



OLDS COLLEGE
OF AGRICULTURE & TECHNOLOGY

**INDUSTRY TRAINING &
CONTINUING EDUCATION**

MASTER SPINNER

STUDENT HANDBOOK



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Website: www.oldscollege.ca/programs/continuing-education/fibre-arts

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Master Spinner Certificate Program

The Olds College Master Spinner Certificate Program consists of six progressive levels of classroom and independent study. These six levels involve skill development, research studies, and project assignments in the area of hand spinning of all major types of fibres, yarns, and the end-use of the spun yarns.

Workshops for levels 1-6 (30 hours each) and level 6 (42 hours) are followed by an independent home study portion for those students working towards certification. This home study portion will require 125-175 hours of work for levels 1-5 and an In-Depth study for level 6.

A Self-Directed option for experienced spinners is currently available for Levels 1 and 2 (see page 8).

At all levels, students are evaluated on the basis of written assignments, practical projects, oral presentations, and skill development.

Those individuals who successfully complete the assignments in all six levels will receive a Master Spinner Certificate from Olds College. See Level 6 In-Depth Study policy for additional details.

Electronic Spinners

Olds College is aware that electronic spinners have become more and more popular, and we understand that some of our Master Spinner students may be using them when completing their homework. However, for all offerings of the Master Spinner program (both on and off the Olds College campus), manually operated spinning wheels are mandatory in the classroom, unless the student has been given prior permission to use an electronic spinner by the Program Manager. Successful completion of the program relies on an understanding of manual spinning wheel mechanics and the ratios used to achieve specific TPI. Our instructors need to be able to see the student's spinning ability on a manual spinning wheel during the scheduled class time.

Master Spinner Program Student Policies

Audit Students

Students may opt to audit a class to upgrade their skills without obtaining a grade when they register for the course. They will participate in the workshop only, and will not be required to submit assignments. These students will receive an audit (AU) designation rather than a percentage grade, and will not be eligible for the Master Spinner certificate. There is no difference in fees between audit and certificate students.

Certificate Students

Students who enroll in the Master Spinner courses will be considered successful for each level upon completion of the workshop and homework with a passing grade (50%). All assignments will be marked and have a percentage grade assigned. Upon completion of the requirements of all six levels in the program, students will earn the Master Spinner certificate.

Students who do not complete the requirements of the course within the time allotted (see page 6) will not receive recognition for the course.

Changing From Audit to Certification

Once a student has received an audit (AU) designation, if they wish to be eligible for the Master Spinner certificate, they must re-take the course and complete the homework for a grade.

Prerequisites

Each Master Spinner level is a prerequisite for the subsequent level. For example, if a student wishes to enroll in a Level 2 course they must have completed a classroom session of level 1 (or a self-directed option has been completed).

Student Fees

Course registration and materials fees will be established by Olds College and will be subject to periodic review. Check the website for the most current information.

Students will generally encounter costs in these areas:

- Course Registration Fees (including marking fee)
- Materials Fees
- Personal Classroom Supplies
- Workbook Assignment
- Supplies
- Assignment Mailing Costs

Course Registration Fees

Classroom and self-directed fees will be set by Olds College at the time advertising is prepared. These fees will include the course manual and marking fees.

Marking Fees

In the past, students have paid marking fees separately from their registration fees. To minimize the number of transactions a student will have to make and ensure that they are not subject to the fluctuating fee costs, marking fees are now integrated into the course tuition and payable upon registration in the course.

Materials Fees

The instructor will supply many of the fibre materials (other than those on a student supply list) that are required for successful participation during a class. The fee for these materials will be collected at the time of registration.

Personal Classroom Supplies

The student is expected to come prepared with certain equipment and supplies necessary for successful participation in the classroom activities. The supply list will be provided to all registrants and will also be available on the website.

Workbook Assignment Supplies

Students are responsible for procuring fibres and other supplies needed to complete the workbook requirements. These can be purchased from vendors during Fibre Week or from other sources available to them. The classroom instructor may have a suggested list.

Assignment Mailing Costs

Upon completion of a homework assignment, the student will mail the project to their assigned instructor. Students are responsible for return mailing costs and should include a cheque payable to the marker for an amount equal to the cost of mailing to that instructor. If the student requires additional mailing information for their assigned instructor, they should contact the Industry Training & Continuing Education department at Olds College at coned@oldscollege.ca.

Student Assignments

Students who are working towards certification will complete a major homework assignment following each level of instruction according to the guidelines presented.

Unless otherwise requested or designated, the assignment will be marked by the instructor who taught that student.

Assignment Timelines

Assignments must be submitted for marking within 12 months after the class has ended. If the work has not been submitted by this deadline, the student will not receive a grade for the course.

An extension to this deadline can be requested from Olds College Continuing Education by filling out the Homework Extension Request form found on the website. This request must be received at least one month before the due date. A processing fee will be applied. If granted, the extension will not exceed four months beyond the original completion date. Only one extension date will be allowed per course level.

Self-Directed Learning

This option is currently available for Levels 1 and 2.

An experienced spinner who wishes to enter the program without attending a class may contact the program coordinator and register for the self-directed option.

Completion timelines will be the same as for a classroom course and submissions must be submitted before the deadline before the student enters the next level.

When a student registers for the self-directed option, Continuing Education will:

- assign an instructor to that student;
- give the instructor's contact information to the student;
- give the student's contact information to the instructor.

The student will receive:

- the current course materials;
- the current assignment requirements;
- up to 3 hours of instructor time (logged by the instructor).

The instructor will contact the student by email to arrange a suitable time for an orientation session in order to review the assignment requirements.

The student will be able to address questions to the instructor at such times and in a manner agreed to during the orientation session.

When completed, the assignment will be mailed to the instructor for evaluation.

Frequently Asked Questions

This document is designed to answer many of the questions students (both classroom and distance learning) ask about the “processes” of the Master Spinner program. Questions about the content of the various levels and the specific workbook requirements are best answered by contacting the assigned instructor.

- **How do I set up my workbook?**

The workbook(s) need to contain all of the exercises listed in the workbook requirements and should be organized so that an instructor can find the needed materials. Many students submit their work in a three- ring binder(s) using plastic page protectors to hold the skeins and samples. But for ease of shipping or personal preference, students are free to use file folders, storage boxes, or whatever system works for them – as long as it is organized and contents clearly labeled. If in doubt, contact the instructor to discuss possibilities.

All skeins (and samples, if loose) should be properly labeled, as described in the requirements. Skeins need to be taken out for examination, so they should not be permanently mounted in the workbook. Place the skeins into the plastic sleeve or folder being used. Proper labels will allow the skeins to be replaced in the correct location should they accidentally come out.

When using tape or glue to secure skeins or samples to a page, remember that when a binder or box is closed the pages may press against one another. Anything sticky will adhere to facing pages and an instructor may literally have to destroy a page or pages to remove a skein for examination.

- **I have a physical disability/limitation that makes it impossible for me to do one or more of the exercises needed for the workbook.**

Most exercises allow for more than one method to be used. For example, if a student cannot use hand cards he/she could use a drum carder or flick cards instead. For those exercises that ask for a specific technique, the student has the option of attempting the exercise and accepting a lower mark or of not submitting the exercise and receiving no mark for it. Students are encouraged to discuss their limitations with their instructor and see if other options are available.

- **How do I submit my workbook for marking?**

Contact your instructor for directions on how to send the workbook to her/him. Generally, books are mailed to the instructor, although the instructor may accept written work electronically. The instructor then marks the book and returns it to the student along with the evaluation sheet(s) and the final mark for the level. Copies of the evaluation sheets and the final mark are submitted to Olds College for recording.

If you no longer have contact information for your instructor, contact the Olds College Industry Training & Continuing Education department at 403-556-4740 or by email at coned@oldscollege.ca.

- **How is my work evaluated, and how is my final mark determined?**

A point value is assigned to each exercise in the workbook requirements and listed in the instructions. A student is assessed on how he/she has completed the assignment and a mark is given to it. Classroom students are also given a test and the results of it assigned a mark. The marks for the workbook and the classroom test are totaled and a percentage determined. NOTE: Distance learning students do not have to do a classroom test. Marks for a test are not included in determining their final mark. By adding up the marks for the individual exercises, students can determine the total marks available for the workbook.

- **I find the instructions for some of the exercises vague – why can they not be more specific?**

Some exercises ask for specific tasks. Others are deliberately vague. Different students may have different approaches to completing a task and there is usually more than one way to accomplish what is being asked for. Students are encouraged to think about what needs to be done and how they best see it being accomplished. Creativity and independent thinking are encouraged. If one really cannot come up with a solution contact the instructor for help.

- **Why do I need to use references?**

Any material you use in your workbooks that is not your own should be acknowledged. Credit must be given to the original source. Used appropriately, references will show that you have studied the task at hand and have selected certain materials to emphasize the points you are making. Failure to credit references and attempting to pass off the material as your own original work could lead to charges of plagiarism.

- **I am not comfortable with my instructor – is there anything I can do?**

Whether it be a personality conflict or a difference in teaching/learning styles, there may be times when a student and instructor do not get along. If attempts to resolve the issues do not work, a student has the option of asking the program manager for another instructor. Another instructor may not be possible for the duration of a class but a different instructor could be assigned to mark the workbook. Similarly, distance learning students who are unhappy with the advice they are being given can request a different mentor.

- **Why should I bother filling in the evaluation forms?**

Input from current students is always important. Evaluation forms are looked at and notes made of the comments. The more people who comment on an issue, the more likely a change will be made. If something is really bothering you, do not just say “this exercise is a total waste of time” or “this

instructor is lousy”. Be specific – what is it that has you upset and what do you see as a solution to your concern. Well thought out comments will be far more effective at resolving an issue than an angry diatribe.

Praise for what you think are highlights of a course is also important. Knowing what works (certain course material, the instructor, and the facility) enables the Program Manager and the instructors to further improve the program. Any suggestions for additions and/or deletions to the courses are also welcome.

- **I will not be able to finish my workbook before the deadline. Is it possible to ask for an extension?**

You may request an extension by completing the Homework Extension Request form on the Olds College Industry Training & Continuing Education website under Fibre Art. The request for an extension must be made at least a month prior to the current deadline date. Someone from Industry Training & Continuing Education will inform both you and your instructor if and when the extension has been granted and what the new deadline is.

An extension fee will be administered to process the request.

Students who do not complete their work by the new deadline will not have their work marked or a grade assigned. In order to obtain the Master Spinner certificate, you will need to successfully complete and achieve a passing grade for all six of the Master Spinner levels.

-

I want to dispute the mark that I was given by my instructor. What can I do?

The first step in any concern or dispute between a student and an instructor regarding their mark on a substantive assignment (such as the Master Spinner homework), is to have the student and instructor discuss the issue. It is always the first step and the most sincere hope of the College that between the student and the instructor the issue can be resolved. Students with concerns should reach out to their instructor so that they can receive additional insight into their mark.

If a student is still unhappy with their mark after reaching out to their instructor and taking his/her feedback into consideration, then the next and final option available will be to have it re-marked by another instructor after the student has had an opportunity to update it. This option provides the student with 4 months to make improvements on the assignment areas that their instructor has provided feedback and then resubmit the work to Olds College. Another instructor will be assigned to remark the work. There are additional costs involved to pay for the second marker and associated administration activities. It is expected that the student will use the four months to take the feedback into account and update their work. This process is available on a case by case basis, and the student should contact the Program Manager for more information.

Formatting and Style Guidelines Summary

Any written work that is to be submitted for marking should follow the American Psychological Association (APA) standards. Any written work should be typed and double spaced.

All work presented in your assignments must be properly researched and provided with correct citations. Proper references and citations give credit for other people's ideas and provide the reader with the sources of the information used in the paper.

The citation and referencing system used by Olds College is the American Psychological Association (APA) Formatting and Style Guide.

This appendix provides a brief summary of the expected citation and referencing styles you should use in your assignments (further information can be found on various websites).

Citations

- In-Text Citations: When direct quotes are used within the text, the citation source (which includes the author, date, and page number) must be provided. For example: "If the project calls for knitting yarn it is best to aim at an almost balanced yarn as a very unbalanced yarn can cause the knitting to skew to one side" (Field, 1995, p. 27).
- Citations of Summaries or Paraphrases: When summarizing or paraphrasing information, the source must be provided. For example: According to Field (1995), balanced yarn should be used for a knitted garment.

A complete reference must appear in the reference list at the end of the paper, for both in-text citations and summaries.

References

A reference list should be provided at the end of the paper that gives the details needed to retrieve the source of the information used in the paper. The reference list should be put in alphabetical order, using the authors' last names. The following examples show the general format used for different sources of information.

Books

Author surname, First Initial. Second Initial. (Year of publication). *Book title: Subtitle*. Place of Publication: Publisher.

Fournier, N., & Fournier, J. (1995). *In sheep's clothing*. Loveland, CO: Interweave Press.

Journal or Magazine Article

Author Surname, First Initial. Second Initial. (Year). Article title: Subtitle. *Journal Title*, Volume (issue), page range.

Buchanan. R. (1999, Fall). Evaluating fibre diameter. *Spin Off*, pp. 23-24.

Web Sites

Author or Corporate Body. (Last update or copyright date; if not known, put n.d.).

Title of specific document. Place of Publication: Name of Corporate Body or Publisher.

(Do not repeat Corporate Body name if listed above.) Retrieved date the site was accessed from URL of specific document.

US Department of Agriculture. (1968). *United States standards for grades of wool*. Retrieved October 15, 2008, from: <http://www.ams.usda.gov/AMSV1.0/getfile?dDocName=STELDEV3062803> .

University of Kentucky, College of Agriculture. (n.d.). No article name. Retrieved November 3, 2008, from: <http://www.uky.edu/Ag/AnimalSciences/index.html>.

Level 6 In-Depth Study Policy

PREAMBLE

The final assignment for successful completion of the Master Spinner certificate is an in-depth study selected and completed by the student on an aspect of hand spinning. Completed studies are available for viewing on the Olds College website. These can be found by the following steps:

Go to www.oldscollege.ca

Click on Student Life

Click on Library

Click on Research Guides

Click on Library & Research Help

Click on Master Spinners Archive Binders

CHOOSING A STUDY TOPIC

Students choose their own in-depth study topics. However, the study topic should fall into one of the following two categories: Experiment or Research.

Experiment studies include some form of measurement and/or ranking of samples. Students could choose to explore yarn construction or fibre type related to suitable end uses, evaluate aspects of hand spinning techniques or hand-spun yarns using various measures, or attempt to prove or disprove a commonly accepted rule, for example. All Experiment studies include measurements, either quantitative, qualitative, or both.¹

Research studies focus on a particular topic and explore it in detail. Students could choose to research a specific fibre type, answer a question about an aspect of hand spinning, or look into the history of a fibre arts practice or culture as it relates to spinning, for example. Research studies do not always include measurements, but should include some evaluation by the student to answer the proposed question.

Study topics must be unique to the Olds College Master Spinner program.² Students can choose to build on the work of an existing study, provided that the new study adds to the knowledge contained in the original.³

Study topics must be broad enough to spin a minimum of 10 and a maximum of 25 skeins of yarn. Each yarn must also be made into a minimum of one and a maximum of four fabric or end-use samples at least 10 cm/4" square. Study topics must also allow for additional research, with a minimum of seven references in the bibliography (no maximum).

PROPOSING A STUDY TOPIC Students must be currently enrolled in Level 6 of the program to submit an in-depth study proposal. They must also have completed and submitted their Level 5 workbook. The latest a student can submit a study topic for approval is four months following their Level 6 class.

To submit an in-depth study proposal, students must fill out the online form located at https://www.oldscollege.ca/Assets/external/programs/con-ed/fibre/master-spinner/Master-Spinner_In-depth.pdf The form asks the student the following:

- Student contact information
- Draft title of study
- Type of study (Experiment/Research)
- Paragraph explaining the proposed topic, including hypothesis/purpose statement, fibre type(s), preparation method(s), spinning method(s), and type(s) of samples. Finishing method(s) can be included, if applicable
- Number of skeins proposed (10-25)
- Number of samples per skein (1-4)

All fields are required. The completed form will be sent to the assigned Level 6 instructor for that year.⁴ The Level 6 instructor will evaluate the proposal and contact the student if s/he has any concerns or suggestions. Once any concerns or suggestions have been incorporated into the study proposal, the Level 6 instructor will inform both the student and the Fibre Arts Programmer that the study topic has been approved. The final proposal will be kept in the student's file at Olds College.

All studies will be graded on how well they fulfil the proposed topic of study. In some cases, students may wish to make changes or adjustments to their study as they work through the process. **If there are any material changes to the number or make-up of skeins, number or make-up of samples, or purpose statement of the study after it has been approved, these changes must be submitted to the Level 6 instructor before proceeding.** As much as possible, the instructor will give due consideration and approve any adjustments, provided that they do not significantly change the expected research outcomes of the study or exceed the minimum/maximum number of skeins or samples.

¹ Quantitative data can be exactly measured, for example surface area, breaking point, and twists per inch. Qualitative data is less exact and more about the experience of the evaluator, for example hand, stitch definition, and drape. ² Topics that have been explored through work at other institutions or in published books are available to Master Spinner students, provided that a similar study has not been conducted by previous Master Spinner students at Olds College. ³ Some previously completed studies relate to dye processes. These studies are not eligible for expansion work. Only studies related to spinning alone can be built upon.

STUDY FORMAT An in-depth study is an academic report. As such, it must conform to the requirements for reports set out in the current American Psychological Association (APA) style guide for citations, line spacing, margins, headers, page numbers, title page, abstract, tables of contents and figures, and bibliography. If you have any questions, please contact your instructor or refer to this page: <https://www.oldscollege.ca/student-life/learning-commons/library/copyright/index.html>.

The final copy of the report is to be submitted in digital pdf. format to the Industry Training & Continuing Education department for addition to the Olds College online library. If students require further information regarding submission requirements, they can contact the ITCE department at coned@oldscollege.ca or 403-556-4740.

4 If the Level 6 instructor has a conflict of interest with regards to a student, s/he will inform the Fibre Arts Programmer, who will assign another instructor to grade that students work.

The written report must follow the structure below:

1. **Title Page:** contains the title of the report, your name, the words “submitted to Olds College” and the date the report was submitted (see below). Running head as per APA style guide is required.
2. **Abstract:** a one-page summary of the study, including hypothesis/purpose statement, brief summary of experiment/research, and conclusions. The abstract is written after the rest of the report is completed.
3. **Table of Contents:** lists, in order, the sections of the report and the pages they begin on. If needed, include a Table of Figures and/or Table of Tables following the Table of Contents.
4. **Introduction:** discuss the purpose of the study, the scope of the experiment/research, and any limiting factors. This section should also include a review of existing information from various sources.
5. **Materials and Methods:** describe how you conducted the study, the materials and techniques used and reasons for those choices, and how data was collected and analyzed.
6. **Results:** detail your findings. For experiment studies, this should include tables of data and any ways in which you manipulated the data to examine different aspects of the initial question. For research studies, this should include any observations you made during spinning that relate to your purpose statement.
7. **Conclusion:** analyze your results and form conclusions. Include at least three recommendations for further study.
8. **Bibliography:** a properly formatted list of all works cited in the study.
9. **Appendices:** any data that should be included in the study but would disrupt the flow of the report if included in the above sections. These might include skeins and samples, detailed descriptions of methods, complete skein information as required by the Master Spinner program, full charts of results, and/or photographs, among others.

Using the above format, students can generate a plan to approach their study topic. Writing an initial draft of the Introduction and Materials and Methods sections prior to beginning any spinning will allow the student to discover what information already exists and write out a plan to proceed with their experiment or research. This draft can then be edited upon completion of the study for the final report.

Organization and good record keeping are the major elements of a successful study. Students should always keep their proposal in mind as they proceed, and ensure that their work remains relevant to fulfilling it. These questions can help guide students through their study and remain focused:

- What is the question I am studying?
- What do I have to do to find the answers?
- What is a manageable scope for this study and what limits can I impose on the question to keep the work manageable?
- What research do I need to complete before beginning to prepare fibre/spin?
- What kind of notes do I have to keep while I am preparing fibre/spinning/creating samples so that I can include all the appropriate information in my final report?
- What kind of fibre samples are important to include in my report (prepared fibre, singles, yarn, cloth/end use samples)?
- Am I going to include full skeins in my final report or only small yarn samples and send the skeins separately?
- Am I going to create a copy of the study for myself?

COMPLETION DEADLINES Students who have submitted a proposal and had it approved must be enrolled in a Level 6 class. If circumstance prevent the student from taking the class, students may request a one-time, one- year deferral by completing the extension request form on the Olds College, Industry Training & Continuing Education website. If there are not enough registered students to run a Level 6 class, all outstanding students automatically receive a deferral to the following year.

In-depth studies must be completed within one year of taking the Level 6 class, unless the student requests an extension. Extensions must be requested a minimum of one month before the completion deadline. Extensions provide the student an additional four months to complete the work, and only one will be granted. Any approved extension will require the payment of an extension fee.

Students must submit a Word-editable version of their report to the Level 6 instructor by the completion deadline (with or without extension). **The document must be print-ready and include properly formatted table of contents, table of figures, bibliography, appendices, and images.** The date the report is emailed to the Instructor is the date that should appear on the title page of the study.

Students should ensure that their work has been edited by a peer with a good grasp of grammar, spelling, and APA formatting prior to submitting the report. The Level 6 instructor will provide the student with a brief edit of the document. This edit is not intended to replace editing by a peer; the instructor will be looking for major errors in spelling, grammar, and APA formatting, as well as any missing information and/or areas where s/he would like to see more detail. The purpose of this edit is to ensure that the version submitted for marking is ready to be uploaded to the Olds College website, without having to be returned to the student for significant corrections.

Once the student receives the instructor edit, they have one month to mail their study to the instructor for marking. All skeins (and samples if loose) should be properly labeled, as described in the requirements as per every other level. The study that students send to the instructor is the final version (students are responsible for mailing costs). Students should send a digital copy (preferably in PDF format) to Olds College so it can be uploaded to the College website.

STUDY EVALUATION The Level 6 instructor will evaluate the in-depth study based on the criteria below. S/He will complete this evaluation within four weeks of receiving the study. If there will be a delay, the instructor will communicate with the student and the Fibre Arts Programmer. Students are not required to orally defend their work. Assessment is done solely on the written materials and the spun samples submitted.

Skeins of at least 10 yards must either be integrated into the study (these skeins must be easy for the instructor to remove and replace) or provided separately for evaluation. If the skeins are provided separately, students must include a self-addressed padded envelope of appropriate size so the skeins can be returned to them. Students are responsible for the mailing costs of returning their skeins.

In-depth studies are marked out of a total 575 marks. The marks are broken down as follows:

- **Format and Design (75).** The study conforms to APA style and specifications, as well as the format for in-depth studies detailed above. The study is formatted well, free from written errors, and consistent in design.
- **Technical Merit (100).** The study conforms to the approved proposal. The information is logically presented, techniques are well explained, and the student's conclusions are logical and supported by their research/experiment. All relevant information is included in the final copy of the study (including the information required on skein labels by the Master Spinner Program).
- **Research (100).** The study includes additional research beyond what is contained in the manuals for the Master Spinner program. The research supports the study and is integrated into the body of the work.
- **Spinning (200).** Skeins must be properly labelled as per the Master Spinner standard. Skeins are evaluated for all of the following (if applicable): execution, balance, evenness, standard measurements.
- **Samples (100).** Samples are evaluated for all the following (if applicable): relevance to topic, execution.

The study remains the intellectual property of the student.

CERTIFICATE OF COMPLETION Certificates are issued by Olds College upon receipt of final marks. The completion certificate is subsequently mailed to the student.

In Depth Study Permission And License

By signing and submitting this agreement, I grant Olds College the non-exclusive license to archive and make accessible my Master Spinner Program In Depth Study in whole or in part in all forms of media now or hereafter known for educational, research, and scientific nonprofit uses during the full term of copyright. I retain all other ownership rights to the copyright including the right to use in future works (such as articles or books) all or part of my work.

I represent that the submission is my original work, and that I have the right to grant rights contained in this license. I also represent that my submission does not, to the best of my knowledge, infringe on anyone's copyright and that I have obtained written permission from the owner(s) of any third party copyrighted matter included in the work.

I understand that my In Depth Study will be placed in the Olds College's digital library for access to registered Master Spinner students. I understand that I will clearly be identified by name as the author of the submitted work and that Olds College will not make any alteration other than as allowed by this license to my submission.

Signed: _____

Date _____

In-Depth Study Proposal Submission Form

(Please refer to the In-Depth Study policy and guidelines before submitting this form)

Name: _____ Date: _____

Proposed Topic (Objective of the Study):

Fibre/s to be used: _____

Preparation method/s: _____

Spinning method/s: _____

Finishing method/s: _____

Samples or end product/s (describe how many and what they will be):

How will the objective be accomplished (briefly describe what you intend to do):

Received By:

Date:

Approved:

Approved with attached modifications:

In Depth Study Guidelines

Once your in-depth study proposal has been approved and you have successfully completed the classroom session for level 6, you are ready to work on the study.

Organization and good record keeping are the major elements of a successful study. Your in-depth study proposal should have contained a general outline of what you propose to do and how you are going to do it. Now is the time to take that information and expand it. Having a well thought out plan will ensure that you are able to successfully complete your study. It will also be the basis for writing your final report.

The plan should contain any questions you are trying to answer and how you propose to get the answers. It will contain (but is not limited to) the following information:

Fibre to be used: Types – the animal(s) or plant(s) to be used; source of the fibre – purchased or raised/collected by you; how many samples will be needed,

Preparation method(s): Is the fibre ready to use or how will it be prepared; collection method; washing method; combing or carding method (and why each was chosen).

Spinning method(s): Each way it will be spun and why.

Finishing method(s): Each method used and why.

Samples/End products: What samples are needed to demonstrate what will be done and how many; or is a final end product what is needed? How will it/they be prepared?

By answering the above in a logical fashion, you should now have a plan to follow to conduct the study. You will know what supplies you need to obtain, what to do with them, and what final products you need to produce. All of this information will also be needed in the final study report.

Some of the points that need to be considered in setting up the plan might include:

- What is the question you are studying?
- What do you have to do to find the answer(s)?
- What is the scope of the topic? What are the limits that need to be set (if the instructors have not already suggested limits, look seriously at how much you are proposing to do. Many studies have the potential to become overwhelming. Look at what you can reasonably accomplish, you might have to revise your study to a more limited topic than originally proposed. The instructors will be happy to help you redefine your study to a more manageable level).
- What types of notes must be kept? What information will be needed for the final report? Good note keeping will ensure that you have all the information you need to write the report. If in doubt make notes – it is easier to not include excess information than to try to accurately remember what you used or did several weeks or months after the fact.

- How will the samples or end products be presented to demonstrate what was done?

Once the plan is complete review it – will what you plan to do accomplish your goal? Will the objectives of the study be met? Be critical of what you are proposing – if your plan does not provide the answers, you need to rethink what you have proposed and come up with a more suitable approach.

Once you know what needs to be done, you can begin the actual study. If you have not already done so, now is the time to do any research about the topic that is relevant to your study. Should you include information about the history and processing of the fibre or the traditional methods you are attempting to duplicate? Do you need something about the history of the equipment you will use? What information needs to be put into your report that will allow the reader to better understand what you have done?

Keep accurate notes on what references you use. Proper annotation will be needed for the reference section of the study (see: Formatting and Style Guidelines Summary for the acceptable methods). Compiling the list as you go along is much easier than trying to go back and find that particularly useful quote later on.

Number of Copies

Students should prepare 2 copies of their report if they wish to retain a copy and send one to Olds College. Once the study has been digitized, the original will be returned to the student, however this may take up to six months depending on volume of IDS's received.

Organizing results and information

The final task of the In Depth Study is the preparation and submission of a written report. The report should be done using the currently acceptable guidelines and should contain the following elements:

TITLE PAGE: Should contain the title of the report, your name, the words “submitted to Olds College” and the date the report was submitted.

ABSTRACT/SUMMARY: A short (usually about 1 page) summary of the contents of the report. It should describe the object of the study, a main conclusion and a recommendation (if any) for further study. This section is usually written after the rest of the report is completed.

TABLE OF CONTENTS: This lists the contents of the report and the pages they begin on in order. A list of appendices and a list of illustrations (if needed) is included here.

INTRODUCTION: Discusses what the author's purpose was, the scope of the study, and any limiting factors. Any necessary background information needed to understand what the study is about is also included here.

MATERIALS AND METHODS: How you conducted the study: the materials and techniques used, how the data was collected and analyzed.

RESULTS: Your findings: the data collected, samples prepared, tables of data, whatever you have as a result

of the work you did.

CONCLUSION: What do your results mean? How do you interpret what you found? You can also include any recommendations for how to apply your findings or suggestions for further study.

REFERENCES/BIBLIOGRAPHY: A list of all references used and cited in the study.

Appendix: Formatting and Style Guidelines Summary details how references should be presented.

APPENDICES: If needed, contain data that should be included in the body of the work but would disrupt the smooth flow of information if included there. These might include detailed descriptions of methods, charts of results or photographs.

Other points to consider when preparing your report are:

- should be typed and printed with double spacing
- should be free of grammatical errors;
- should be neat and well presented;
- should have margins of 1.5” on the right, 1” on the other 3 sides.

Twist Per Inch

The look and feel of a yarn is greatly influenced by, among other things, the amount of twist that is put into the singles yarn and plied yarn. Understanding how to analyze the amount of twist in a yarn and how to put the desired amount of twist into a yarn is an important skill for a spinner to master.

What is Twist Per Inch?

Twist per inch (tpi) is the number of times the fibres in a yarn sample are turned (twisted) in a linear inch of yarn. The amount of twist is one factor in determining how well a yarn will hold together and how soft or harsh a yarn will feel. Too little twist and the yarn will not hold together; too much twist and the yarn will be very kinked and feel very harsh, and too much twist can also break the yarn. The number of twists can be counted over any length of yarn, but the most common measurement used is the number of twists over an inch of length.

Measuring Twist Per Inch (tpi)

Each time the fibres are twisted a full turn, a small bump is produced in the yarn. By counting the number of bumps in an inch of yarn, the number of twists can be calculated. In a singles yarn, counting the bumps may be difficult, but with perseverance and a magnifying glass, they can be counted. Very thin singles are more difficult to analyze than a thicker sample. For a singles, the number of bumps counted in an inch will give the tpi of the yarn.

The bumps will be easier to see and count in plied yarns. To count the tpi in a plied yarn, count the bumps in an inch and divide that number by the number of plies of the yarn. For example: in a 2-ply yarn the number of bumps counted is divided by two; in a 3-ply yarn, the number of bumps counted is divided by three; in a 4-ply yarn the number of bumps counted is divided by four.

To understand why the division is necessary, take two short pieces of yarn of different colours. Hold them together at one end and twist the yarns one full turn. There will be two bumps in the yarn, one for each colour. Twist another full turn, and there will now be four bumps in the yarn. Each time a full twist is put into the yarns, a bump is made for each strand, but each yarn has only one twist. Therefore, to determine the twist in the sample, divide the number of bumps by two. Repeat this exercise using three singles to see that each turn produces three bumps (one for each single), and divide by three to find the actual number of twists.

When plying singles of the same fibres there will not be different coloured bumps, but the principle remains the same: divide the number of bumps counted by the number of plies used to determine the number of twists.

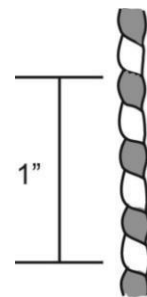


Figure 1

3 tpi 2-ply yarn
Courtesy of: Olds College.

Spinning to Specific tpi

There are times when a spinner must spin a yarn with a specific tpi, for example to duplicate a commercial yarn or to spin a yarn that is consistent throughout. The following formula can be used to determine a specific tpi:

$$\text{tpi} = R \times N / D \text{ or } N = \text{tpi} \times D / R$$

Where:

R = ratio of the wheel N =

number of treadles

D = draft length

Understanding how the formula works will allow the spinner to quickly make any adjustments needed to get the desired results.

The amount of twist in a yarn is determined by three factors: the ratio of the wheel, the length of draft, and the number of treadles made for the length of the draft.

The **ratio of the wheel** (R) is the number of times the flyer or bobbin turns for each full turn of the drive wheel.

Manufacturers provide the ratio for a wheel, however, this number is usually a guideline and should be checked on a new wheel to determine the actual ratio. In addition, the wheel's ratio should be checked periodically over the life of the wheel to confirm it. To determine a wheel ratio, make a mark (with a marking pen or piece of tape) on the drive wheel. One full treadle of the wheel will rotate the mark 360°. Also make a mark on the flyer (or bobbin if it turns). Note that as the drive wheel turns, the flyer also turns. While slowly rotating the drive wheel through one full turn, count the number of turns the flyer makes. The number of turns is the ratio for that wheel. A manufacturer might give a whole number such as 6:1 (six turns of the flyer for each turn of the drive wheel), but when measuring the actual number of turns, the ratio might turn out to be, for example, 5.5:1 or 6.25:1. For a wheel that has multiple ratios, determine the ratio for each whorl (size) and record the results for future use. The ratio is the number in the equation that does not change: the spinner chooses a ratio and does not adjust it once the spinning begins.

Another way to determine the ratio of your wheel is to measure the diameter of both the drive wheel and each whorl. To easily measure the drive wheel, take a piece of inelastic yarn or cotton thread, wrap it around the drive wheel and snip it to length as tightly as you can manage. Do the same for each whorl. Measure the length of each yarn/thread. Take the measurement of your drive wheel and divide it by the measurement of the whorl. This will give you the ratio. For example, if your drive wheel diameter measures 56 inches, and your whorl diameter measures 8 inches, the calculation would be $56/8 = 7$. This would be a ratio of 7:1.

Using both methods of measurement will give you a broader idea of your ratios and the twist you are adding to your yarn, as these results of these measurements may be a little different.

A **full treadle** is one full rotation of the drive wheel.

A full treadle includes both the action of depressing the treadle and letting it come back up to the starting point. Varying the number of treadles for a given draft length can change the amount of twist inserted into the yarn. If a wheel ratio of 6:1 is used, each treadle will put six twists into the yarn; two treadles inserts 12 twists into the yarn; three treadles inserts 18 twists into the yarn, and so forth. Count the number of treadles while spinning. Every treadle counts towards the desired number of twists per make length, including the one (or portion of one) used to wind the yarn onto the bobbin.

The **draft length** is the drafted length into which twist is allowed to travel to produce yarn. The length of draft is measured differently depending on the spinning method used. For a long draw, it is the distance from the orifice to the hands, for a short forward draft, it is the distance the fibres between the hands, and for short backward draft it is the length of yarn made with incremental drafts. The draft length should be measured periodically throughout the spinning to ensure the length remains consistent. Some spinners use a cord with knots at specific intervals to check the consistency of the length of draft. The cord is attached to the wheel and the spinner can measure the distance from the orifice by counting the number of knots. Other spinners use a lap cloth with measurements on it. Other spinners yet attach measuring sticks to their wheels, and still others tape out their draft length on one of their legs.

To calculate the tpi of a yarn, the above three values (wheel ratio, length of draft, and number of treadles for each draft length) are needed. If you multiply the ratio (R) by the number of treadles made (N), the number of twists put into the fibres in the draft length can be determined. If the draft length (D) has been measured in inches, divide the number of twists (R x N) by D to get the tpi for that sample.

The formula is:

$$\text{tpi} = R \times N / D$$

By inserting your numbers into the formula, the tpi can quickly be calculated.

More often, a spinner will want to spin to a specific tpi. This can be done by trial and error, or alternately, a calculation can be completed to give the information needed. The above formula can be rearranged to look like this:

$$N = \text{tpi} \times D / R$$

The spinner determines the desired tpi and chooses the wheel ratio to be used. Draft length may vary with fibre types as well as the spinner's preference. Insert those three numbers into the formula to determine how many treadles are needed to give the desired tpi for a given draft length.

Specific TPI in a plied yarn

According to Mabel Ross, there are a variety of levels of twist in relation to singles twist in a plied yarn. One that creates a well-balanced yarn is one in which the tpi of a plied yarn is $\frac{2}{3}$ that of the tpi of the singles being used. Conversely, singles tpi is $\frac{3}{2}$ (or 1.5) the tpi of the plied yarn. For example, if the plied yarn is to be 6 tpi, then the singles should be spun to 9 tpi; if a singles has been spun at 6 tpi, it should be plied at 4 tpi.

Table 1

TPI of singles needed for specific tpi of 2-ply yarn at $\frac{2}{3}$ ply twist

tpi of 2-ply yarn	tpi of singles yarn
1.5	2.25
2	3
3	4.5
4	6
5	7.5
6	9
7	10.5
8	12

Another singles to ply twist relationship is $\frac{1}{2}$ or 50% ply twist. This ratio of singles to ply twist gives softer knitting yarns. The numbers for these yarns look like this:

Table 2

TPI of singles needed for specific tpi of 2-ply yarn at $\frac{1}{2}$ ply twist

tpi of 2-ply yarn ($\frac{1}{2}$)	tpi of singles yarn
1	2
1.5	3
2	4
2.5	5
3	6

A sturdy yarn suited to warp threads and rug yarns can have the same tpi in the singles and in the ply. Yarns such as these will likely not balance, but they can be useful for interesting colour and fabric effects.

Equations for calculating singles twist required to achieve specific tpi

2/3 ply twist (balanced yarn)

$$\text{tpi in singles} = \frac{\text{tpi of plied yarn} \times (\text{number of plies} + 1)}{\text{number of plies}}$$

½ ply twist (soft knitting yarn)

$$\text{tpi in singles required} = \text{tpi of plied yarn} \times 2$$

Equal ply to spin twist (hard-wearing yarns)

$$\text{tpi in singles} = \text{tpi in ply}$$

Count

a. Fleece Count

Over the years, several different systems of assessing the fineness of fibres in a fleece have been developed. Many are still in use and can be confusing to the spinner looking to purchase a fleece. By understanding how different systems work and how they correlate to one another, the spinner will be able to make an informed choice about any fleece.

The **Blood (or American grade) System** is based upon merino wool being set as the standard against which other breeds of sheep would be rated. It is based upon the percentage of merino blood a particular breed would carry – in other words, was the breed developed from and considered to be half merino, quarter merino, etc. In the blood system, the more merino in the mix, the finer the fibre (see fig. 1). This system is not very precise and is not used by processors today.

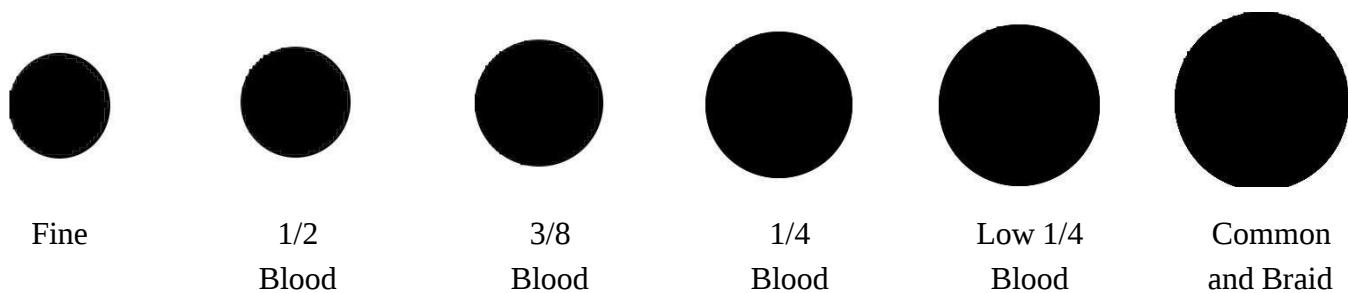


Figure 1

Relative diameters of the American Wool Grades (approximately 500x magnification).

The **Bradford (or English) Count System** was developed in Bradford, England and rather than being based on percentage of merino, it is based on the number of skeins (hanks) of worsted yarn of a given length (560 yards)

that can be spun from one pound of fibre. For example, the number 64 means that sixty-four 560-yard skeins could be spun from one pound of wool. The higher the number, the finer the wool – i.e. finer wool can be spun into finer yarns and more skeins can be spun per pound.

The **Micron System** developed in response to the demand for precise measurements and became possible with the development of sophisticated machines capable of analyzing individual fibres. A micron is one millionth of a metre and can only be measured accurately under high magnification. It is currently becoming the system of choice for the industry. However, the equipment needed to do the measurements is expensive and not readily available to the handspinner.

Table 3 shows a comparison of the values in each system for a number of breeds of sheep. A spinner who understands the values used in each system will have no trouble dealing with a producer and selecting an appropriate fleece.

Table 3

Comparison of blood, Bradford and micron measurements for selected breeds of sheep

	Staple Length	Blood System	Count	Microns
Merino 80s	2 1/2 inches	Fine Wool	80s-64s	18 to 22
Rambouillet			70s-60s	19 to 25
New Zealand Merino 64s	3 inches	1/2 Blood	70s-60s	20 to 25
Targhee & Romeldale			62s-58s	22 to 26
Corriedale & Columbia			62s-46s	22 to 34
Southdown			60s-50s	24 to 31
Blue Faced Leicester	3 1/2 inches	3/8 Blood	60s-56s	24 to 28
Suffolk, Dorset Horn, Montadale			58s-50s	25 to 31
Finn & Cheviot	4 inches	1/4 Blood	58s-48s	25 to 32
Oxford			50s-46s	29 to 34
Romney	4 1/2 inches	Low 1/4	48s-44s	31 to 36
Border Leicester	5 inches	Common	46s-40s	33 to 38
Lincoln & Cotswold	6 inches	Braid	40s-36s	37 to 40

b. Yarn Count

The Bradford count system (or count) is what is most commonly used by handspinners. It is considered an indirect system, as the higher the number the finer the yarn. Knowing the count for a particular breed of sheep allows the spinner to choose the correct fleece/fibre for the desired end project.

Few spinners will want to spin a pound of fibre to determine the yarn count. Formulas have been developed to allow a spinner to produce a small length of yarn and then calculate the count. Once the count has been determined, the spinner can then calculate how much fibre is needed to produce enough yarn for the desired project.

For a **WORSTED** wool yarn (or yarn from other protein fibres such as mohair or llama) the calculation is:

$$\text{Count} = (\text{yards of yarn} / \text{weight of yarn in oz}) \times 16 \text{ oz} \times \# \text{ of plies} / 560$$

Count = (The number of yards of yarn being measured divided by the weight of that yarn in ounces), multiplied by 16 ounces, multiplied by the number of plies in the yarn, divided by 560

If the weight is in grams, substitute 454 grams for the 16 ounces and use the weight of the yarn in grams. The formula then reads:

$$\text{Count} = (\text{yards of yarn} / \text{weight of yarn (in oz or g)}) \times 16 \text{ oz (or 454 g)} \times \# \text{ of plies} / 560$$

The formula takes the measured value of weight per a given length of yarn and calculates how many yards would be in a pound, then multiplies that by how many plies to give the length of the singles used, and then finally divides by 560 (the number of yards in one count) to determine how many skeins of the yarn could be spun from one pound of fibre.

The above formula is for a worsted yarn only. For woollen yarns, or yarns spun from other fibres, other values were selected to define count.

There are several WOOLLEN count systems. The one used in North America is the Philadelphia (or American cut) count. This is based on measuring the number of 300-yard skeins spun woollen from one pound of fibre. The formula is:

$$\text{Count} = (\text{yards of yarn} / \text{weight of yarn (in oz or g)}) \times 16 \text{ oz (or 454 g)} \times \# \text{ of plies} / 300$$

For **COTTON**, the measure is the number of 840-yard skeins per pound of fibre and the formula is:

$$\text{Count} = (\text{yards of yarn} / \text{weight of yarn (in oz or g)}) \times 16 \text{ oz (or 454 g)} \times \# \text{ of plies} / 840$$

For **LINEN, RAMIE and HEMP**, the term is lea (instead of count) and 1 lea = 300 yards per pound of fibre. The formula is:

$$\text{Lea} = (\text{yards of yarn} / \text{weight of yarn (in oz or g)}) \times 16 \text{ oz (or 454 g)} \times \# \text{ of plies} / 300$$

For **SPUN SILK**, the measure is the number of 840 yards per pound of fibre and the formula is:

$$\text{Count} = (\text{yards of yarn} / \text{weight of yarn (in oz or g)}) \times 16 \text{ oz (or 454 g)} \times \# \text{ of plies} / 840$$

For **REELED SILK**, the term is denier and 1 denier = 9000 metres of silk, which weighs 1 gram.

$$\text{Denier} = 9000 (\text{meters}) / \text{meters of yarn} \times \text{weight of yarn in grams}$$

(Note: To convert yards to metres multiply yards by .9144)

For **SYNTHETICS and REGENERATED FIBRES** (including but not limited to nylon, polyester, rayon, Lyocell, and milk), the measure is the number of 840-yard skeins per pound of fibre and the formula is:

$$\text{Count} = (\text{yards of yarn} / \text{weight of yarn (in oz or g)}) \times 16 \text{ oz (or 454 g)} \times \# \text{ of plies} / 840$$

Notation for yarn count generally follows this template: Plies/Count Number s. For example, a two-ply yarn with a count of 8 would be written as 2/8s. Weaving yarns reverse this template, so the same count and ply structure in a weaving yarn would be written as 8s/2. Bast fibre yarns would have their count written as 2/8 lea. Reeled silk, on the other hand, would have its count written as 5 denier, for example.

Other yarn count systems are the Tex system, the NM system, and YPP system.

The **Tex system** is based on the weight in grams per kilometer of yarn. For example, if one kilometer of yarn weighs 20 grams, the tex number is 20. It is a direct system of measurement since heavier yarns have a higher number.

The **NM system** indicates the number of meters in 1 gram of yarn. A 20 NM yarn will have 20 meters per gram. Because the higher the number achieved through the calculation indicates a finer yarn, it is an indirect system of measurement.

The **YPP (yards per pound) system** is an indirect system, as the number of yards in a pound is greater the finer the yarn is. It is one of the most common methods of stating the linear density and therefore the diameter of a yarn.

Review of Spinning Techniques

Table 4
Spinning Techniques

Spinning Technique	Spinning Description	Fibre Preparation
True Woollen	- Traditional woollen longdraw. - Twist is added to the fibres before and during drafting to ensure random orientation in the yarn.	Hand carded rolag
Semi-woollen	- Twist is added to the fibres before or during drafting to ensure random orientation in the yarn. - Use point of contact with carded preparations. Spin parallel fibres from the fold. - Resulting yarn will have a semi-woollen character when fibres are short with lots of crimp, and they are not straight or parallel when twist is added.	- Carded sliver - Flick-carded locks - Hand carded rolag - Hand carded batt with parallel fibres
Semi-worsted	- Fibres are of mixed lengths. They are nearly parallel when twisted. No twist is allowed into undrafted fibres. - Can use short or long worsted draws to achieve a semi-worsted result. - Resulting yarn will have a semi-worsted character when fibres are of mixed lengths, with little or no crimp, and they are nearly straight and parallel before twist is added.	- Carded sliver - Gilled sliver - Hand carded batt with parallel fibres - Flick carded locks

Spinning Technique	Spinning Description	Fibre Preparation
True Worsted	- Short forward worsted draw, short and long backwards worsted draws. - No twist is allowed into undrafted fibres. The fibres are parallel when twisted.	Combed top from which all the short fibres have been removed.

Table 5

Fine, Medium and Coarse Breed: Comparison of Fleece Characteristics, Preparation and Spinning Techniques

	Example of Breeds	Count	Fibre Length	Crimp	Grease	Preparation Methods	Spinning Techniques	Special Yarn Characteristics
Fine	- Merino - Rambouillet - Cormo - Targhee	64s and finer	5-7.6 cm (2-3 in)	10-30 per 2.5 cm (1 in)	high (many follicles to lubricate)	comb or card	woollen or worsted	warm, lofty, fulls well, soft hand
Medium	- Corriedale - Columbia - Hampshire - Suffolk - Jacob - Cheviot - Clun Forest - Dorset	50s to 62s	5-15 cm (2-6 in)	6-11 per 2.5 cm (1 in)	varies (Merino crosses can have high grease)	comb or card	woollen or worsted	warm, lofty, fulls well, strong
Coarse	- Romney - Border Leicester - Lincoln - Scottish Backface - Karakul	36s to 48s	more than 12.7 cm (5 in)	wavy or no crimp	low (few follicles)	comb or card	woollen or worsted (worsted preserves lustre)	often lustrous, strong, drapes well

Metric/Imperial Conversion Charts

Length

Metric Units: millimetre (mm)
centimetre (cm) = 10 mm
metre (m) = 100 cm
kilometre (km) = 1000 m

Imperial Units: inch (in)
foot (ft) = 12 in
yard (yd) = 3 ft
mile (mi) = 1760 y

Common Conversions

Metric		Imperial
1 mm	=	0.03937 in
1 cm (10 mm)	=	0.3937 in
1 m (100 cm)	=	1.0936 yd
1 km (1000 m)	=	0.6214 mi
Imperial		Metric
1 in	=	2.54 cm
1 ft (12 in)	=	0.3048 m (30.48 cm)
1 yd (3 ft)	=	0.9144 m (91.44 cm)
1 mi (1760 yd)	=	1.6093 km

Converting Inches (in) to Millimetres (mm)

For cm equivalent, multiply mm by 10

Imperial (in)		Metric (mm)
1/16	=	1.58
1/8	=	3.17
3/16	=	4.76
¼	=	6.35
3/8	=	9.52
½	=	12.7
¾	=	19.05
1	=	25.4
12	=	304.8

Diameter**Imperial (in)****Metric (mm)**

$$1/25 = 1.0$$

$$1/30 = 0.848$$

$$1/35 = 0.725$$

$$1/40 = 0.635$$

Area

Metric Units: square millimetres (mm²)
 square centimetres (cm²) = 100 mm²
 square metres (m²) = 10,000 cm²

Imperial Units: square inch (in²)
 square foot (ft²)
 square yard (yd²)

Conversions**Metric****Imperial**

$$1 \text{ cm}^2 (100 \text{ mm}^2) = 0.1550 \text{ in}^2$$

$$1 \text{ m}^2 (10,000 \text{ cm}^2) = 1.1960 \text{ yd}^2 \\ (10.764 \text{ ft}^2, 1,550 \text{ in}^2)$$

Imperial**Metric**

$$1 \text{ in}^2 = 6.4515 \text{ cm}^2 (64.515 \text{ mm}^2)$$

$$1 \text{ ft}^2 (144 \text{ in}^2) = 0.0929 \text{ m}^2 \\ (92.9 \text{ cm}^2, 929.0 \text{ mm}^2)$$

$$1 \text{ yd}^2 = 0.8361 \text{ m}^2 \\ (9 \text{ ft}^2, 1296 \text{ in}^2) \quad (8361 \text{ cm}^2, 83610 \text{ mm}^2)$$

Volume

Metric Units:	cubic centimetre (cm ³) (solid)	millilitre (ml) (liquid)
	cubic decimetre (dm ³) (solid)	litre (l) (liquid)
	cubic metre (m ³) (solid)	hectolitre (hl) (liquid)
Imperial Units: & USA	cubic inches (in ³) (solid)	teaspoon (tsp)
	cubic feet (ft ³) (solid)	tablespoon (tbsp)
	fluid ounce (fl oz) (liquid)	cup
	pint (pt) (liquid)	ounce (oz)
	quart (qt) (liquid)	
	gallon (gal) (liquid)	

Common Conversions

Metric		Imperial
1 cm ³	=	0.0610 in ³
1 dm ³ (1,000 cm ³)	=	0.0353 ft ³
1 m ³ (1,000 dm ³)	=	1.3080 yd ³
1 l (1,000 ml)	=	1.76 pt
1 hl (100 l)	=	21.997 gal
Imperial		Metric
1 in ³	=	16.3867 cm ³
1 ft ³ (1,728 in ³)	=	0.0283 m ³
1 fl oz	=	28.413 ml
1 pt (20 fl oz)	=	0.56831 l
1 qt (2 pt)	=	1.136 l
1 gal	=	4.5461 l
USA Measure		Metric
1 fl oz		
(1.0408 Imp. fl oz)	=	29.574 ml
1 pt (16 fl oz)		
(0.8327 Imp. fl oz)	=	0.4731 l
1 gal		
(0.8327 Imp. gal)	=	3.7854 l

Common Liquid Volume Equivalents

(Metric unless otherwise noted)

Imperial		Metric
1/4 cup	=	60 ml
1/3 cup	=	75 ml
1/2 cup	=	125 ml
2/3 cup	=	150 ml
1 cup	=	250 ml
1 pt (Imp)	=	568.26 ml
1 qt (Imp)	=	1136.5 ml
1 US qt	=	0.946 litre

From Your Kitchen

Imperial		Metric
1 tsp	=	5 ml
3 tsp	=	1 tbsp
1 tbsp	=	15 ml
16 tbsp	=	1 cup
1 cup	=	250 ml
2.5 cups	=	1 pt

Mass (weight)

Metric Units: milligram (mg) = 0.001 grams
gram (g) = 1,000 mg
kilogram (kg) = 1,000 g

Imperial Units: grain
ounce (oz) = 437.5 grains
pound (lb) = 16 oz
stone = 14 lb
hundredweight (cwt) = 112 lb

Common Conversions

Metric		Imperial	
1 mg	=	0.0154	grain
1 g	=	0.0353	oz
1 kg	=	2.2046	lb
Imperial		Metric	
1 oz	=	28.35	g
1 lb	=	0.4536	kg (453.6 g)
1 stone	=	6.3503	kg
1 cwt	=	50.802	kg

Converting Ounces to Grams and Grams to Ounces

Imperial (oz)		Metric (g)	
1/4	=	7.09	
1/2	=	14.17	
3/4	=	21.26	
1	=	28.35	
Metric (g)		Imperial (oz)	
1	=	1/28	
2	=	1/14	
5	=	1/5	
10	=	1/3	
20	=	2/3	

Temperature

Metric Units: Celsius degrees (°C)

Imperial Unit: Fahrenheit degrees (°F)

Conversion Formulas

- Celsius degrees to Fahrenheit degrees, multiply Celsius temperature by 1.8 or 9/5, then add 32
- Fahrenheit degrees to Celsius degrees, subtract 32 from the Fahrenheit temperature, then multiply by 0.5556 or 5/9

Common Temperature Conversions

Metric		Imperial
100°C	=	212°F Boiling Point
80°C	=	176°F
40°C	=	104°F
21°C	=	70°F Average Room
10°C	=	33.8°F
0°C	=	32°F Freezing

Websites: see: <http://www.metric-conversions.org/> and <http://www.almanac.com>

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