% \times U}{V(gallons)}$

Hop Characteristics	How these characteristics are extracted
Antibacterial/Preservative	Boiling hops in wort.
Bitterness	Boiled for 60 minutes or longer from the end of the boil. Hop utilization is about 25% in this phase.
Flavor	Boiled for 40-25 minutes from the end of the boil. Hop utilization is about 10% in this phase.
Aroma	Boiled for 15 minutes or less from the end of the boil. May also be steeped by throwing them in after flame-out. Hop utilization is 5% or less in this phase.
Aroma	Dry Hopping. Added to the secondary fermenter for aroma only.

Hop Variety	Country	Characteristics	Associated Style
Hallertauer, Tettnanger, Spalt	Germany	Noble hops. Low in bitterness, high on aroma, spicy, floral	German Pilsner, Bocks, Alts
East Kent Goldings, Fuggles	England	English hops: Good for bittering, flavor and aroma, earthy, tobacco	English Pale Ale, Porter
Saaz	Czech Republic	Floral, mild, sweet	Bohemian Pilsner
Cascade, Centennial, Columbus, Amarillo	America (Pacific Northwest)	Citrusy, grapefruity	American IPA, American Pale Ale
Northern Brewer	Europe, America	Rustic, Woody	California Common
Styrian Goldings	Austria and Slovenia	Spicy	Witbier, Belgian Pale Ale

YEAST

6. Describe the stages of yeast development and give five considerations in selecting the appropriate yeast strain for a given beer style.

A. Describe the stages of yeast development

Name	Describe
Lag Phase	Make enzymes, use glycogen, acclimatize to environment
Growth Phase	Divide 1-3 times, absorb oxygen, make sterols
Low Krauesen	Anaerobic metabolism begins, foam on center of beer
High Krauesen	Most active portion of fermentation
Late Krauesen	Yeast metabolizes fermentation by-products

B. Give five considerations in selecting the appropriate yeast strain for a given beer style.

Consideration	Effect on Beer
Apparent Attenuation	• Less residual sweetness (lager yeast) • More alcohol • Less body
Alcohol Tolerance	• Greater Alcohol by Volume
Flocculation	• Less time required for clearing • Potentially clearer beer
Temperature	• Fruity esters for ale yeasts (higher temperatures) • Clean, ester-free beers for lager yeasts (lower temps) • Lager yeasts require longer time to finish
Ester/Phenol Production	• Fruity flavors/aromas for yeasts high in ester production • Clean, crisp flavors/aromas for yeasts low in ester production • Spicy, clove or peppery phenols in Belgian styles and Bavarian Wheat beers
Diacetyl Production	• Butter or Butterscotch flavors • Acceptable in low amounts in some styles

MASHING

6. Explain what happens during the mashing process. Describe three different mashing techniques and the advantages and disadvantages of each.

A. Explain what happens during the mashing process.

Mashing Step	Temperature	Time	Active Enzymes	Description
Milling Grain	n/a	n/a	n/a	* Crushing grain kernels to expose starches
Dough-in	10-15F higher than first rest to raise grain temperature	n/a	n/a	* Mixing grist with water * 1.3 qts per pound of grist * Break all clumps so no dry grist remains
Acid Rest	95-120F	60-120 min	* Phytase * Beta Glucanase	* For under-modified malt only * Lowers mash PH when using low calcium brewing liquor * Breaks down phytin into calcium- and magnesium-phosphate and phytic acid * Breaks down hemicellulose and gums in the cell walls
Protein Rest	113-127F	15-60 min	* Proteinase * Peptidase	* Proteolytic enzymes * Breaks down proteins into smaller fractions such as polypeptides * Breaks down polypeptides into peptides and amino acids, essential for proper yeast growth and development
Saccharification	See descriptions for Beta and Alphay Amylase enzymes			* Breaks down starches into dextrins and fermentable sugars **Produces:** * Monosaccharides: Glucose, Fructose, Mannose, Galactose * Disaccharides: Maltose, Isomaltose, Fructose, Melibiose, Lactose * Trisaccharides: Maltriose * Oligosaccharides: “dextrins” – glucose chains
Saccharification – Beta Amylase	130-150F	15-90 min	* Beta Amylase	* Subset of Diastatic enzymes * Yields wort very low in dextrins, high in fermentables * M.A.L.T. – More Alcohol, Lower Temperature * Breaks off maltose units from reducing ends of starches
Saccharification – Alpha Amylase	149-158F	15-30 min	* Alpha Amylase	* Subset of Diastatic enzymes * Wort high in dextrins, low in fermentables

				* Breaks 1-4 links from starches at random
Mash-Out	168-172F	5-15 min	n/a	* Denatures enzymes, stops conversion * Reduces viscosity, aids run-off of mash

B. Describe three different mashing techniques and the advantages and disadvantages of each.

Mash-Type	Describe	Advantages	Disadvantages
Infusion Mash	* Mixing grain with a single temperature of water and resting at that temp for the entire mash	* Requires minimum of labor, equipment, energy and time	* Prohibits the use of under modified malt or adjuncts
Step Mash	* Mashing in with a low temp of water * Raising mash temps to achieve conversion goals * Temp raised by adding boiling water or direct heat	* Allows flexibility in use of different temp steps * Under modified malts may be used.	* Requires more resources (labor, time, equipment)
Decoction Mash	* Removal of a thick third of mash * Raise to brief saccharification rest * Boil for 15-30 minutes * Mixing it back into the main mash * Repeat up to 3 times	* Explode starch granules * Breaks down the protein matrix in under modified malt * Improves extraction efficiency * Promotes the formation of melanoidins.	* Most resource intensive (time, labor, equipment) * May extract higher levels of tannins and DMS precursors from grain husks
Cereal Mash (Double Mash)	* Two separate mashes: main mash is crushed malt, cereal mash is raw adjuncts and a bit of crushed malt * Boiled for 1+ hours to gelatinize the starches * Added to main mash, which has undergone an acid rest	* Allows use of adjuncts as alternate source of sugar	* Needs to be boiled or hot-flaked before adding to mash * Time and resource intensive

7. Family of Beers question

7. For each of the three sub-styles [A, B, and C] provide a statement describing the sub-styles as well as the difference and similarities between the sub-styles by addressing each of the following topics:

6 points	Describe the aroma, appearance, flavor and mouthfeel of each sub-style as in the BJCP Style Guidelines.
2 points	Identify at least one aspect of the ingredients (malts, hops, water chemistry) or background information (history, fermentation techniques and conditions, or serving methods) that distinguishes each sub-style.
1 point	For each of the sub-styles name at least one classic commercial example as listed in the BJCP Style Guidelines.
1 point	Describe the similarities and differences between the three sub-styles

i.e. **[Maibock, Traditional Bock, Doppelbock]**

Three beers will be given. They will usually all be in the same FAMILY of beers. The potential list of beers to be compared is in the appendix of this study guide, under "**COMBINED Possible (named) Section II Beers for Q.1,3,5,7 and 9**".

(*See question #2 above for example on how to fill out grid*)

STYLE	**Maibock**	**Traditional Bock**	**Doppelbock**
AROMA			
APPEARANCE			
FLAVOR			
MOUTHFEEL			
INGREDIENTS/ BACKGROUND			
CLASSIC			
SIMILARITIES			
DIFFERENCES			

8. Beer Characteristics Question

8. What is meant by the terms "hot break" and "cold break"? What is happening and why are they important in brewing and the quality of the finished beer?

	Meaning	**What's happening?**	**Why important in brewing and beer quality?**
Hot Break	* Flocculation of proteins and other materials during the boil	* Begins forming at beginning of boil – 212 F * Consists primarily of proteins, responsible for chill haze * pH of 5.2 ideal for hot break formation * Achieved by full, rolling boil of at least 60 minutes * Boil for 2 hours promotes maximum hot break *Best promoted with quicker temperature rise * Controversy regarding removal during boil or not	* Reduces protein (chill) haze
Cold Break	* Flocculation of proteins and other materials during cooling	* Begins forming at about 140 F * Consists of protein-polyphenols (tannin) complexes * Higher level of carbohydrates than hot break * Must be rapidly cooled below 70 F for best results * Some cold break left in fermenter provides yeast nutrients * Removing Cold Break prior to ferment reduces fusels and sulfur flavors	* Facilitates clear beer * Minimizes DMS * Reduces fusels and sulfur flavors

8. What are body and mouthfeel? Explain how the brewer controls body and mouthfeel in his/her beer?

	What is it?	How to control?
BODY	* **Body** is a sub-characteristic of Mouthfeel	(See below)
MOUTHFEEL	* **Mouthfeel** is the tactile character of beer, how it "feels" in your mouth. It has five sub-components: Body, Alcohol Warmth, Creaminess, Astringency and Carbonation.	***** Primarily controlled by the amount of dextrins and medium length proteins in the finished beer.
	* **Body** is the viscosity of a beer. On a viscosity scale of water to molasses, water is a "thin" body, and molasses would be a "thick" body.	* Increasing unfermented dextrins will give the perception of a "bigger, thicker" body – use more grist, mash hotter (153 F) * Reducing unfermented dextrins will give the perception of a "smaller, thinner" body – use less grist, mash cooler (148F)
	* **Alcohol warmth** is the sensation of warmth or burning you feel as the beer goes down your throat. Whiskey would be at the high end of alcohol warmth.	* Reduce fermentables, ferment cooler to reduce alcohol warmth and fusels * Increase fermentables, ferment warmer to increase alcohol warmth and fusels
	* **Creaminess** is the sensation of "smoothness" or "roundness" in a beer. It is the opposite of "Crispness."	* A percentage of Oats in the grist can cause a creamy sensation.
	* **Astringency** is the puckery sensation you get from a beer.	* Primarily caused by tannins (sometimes mistakenly attributed to hop bitterness) * Can also be caused by a high percentage of roast or dark malt in the grist * Can also be cause by lingering hop bitterness * Reduce tannins by: - Keeping sparge under 168F - Ending sparge when gravity of runoff reaches 1004
	* **Carbonation** is the sparkling sensation you feel in your mouth, or in extreme cases, in your nose. Champagne or Seven-Up soda would be at the high end of carbonation.	* To increase bottle carbonation, add more priming sugar and/or a small amount of fresh yeast at bottling. * To increase carbonation in kegging, increase the CO2 pressure. * Unwanted high carbonation can be decreased by completely fermenting the beer prior to packaging.

NOTE: Should you be lucky enough to get this question, pull out one of your score sheets for the taste section of the test and look at the key words under "Mouthfeel" – then just copy them down and define each of them, and explain how to control each of them.

8. Describe and explain the role of diastatic and proteolytic enzymes in the brewing process and how they affect the characteristics of the finished beer.

	Proteolytic	**Diastatic**	
Works on	Proteins	Starches	
Subset	Proteolytic	Beta Amylase	Alpha Amlyase
Temperature	113-127F (aka "Protein" rest)	130-150F (aka "Saccharification")	149-158F (aka "Saccharification")
Describe/Explain	* Proteinase breaks down proteins into smaller fractions such as polypeptides – necessary for good head retention. * Peptidase breaks down polypeptides into peptides and amino acids, essential for proper yeast growth and development	* Starches are gelatinized * Beta amylase enzymes breaks off maltose units from reducing ends of starches * Unable to break down largest units of starches	* Alpha amylase enzymes breaks 1-4 links from starches at random * Unable to break down into smallest units of starches
Effect on Beer	* Reduces cloudiness * Too long a protein rest can reduce head	* Creates more fermentable wort * Thinner bodied beer	* Creates more dextrinous wort * Thicker bodied beer

NOTE: If you get this question, the big hint is the word "Proteolytic" – remember "Proteo" means "proteins." You'll just have to remember that the OTHER type of enzyme – Diastatic – works on starches, but the the root of the word "Diastatic" ("Dia-") should remind you that it has two components, Beta and Alpha. Beta-Amylase enzymes are activated first in the temperature scale – in the lower range, and Alpha-Amylase is activated second – at the higher range. You could remember "Alpha" as in "Alpha-male" – the TOP of the temperature range. Note that the two ranges overlap at 149-150F, so to take advantage of BOTH the Beta and Alpha Amylase enzymes, choose that temperature for your Saccharification rest.

. 8. Describe the following brewing techniques. How do they affect the beer?

A) Kräuesening B) Adding Gypsum C) Fining

	Describe	**Effect on Beer**
Kräuesening	* The addition of a portion of actively fermenting wort to a wort that has finished fermenting.	* To provide "natural" carbonation. * Also reduces residual diacetyl * Used for most German and American Lagers * May contribute acetaldehyde ("green" beer character) in the finished beer.
Adding Gypsum	* Gypsum is Calcium Sulfate * Common brewing salt * Key salt for “Burtonization”	***** Increases Ca++ and SO4— * Calcium helps yeast metabolism in proper levels, * Calcium allows the wort to acidify * Critical to proper enzyme function. * Sulfate lends a soft edge to hop bitterness by affecting alpha-acid extraction and creating a synergistic perception effect.
Fining	* The addition of a compound to wort or beer. * Added to the boil for hot break: Irish moss or Whirlfloc * Added to the secondary: Isinglass, Bentonite, Polyclar, Sparkloid	***** Coagulates proteins to clarify beer * Precipitate tannins and/or proteins that may cause haze, or even flavor instability.

8. Explain how the brewer gets the following characteristics in his/her beer.

A) Good Head Retention B) Clarity in beer C) Proper diacetyl level for style

Explain how the brewer gets the following characteristics in his/her beer.

A. Good head retention

Answers here should focus on medium length proteins, but dextrins do play a minor role. The breakdown of proteins occurs in the mash, so there should be a description of proteolysis.

B. Clarity in a beer

1. Use a protein rest in the mash (122 F for 15-30 minutes)
2. Boil long enough for a good hot break (60 minutes minimum)
3. Chill rapidly enough for a good cold break
4. Use fining agents
5. Watch your sanitation. There are also starch and bacterial hazes, but these are rare compared to permanent and chill haze.)

C. Proper diacetyl level for style

The level of diacetyl in the beer is most strongly affected by the choice of yeast and the fermentation temperature. All yeasts produce diacetyl, but some are more effective at reducing it than others. Cold secondary fermentations can inhibit the ability of yeast to reduce diacetyl; so many lager brewers employ a diacetyl rest (raising the temperature of a lagering beer to room temperature for 1-2 days). Premature racking from the yeast can keep the diacetyl level abnormally high.

9. Complete the attached scoresheet marked with "Classic Example Score Sheet" as if you were judging a *classic commercial example* of the _____ style. You do not need to complete the "Overall Impression" section but otherwise the scoresheet should be completed as it would during a normal competition.

See the example sheet in the Appendix.

This should be treated just like another Tasting score sheet.

- This is supposed to be a Classic Commercial Example, not a "perfect beer", so if you have a specific commercial example in your mind for this style as you write this question, that will help.
- Comment on each and every one of the helper words.
- Fill every line up completely – leave none blank.
- Use colorful, lively and evocative language for your descriptions.
- Stick to objective comments – only what you would smell, see, taste or feel.
- If you want to be brave, you can even comment on a well-known FLAW of that commercial style, if you know of one! (For example: a little bit of skunkiness in any example that normally comes in a clear or green bottle….)
- Don't forget to fill out the style grid! Easy points – all 5's!
- Another easy point – circle the score that you WOULD HAVE given the beer (45-50) on the Scoring Guide.
- The potential list of beers is in the appendix of this study guide, under "**COMBINED Possible (named) Section II Beers for Q.1,3,5,7 and 9**".

TASTE PORTION

4 beers (worth 30% of your total score)

THE SCORESHEET – THE SECTIONS YOU WRITE FOR EACH BEER

The first four sections on the score sheet (aroma, appearance, flavor and mouthfeel) are objective! What do you sense? Don't write about how to improve these sensations in the first four sections. Save those for "Overall". Comment on each "key word" beneath each section of the score sheet. (Some people even make a little check mark on the key word after they've commented on it. This also telegraphs to the grader: "Look, see? I talked about this aspect of the beer!")

1. **AROMA** - ***Key Words:*** Malt, hops, esters, and other aromatics
2. **APPEARANCE** - ***Key Words:*** Color, clarity, head retention, head color, and head texture
3. **FLAVOR** - ***Key Words:*** Malt, hops, fermentation characteristics, balance, finish/aftertaste, and other flavor characteristics
4. **MOUTHFEEL** - ***Key Words:*** Body, carbonation, warmth, creaminess, astringency, and other palate sensations

The fifth section is subjective. How did you enjoy the beer? How could the brewer improve the beer, the recipe and/or the process?

5. **OVERALL** - Overall drinking pleasure associated with entry, give suggestions for improvement

HOW THE GRADERS GRADE THE TASTE SECTION

The graders score the TASTE section on 5 segments - each beer gets 5 points for each segment, for each beer, totaling 100 points.

1. SCORE: How close did your score for the beers get to the consensus proctor scores?
2. PERCEPTION: How closely did your descriptions of the beers match those of the proctors? Did you identify the primary characteristics?
3. DESCRIPTION: Were your comments colorful and evocative?
4. FEEDBACK: Did you describe how you enjoyed the beer? Did you give 2-3 specific suggestions for improvement?
5. COMPLETENESS: Did you avoid leaving white space? Did you comment on all sub-key words under all sensory components? Did you fill out the style grid? Did you total your score accurately?

The first two segments, SCORE and PERCEPTION, are dependent on how the proctors scored and perceived the beer.

The last 3 segments, DESCRIPTION, FEEDBACK, and COMPLETENESS are all dependent on you - as long as they're all consistent to each other and all thorough, you should be able to get the maximum points independent of the proctors score sheets.

A. SCORE

(20 points total – based on absolute difference in scores for all four beers)

For SCORE, graders take the absolute difference between your score and the proctors score on each beer, total them, then compare them to the Score matrix: i.e.

	Proctors' Consensus	Your Score	Absolute Difference
Beer 1	43	38	5
Beer 2	33	35	2
Beer 3	13	15	2
Beer 4	27	25	2
		TOTAL	11

Variance from Proctors	Points	Variance from Proctors	Points
0-4	20	19-22	14
5-8	19	23-26	13
9-12	**18**	27-30	12
13-14	17	31-35	11
15-16	16	36-40	10
17-18	15	>40	9

In the case above, the total absolute difference was between 9-12, so you would get 18 points for the SCORING portion of the Taste exam. (NOTE: you CAN'T get any fewer than 9 points on the Score section, no matter HOW far off you were from the proctors' scores.

- Think of all the "Calibration Beers" you've ever judged.
- Do you usually judge higher or lower than everyone else?
- Do you have a fondness or dislike for some styles that consistently make you judge them either high or low? If so, score the beers normally, then knock off or add a point or two, per your calibration experiences.

Want to play the averages? (Risky.... use at your own peril!)

- It's considered poor taste to judge a beer below 13, and most people will give no higher than a 45.
- That gives you a 32 point range, not a 50 point range (45-13 = 32).
- The midpoint between 13 and 45 is 29. (32 / 2 = 16, 13 + 16 = 29) Most judges don't sway too far from this.
- IF (and I say IF) a beer on the exam is really poor, give it a 13. Done deal. (One beer in the exam set is supposed to be flawed.)
- If a beer is nearly average, give it near a 29.

Even <u>more</u> risky business… exam administrators are instructed to offer the following beer examples:

- As near as possible to a flawless, "Classic Example" (mid to high 40's score)
- A badly flawed beer (13-20 score)
- A middle-range beer (27-34 score)
- A beer that has a perceptible flavor or aroma component (depends on whether the characteristic is appropriate for the style or not)

If you think you recognize which beer fits which category, and if you think your exam administrator has properly followed directions, then you can set your score based on these hunches. (I told you it was risky!)

B. PERCEPTION

(20 points total - 5 points per beer)

- Did you get the same characteristics in the beer as the proctors and the rest of the examinees?
- Write what you see, hear, smell, taste feel.
- Write every little thing – however slight it was.
- Write what wasn't perceived as well as what was perceived, especially for the "key words." (i.e., "No hop aroma", "No astringency", etc.)
- Use as many colorful, descriptive words as you can muster. The more you write, the more likely you'll match some of the perceptions of the proctors
- Use real descriptors - i.e. "Dark Brown to Ruby" instead of "Dark", "Head pours full, gradually dissipates" instead of "Good head"
- There's an element of luck here, as you're trying to match what the proctors perceive.
- Risky Tip: If you know the proctors, recall other judging experiences you've had with them. For example, if you know that a specific judge picks up diacetyl at 0.005 parts per million, be sure to mention Diacetyl in your descriptions....

C. DESCRIPTIVE ABILITY

(20 points total – 5 points per beer)

- Talk about EACH element of the beer: Malt, Water, Yeast, and Hops (bittering, flavor and aroma) in each section where it's appropriate, as well as the balance between them.
- Don't forget: hops have three purposes: Bitterness, Flavor and Aroma - talk about each!
- It's useful to talk about the lack of a descriptor also (i.e., "No floral hop aroma" for a Bohemian pilsner would be an objective, and telling statement)
- Throw in a couple of factoids that show you understand what that world-beer style is supposed to taste like (i.e., in the Overall section, write "Try adding some Lyle's Golden Syrup to create the toffee-like character normally found in an English Bitter....), etc.
- Avoid words like "Nice", "Good", "Appropriate to Style"
- Use instead colorful, evocative language, i.e. "Tan to Brown head, thick and moussy, tiny bubbles, very slowly dissipates to a fine film on the surface"
- Don't forget to comment on sweet-bitter balance
- Use ***DESCRIPTIVE***, colorful words for sensations: color, viscosity, smell, taste, feel. NOT: "Nice", "Good" or "Appropriate to Style"
- Quantify the intensity of the flavor component, ie. "low", "medium", or "high."

IE:

APPEARANCE: instead of "Nice Head"…

Huge, creamy tan to brown head, tiny bubbles, dissipates gradually. Lace clings to the side of glass. Garnet to Black color, almost opaque. Brilliantly clear.

AROMA: instead of "Good Aroma"…

Bready malt aroma, fruity raisin notes. Spicy hop nose lingers. Some alcohol scent.

FLAVOR: instead of "Great Flavor"…

Rich chocolate and roast malt flavor, with dark fruit overtones. Hop flavor subdued with faint citrus notes, but firm hop bitterness provides balance for huge malt bill, towards the malt side. Slightly medicinal, "Chloraseptic"-like taste very slight, in background.

MOUTHFEEL: instead of "Big Body"…
Thick, chewy body, like a loaf of rye bread in a glass. Creamy, not oily sensation going down. Alcoholic warmth spreads like a fire in my belly. Some astringency, but the sensation is probably hop-based rather than tannin-based.

OVERALL: instead of "Good beer!"… (OK, but don't stop there!)
Good Beer! Chocolate and roast malt comes through strong; base malt provides a solid framework. Hop bitterness was to balance, but the use of citrus hops (Cascades?) is inappropriate for a Russian Imperial Stout. Use English flavor and finishing hops instead. Slight medicinal flavor may indicate sanitation or rinsing issue. If using bleach, be sure to RINSE WELL!

D. FEEDBACK

(20 points total – 5 points per beer)

- Did you tell the brewer how you enjoyed their beer? (hint: use the score guidelines, and make sure your enjoyment word matches your score - i.e., Outstanding=45-50, Excellent=38-44, Very Good-30-37, Good=21-29, Fair=14-20, or Problematic-0-13)
- Did you give the brewer at least one specific suggestion to improve the beer? (Hint: You'd BETTER, unless you scored the beer a perfect 50!)
- The lower the score you gave, the more suggestions you should offer!
- Did you give at least 2-3 specific suggestions for improvement on each beer?
- Did you score the beer 13 or higher? (For the purposes of the test, DON'T give a beer below 13, no matter how bad it is!)
- Did you say something positive and encouraging?

E. COMPLETENESS

(20 points total – 5 points per beer)

- Did you fill out all the sections?
- Was each section jam-packed with stuff?
- Did you fill out the Style Grid?
- Did you total your score correctly?
- Did you PRINT LEGIBLY??
- Did you PRINT? (Don't use cursive!)
- Did you leave any whitespace?
- Did you comment on all key-words beneath main sections?
- Did you total your scores accurately? (Simple calculators are ok to use on the test!)

It is important that you FINISH each of the four score sheets! Since this is a timed test, it means you must complete each score sheet in about 12 minutes – roughly the amount of time you'll have to judge a beer and fill out a score sheet in a competition scenario. USE A WATCH, and when 12 minutes goes by, move on to the next beer – or the next question on your test. If you have extra time at the end of the test, you may come back to the score sheets and add more to them.

PRACTICE THIS before undertaking the test! Time yourself as you fill out ten or twelve score sheets in your preparation for the test. Keep them, and compare your first one to your last one to check your improvement.

APPENDIX – Sample Text Questions

This section contains sample questions, and the blank grid in which you may write your answer. NOTE: The exam will NOT give you these grids! If you wish to use the grid and bullet system to structure your answers, you will have to create the grid yourself prior to writing your answers. If you have studied the BJCP EXAM FOR DUMMIES well, this should be second nature to you by now.

SECTION 1. (BJCP/ETHICS/JUDGING PROCESS)

Part 1: BJCP

List three primary purposes of the BJCP as listed on http://bjcp.org and in the BJCP Study Guide..

1. _____

2. _____

3. _____

Complete the grid with the 7 principal BJCP Judge Levels, excluding honorary ranks, and the requirements to earn each of them (for 2.5 points).

BJCP Level	Minimum Exam Score	Total Experience Points	Minimum Judging Points	GM Service Requirements
				Yes / No
				Yes / No
				Yes / No
				Yes / No
				Yes / No
				Yes / No
				Yes / No

SECTION 1 (BJCP/ETHICS/JUDGING PROCESS)

Part 2. Judging Process & Ethics

For the following 15 questions circle the "T" if the statement is true or circle the "F" if the statement is false. Each question is worth one third of a point or, in total, the 15 questions are worth 5 of the 100 points possible on the essay portion.

Definitions	
T / F	A competition organizer may serve as the judge director and may also serve as a judge, provided this person has no knowledge of entries and entrants.
T / F	A competition organizer may serve as a judge, provided this person does not divulge information about entries and entrants to other judges.
T / F	The "lead" judge at a table should try to tutor apprentice or lower-rank judges if time permits.
T / F	The steward at the table has sole responsibility for completing the Cover Sheets for beers in each flight.
T / F	The "lead" judge at a table should fill out Cover Sheets for beers in his or her flight as directed by the competition management.
T / F	There is no need for the lead judge to complete the Flight Summary Sheet - the competition organizer can obtain all that information from the cover sheets.
T / F	If possible, there should be at least one BJCP-ranked judge in every flight.
T / F	When novice judges judge entries in a competition, each novice should be paired with a BJCP judge.
Conduct	
T / F	To reduce stray odors and flavors present, beverages and foods other than water, bread or crackers should not be brought to the judging table.
T / F	You must filter out strong scents from fellow judges or the environment from your mind rather than discussing the problem with the competition organizer.
T / F	Because entries cannot have any identifying marks, it is ok for a judge to judge beers in a category he or she has entered.
T / F	If a judge is assigned to judge a category that he/she has entered, that judge should ask the competition organizer to reassign him/her to another category.
T / F	Judges should not read and review the sub-style being judged from the BJCP Style Guidelines while at the judging table prior to judging that style.
T / F	Novice judges may only evaluate entries if authorized by the judge director, and novices should be paired with BJCP judges when possible.
T / F	Judges may invite stewards to taste the beers in a flight, if there's enough sample to share.
T / F	It is acceptable to change the order in which you judge the beers on your flight sheet from how it was printed.
T / F	Beers must be evaluated in the sequence specified on the flight sheet.
Preparing	

T / F	If you have eaten spicy or greasy food within few hours prior to judging, you should use mouthwash or antiseptic rinse before judging.
T / F	You should avoid eating spicy or greasy food within few hours prior to judging.
T / F	Hot and/or spicy foods should be avoided prior to a judging event because they can reduce a judge's sensitivity to the aromas and flavors of beer.
T / F	Perfumed shampoos and colognes should be avoided prior to a judging event because they can reduce a judge's sensitivity to the aromas of beer.
T / F	It is a good idea to take a decongestant prior to a judging event to increase your sensitivity to the aromas of beer.
T / F	Calibrations beers are selected to be the standard against which entries should be judged.
Mechanics	
T / F	It is the responsibility of the lead judge, in consultation with the other judges in a flight, to assign a consensus score to each entry.
T / F	It is important to be quick as well as to write your score sheets thoroughly and completely.
T / F	When there is a discrepancy in the scores for a given beer, the lower-ranked judges should yield to the opinion of the highest ranked BJCP judge at the table.
T / F	A judge must disqualify an entry if it has raised lettering or the cap has identifying marks.
T / F	Only the judge director or competition organizer can disqualify an entry.
T / F	When you suspect an entry has been placed in the wrong flight based on the style being judged, you should request that it be judged in a different flight instead.
T / F	When you suspect an entry has been placed in the wrong flight based on the style being judged, you should consult with the judge director or competition organizer.
T / F	It is not necessary to offer any feedback for improvement if you score a beer above 40.
T / F	It is common practice to refrain from sharing your thoughts while judging a beer until the other judges have completed their scoresheet.
T / F	If you are very familiar with a beer style, it is preferable to disregard the BJCP Style Guidelines and rely on your personal expertise instead.
T / F	After discussing the initial scores, judges should adjust their final scores to be within seven points.
T / F	If rushed, it's OK to write only comments and an overall score on a score sheet, leaving the scores for the subsections blank.
T / F	If rushed, it's OK to write only 1-2 comments on a score sheet as long as the score is filled out.
T / F	If a beer is a "gusher" or has an unpleasant aroma upon opening, a judge may assign a courtesy score of 13 without tasting and commenting on the characteristics of the beer.
T / F	All beers should be tasted and scored, even if they are "gushers" or have an unpleasant aroma upon opening.
T / F	It is acceptable to comment on the serving temperature of the beer on the score sheet if you feel it was a relevant criterion in regards to your enjoyment of the

	beer.
T / F	In each section of a score sheet, you should only comment upon the most prominent features of each entry, not subtle characteristics.
T / F	Scores should not be assigned to the aroma section immediately because the entry's aroma profile may change over time.
T / F	Each section must be scored with a number prior to writing any comments, to best capture your first impressions.
T / F	To assure objectivity, you should never write your full name or put contact information on the score sheet.
T / F	You should write your full name and judging rank on each score sheet.
T / F	You should always fill out the "Style Grid" on the score sheet, as a good check against your scores.
T / F	You should use the "Overall Impression" section of the score sheet to refer to how the entry compares to other entries in the flight.
T / F	You should use the "Overall Impression" section of the score sheet to comment on how much you enjoyed the entry or provide suggestions for how to improve the beer.
T / F	A score in the "Outstanding" range is reserved for beers that not only lack flaws but also have the hard-to-define "extraordinary" character that great beers have.
T / F	The courteous lower limit for scores assigned to "Problematic" beers is 6 points—one point for each section of the score sheet.
T / F	The courteous lower limit for scores assigned to "Problematic" beers is 13 points.
T / F	If judges require more "samples" than one bottle to judge a flight, the "lead" judge should ask the steward to request a second bottle from the cellar master.
T / F	It is preferable to use ink on score sheets so that your scores and comments cannot be altered by contest personnel.
T / F	It is preferable to use mechanical pencils, rather than wooden pencils, on score sheets so that wood odors do not interfere with beer aromas.
T / F	It is acceptable to request a second bottle to give the entry a fair chance at an accurate judging if a beer is a "gusher" or tastes infected.
T / F	Entrants may contact the judge, the competition director, or their BJCP Regional Representative if they are dissatisfied with any aspect of their score sheets.
T / F	When your flight has finished, you should avoid having conversations that might distract other judges who have not yet finished their flights.
T / F	When your flight has finished, it is OK to visit other flights still in progress to see how beers you have entered are faring.
T / F	Because it may have been entered by a person in the room, it is polite to refrain from publicly deriding a "problem" beer that you have scored during a competition.
T / F	Judges from outside the table should not be consulted on a beer unless the judges at the table cannot reach a consensus score, and then only if they all agree to the consultation.

SECTION 2 (STYLES/BREWING TECHNIQUES)

1. For each of the three sub-styles [A, B, and C] provide a statement describing the sub-styles as well as the difference and similarities between the sub-styles by addressing each of the following topics:

6 points	Describe the aroma, appearance, flavor and mouthfeel of each sub-style as in the BJCP Style Guidelines.
2 points	Identify at least one aspect of the ingredients (malts, hops, water chemistry) or background information (history, fermentation techniques and conditions, or serving methods) that distinguishes each sub-style.
1 point	For each of the sub-styles name at least one classic commercial example as listed in the BJCP Style Guidelines.
1 point	Describe the similarities and differences between the three sub-styles

STYLE			
AROMA			
APPEARANCE			
FLAVOR			
MOUTHFEEL			
DISTINGUISH			
COMMERCIAL			
SIMILARITIES			
DIFFERENCES			

2. Provide a complete ALL-GRAIN recipe for a _____, including

1 point	Target statistics (starting specific gravity, final specific gravity, and bitterness in IBUs or HBUs) and color (as SRM or a textual description of the color)
2 points	Batch size, ingredients (grist, hops, water, and yeast) and their quantities
3.5 points	Mashing, boil, fermentation, packaging, and other relevant brewing procedures
3.5 points	Explain how the recipe fits the style's characteristics for aroma, appearance, flavor, mouthfeel, and other significant aspects of the style and describe how the ingredients and processes used impact this style.

1. OG:_____ **3. IBUs _____**
2. FG:_____ **4. SRM/Color_____**

5. Batch Size _____ gallons

6. Grist: (_____% efficiency)
____lb _____
____lb _____
____lb _____

7. Hops:
__oz bittering: _____ ____%AA _____min., 25%Util.
__oz flavor:_____ ____%AA _____min., 5%Util.
__oz aroma:_____ ____%AA _____min., 0%Util.

8. Water: _____
_____

9. Yeast: _____ variety, pitched post-chill, at _____ºF, aerated by_____

10. Mash: _____ technique
_____ rest _____ºF _____ minutes
_____ rest _____ºF _____ minutes
_____ rest _____ºF _____ minutes
Vorlauf: _____ minutes
Sparge/Lauter _____ºF, _____gallons, _____minutes

11. Boil/Chill:
Boil _____minutes, full rolling boil to facilitate hot break, adding hops according to schedule above.
Finings: _____, Added at _____minutes

Chill: Use _____method to facilitate cold break, to _____ºF, prior to pitching yeast

12. Fermentation:
Primary: _____ºF, _____days
Diacetyl Rest: _____ºF, _____days
Secondary: _____ºF, _____days

13. Packaging:
Bottle Condition: _____cup priming sugar at bottling **OR** Keg with _____ volumes CO2 at kegging

14. Aroma:_____

15. Appearance: _____

16. Flavor:_____

17. Mouthfeel: _____

18. How ingredients/procedures impact the style: _____
_____
_____
_____

4. Describe and discuss the following beer characteristics. What causes them and how are they avoided and controlled? Are they ever appropriate, and if so, in what beer styles?

	1.	2.	3.
Describe/Discuss			
How caused?			
How avoided/ controlled?			
Ever Appropriate?			
If so, which Style?			

5.Identify, describe, and give at least one classic commercial example as listed in the BJCP Style Guidelines of a major beer style commonly associated with [A, B, and C].

CITY	A.	B.	C.
IDENTIFY (style)			
DESCRIBE			
AROMA			
APPEARANCE			
FLAVOR			
MOUTHFEEL			
COMMERCIAL			

6. Discuss the importance of water characteristics in the brewing process and how water has played a role in the development of world beer styles.

WATER TREATMENT METHODS

Method	Importance
Boiling	
Charcoal Filtration	
Reverse Osmosis	
Minerals	
Salts	
Acids	

pH (Power of Hydrogen):

WATER TYPE	pH
Pure Water	
Acidic	
Alkaline	
Proper mashing level	

FAMOUS BREWING WATERS

CITY	BEER STYLE	IMPORTANCE OF WATER

6. Describe the stages of yeast development and give five considerations in selecting the appropriate yeast strain for a given beer style.

A. Describe the stages of yeast development

Stage	Describe

B. Give five considerations in selecting the appropriate yeast strain for a given beer style.

Consideration	Effect on Beer

6. Explain the malting process, identifying and describing the different types of malts by their color and the flavor they impart to the beer. Give the styles with which they are associated.

A. Explain the malting process

Phase	Explanation

B. Identifying and describing the different types of malts by their color and the flavor they impart to the beer. Give the styles with which they are associated.

Identify	Describe	Color	Flavor	Styles

6. Explain what happens during the mashing process. Describe three different mashing techniques and the advantages and disadvantages of each.

A. Explain what happens during the mashing process.

Mashing Step	Temperature	Time	Active Enzymes	Description

B. Describe three different mashing techniques and the advantages and disadvantages of each.

Mash-Type	Describe	Advantages	Disadvantages

6. Discuss hops, describing their characteristics, how these characteristics are extracted, and the beer styles with which the different varieties are normally associated.

Discuss hops:

1.

2.

3.

4.

5.

6.

Hop Characteristics	How these characteristics are extracted

Hop Variety	Country	Characteristics	Associated Style

8. What is meant by the terms "hot break" and "cold break"? What is happening and why are they important in brewing and the quality of finished beer?

	Meaning	What's happening?	Why important in brewing and beer quality?
Hot Break			
Cold Break			

8. What are body and mouthfeel? Explain how the brewer controls body and mouthfeel in his/her beer.

	What is it?	How to control?
BODY		
MOUTHFEEL		

8. Describe and explain the role of diastatic and proteolytic enzymes in the brewing process and how they affect the characteristics of the finished beer.

	Proteolytic	**Diastatic**	
Works on			
Subset			
Temperature			
Describe/Explain			
Effect on Beer			

8. Describe the following brewing techniques. How do they affect the beer?
A. Kräuesening B. Adding Gypsum C. Fining

	Describe	Effect on Beer
Kräuesening		
Adding Gypsum		
Fining		

8. Explain how the brewer gets the following characteristics in his/her beer:
A. Proper Diacetyl B. Head Retention C. Clarity

Proper Diacetyl
Head Retention
Clarity

9. Complete the attached scoresheet marked with "Classic Example Score Sheet" as if you were judging a *classic commercial example* of the _____ style. You do not need to complete the "Overall Impression" section but otherwise the scoresheet should be completed as it would during a normal competition.

SCORING GUIDE

Outstanding	(45 - 50):	World-class example of style
Excellent	(38 - 44):	Exemplifies style well, requires minor fine-tuning
Very Good	(30 - 37):	Generally within style parameters, some minor flaws
Good	(21 - 29):	Misses the mark on style and/or minor flaws
Fair	(14 - 20):	Off flavors, aromas or major style deficiencies
Problematic	(0 - 13):	Major off flavors and aromas dominate

			Stylistic Accuracy			
Classic Example	☐	☐	☐	☐	☐	**Not to Style**
			Technical Merit			
Flawless	☐	☐	☐	☐	☐	**Significant Flaws**
			Intangibles			
Wonderful	☐	☐	☐	☐	☐	**Lifeless**

Classic Example Score Sheet

Subcategory (spell out) _____

Aroma (as appropriate for style) **X /12**
Comment on malt, hops, esters, and other aromatics

_____
_____
_____
_____

Appearance (as appropriate for style) **X / 3**
Comment on color, clarity, and head (retention, color, and texture)

_____
_____
_____

Flavor (as appropriate for style) **X /20**
Comment on malt, hops, fermentation characteristics, balance, finish/aftertaste, and other flavor characteristics

_____
_____
_____
_____
_____

Mouthfeel (as appropriate for style) **X / 5**
Comment on body, carbonation, warmth, creaminess, astringency, and other palate sensations

_____
_____
_____
_____

Overall Impression **X /10**
Comment on overall drinking pleasure associated with entry, give suggestions for improvement

Total **X /50**

Complete this score sheet as if you were presented with a classic commercial example of the _____ style.

Complete the scoresheet just as you would in a normal competition with the exception that you do not need to complete either the **Overall Impression** section or the actual scores.

COMBINED Possible (named) Section II Beers for Q.1,3,5,7 and 9 (64 beers)

- American Amber Ale
- American Barleywine
- American Brown Ale
- American IPA
- American Pale Ale
- American Stout
- American Wheat or Rye Beer
- Baltic Porter
- Belgian Blond Ale
- Belgian Dark Strong Ale
- Belgian Dubbel
- Belgian Golden Strong Ale
- Belgian Pale Ale
- Belgian Tripel
- Beliner Weisse
- Bieré de Garde
- Blonde Ale
- Bohemian Pilsener
- Brown Porter
- California Common Beer
- Classic American Pilsner
- Classic Rauchbier
- Cream Ale
- Dark American Lager
- Düsseldorf Altbier
- Doppelbock
- Dortmunder Export
- Dunkelweizen
- Dry Stout
- Eisbock
- English Barleywine
- English IPA
- Extra Special/Strong Bitter (English Pale Ale)
- Flanders Red Ale
- Flanders Brown Ale/Oud Bruin
- Foreign Extra Stout
- German Pilsner (Pils)
- Gueuze
- Imperial IPA
- Imperial Stout
- Irish Red Ale
- Kölsch
- Light American Lager
- Maibock/Helles Bock
- Mild
- Munich Dunkel
- Munich Helles
- North German Altbier
- North German Altbier
- Northern English Brown
- Oatmeal Stout
- Oktoberfest/Mäerzen
- Old Ale
- Premium American Lager
- Robust Porter
- Roggenbier (German Rye Beer)
- Russian Imperial Stout
- Saison
- Schwarzbier
- Scottish Export 80/-
- Scottish Heavy 70/-
- Scottish Light 60/-
- Southern English Brown
- Special/Best/Premium Bitter
- Standard American Lager
- Standard/Ordinary Bitter
- Straight (Unblended) Lambic
- Strong Scotch Ale
- Sweet Stout
- Traditional Bock
- Vienna Lager
- Weizen/Weissbier
- Weizenbock
- Witbier

(Named) Beers/Meads/Ciders that WON'T be on the (ESSAY) test (33):

- Belgian Specialty Ale
- Fruit Lambic
- Fruit Beer
- Spice Herb Vegetable Beer
- Christmas/Winter Specialty Beer
- Other Smoked Beer
- Wood Aged Beer
- Specialty Beer
- Dry Mead
- Semi-Sweet Mead
- Sweet Mead
- Cyser
- Pyment
- Other Fruit Melomel
- Metheglin
- Braggot
- Open Category Mead
- Common Cider
- English Cider
- French Cider
- Common Perry
- Traditional Perry
- New England Cider
- Fruit Cider
- Applewine
- Other/Specialty Cider/Perry

Sample Lined page for exam

Q#_____, Page ___ of ____ **Participant _____-____-____**

Page ___ of ____