Sewing Machines

Unit: Science of Textiles and Manufacturing

Problem Area: Equipment Use and Care

Lesson: Sewing Machines

Student Learning Objectives.

Instruction in this lesson should result in students achieving the following objectives:

1. **Review standard sewing machine parts.**
2. **Thread a machine, and wind a bobbin.**
3. **Conduct maintenance for a standard sewing machine.**

Resources.

The following resources may be useful in teaching this lesson:

E-unit(s) corresponding to this lesson plan. CAERT, Inc. http://www.mycaert.com.

"Basic Sewing Machine Maintenance: Cleaning and Oiling," *Sewing School*. Accessed March 22, 2016. http://sewingschool.org/2011/05/19/basic-sewing-machine-maintenance-cleaning-and-oiling/.

Readers Digest Editors. *The New Guide to Sewing*. The Reader's Digest, 2010.

Soto, Anne Marie and Staff of the Simplicity Pattern Company. *Simply the Best Sewing Book*. Simplicity Pattern, 2011.

Weber, Jeanette. *Clothing: Fashion, Fabrics, and Construction*, 4th ed. Glencoe/McGraw-Hill, 2008.

Westfall, Mary G. *Successful Sewing,* 7th ed. Goodheart-Willcox, 2013.

Equipment, Tools, Supplies, and Facilities

- ✓ Overhead or PowerPoint projector
- ✓ Visual(s) from accompanying master(s)
- ✓ Copies of sample test, lab sheet(s), and/or other items designed for duplication
- ✓ Materials listed on duplicated items
- ✓ Computers with printers and Internet access
- ✓ Classroom resource and reference materials

Key Terms. The following terms are presented in this lesson (shown in bold italics):

- bobbin
- bobbin case
- bobbin cover
- bobbin winder
- compressed air
- feed dogs
- flywheel
- foot (knee) control
- hand wheel (flywheel)
- light switch
- lint
- motor
- needle clamp
- needle plate
- power switch
- presser foot
- presser foot lifter
- reverse button
- sewing machine
- sewing machine needle
- sewing machine oil
- slide plate
- spool pin
- stitch length control
- stitch pattern control
- stitch patterns
- stitch width control
- take-up lever
- tension disc
- thread cutter
- thread guides
- throat plate

Interest Approach. Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situations. A possible approach is included here.

> *Begin the lesson with a short demonstration of the standard sewing machine operation. Thread the machine, wind a bobbin, and place the bobbin inside the bobbin case. Have some pre-cut fabric strips ready to demonstrate stitching by sewing strips of fabric together. Use the strips of fabric to demonstrate the accurate tension required between the upper thread and the bobbin. Encourage students to take a turn at stitching with the standard machine and to ask questions about machine operation.*

> *Then show students the video of how stitches are formed and locked at http://www.theatlantic.com/technology/archive/2013/11/how-a-sewing-machine-works-explained-in-a-gif/281403/. It allows the students to visualize how stitches are made "below" the throat plate.*

CONTENT SUMMARY AND TEACHING STRATEGIES

Objective 1: Review standard sewing machine parts.

Anticipated Problem: What are standard sewing machine parts?

I. Standard sewing machine parts

A. A ***sewing machine*** is a device with a mechanically driven needle that stitches cloth and other materials together with thread. Many different styles and models of standard sewing machines exist, and all operate a little differently. It is important to read and refer to the owner's manual that comes with the sewing machine for detailed operation instructions. When a hard copy of an owner's manual is not available, the manufacturer's Web site typically has an electronic copy for download. Most standard machines have the same basic parts. It is important to learn the various parts of the machine and their purpose to use the machine correctly. When troubleshooting sewing problems, knowing the technical name of each machine part is helpful.

B. Sewing machine parts

1. A ***bobbin*** is a cylinder or spindle on which thread is wound. It holds the bottom thread that will show on the backside of the fabric. A bobbin may be different for all machines, so it is necessary to ensure that the correct bobbin is placed inside the machine. A bobbin is metal or plastic. NOTE: A plastic bobbin should be discarded when the edges become chipped or crack.

2. A ***bobbin case*** is the outer covering that houses the bobbin, holds it in place, and regulates the tension of the bobbin thread. The bobbin case may be a metal piece that is removable from the machine, or it may be a location where the bobbin drops into the underside of the machine.
3. The ***bobbin cover*** is the machine part that opens and allows access to the bobbin. ***Slide plate*** is another name for a bobbin cover. While the machine is in operation, it covers the bobbin case and protects the bobbin area from thread and fabric being caught in the machine. It may be a hinged or a sliding cover. However, a slide plate may have a lever release, depending on the machine model. The bobbin is wound on a bobbin winder.
4. The ***bobbin winder*** is a device (a spool pin pressed against a winder and threaded through a tension disc) that evenly coils the thread to fill a bobbin. It is important to follow the manual directions when winding the bobbin. It may be filled inside the machine. A correctly wound (evenly wound) bobbin is essential for sewing ease.
5. ***Compressed air*** is a gas that has been placed under greater pressure than the air in the general environment. It is used to clean dust and lint from the machine and reaches into areas that a brush cannot. Compressed air is available at local sewing or general stores.
6. The ***feed dogs*** are the metal teeth that stick up above the needle plate and move the fabric forward one stitch at a time. They are located just beneath the presser foot.
7. The ***foot (knee) control*** is a device placed on the floor that, when stepped on/pressed (as for an auto accelerator), applies power to the sewing machine. It allows the seamstress/seamster to regulate the starting and stopping of the machine and the speed at which the machine runs. The more pressure applied to the foot control, the faster the machine runs. A knee control is available and works in the same fashion: Pressing the knee against the lever powers the machine.
8. The ***hand wheel*** is the device that controls the take-up lever to adjust the position of the needle. ***Flywheel*** is another name for the hand wheel. The wheel can be manually turned to raise and lower the needle.
9. The ***sewing machine needle*** is a specialized needle shank inserted into the needle bar with several characteristics that differ from a hand needle.
    a. Shank—The part clamped by the needle holder
    b. Shaft—A length suitable to drive the eye and thread through the material and down to the bobbin
    c. Groove—A cut in the back of the shaft to release the thread into a loop that aids the hook or shuttle to pick up the thread
    d. Scarf—Extra room for the hook or shuttle to pass close by
    e. Eye—The needle opening that carries the thread
    f. Point—The part that penetrates the material by parting threads or by cutting a hole in the fabric

10. The ***needle clamp*** is the piece that holds the needle in place. It is tightened and loosened by the turn of a screw.
11. The ***motor*** is the engine that provides electrical movement to run the machine.
12. The ***power switch*** is a button or a lever that turns on the sewing machine and the light. The ***light switch*** is a button or lever that turns on the light that shines above the needle. Switches may be located in different locations on different machines.
13. The ***presser foot*** is the mechanical device that sits below the needle and above the feed dogs that hold the fabric in place when stitching. Different presser foots are available: zipper, button, etc.
14. The ***presser foot lifter*** is a mechanical lever that controls the pressure foot by raising and lowering the foot to accommodate turns, beginning and ending of sewing, etc.
15. The ***reverse button*** is the device that, when engaged, allows the machine to stitch backwards. Lever is another name for the reverse button. All sewing machines can run in reverse. Reverse stitching is important when locking stitches in place.
16. ***Sewing machine oil*** is specialty lubricant, usually clear; only oil specified for sewing machines should be used. Sewing machine oil can be purchased in most local fabric stores and general stores. NOTE: It is important to unplug the machine before cleaning and oiling.
17. A ***spool pin*** is a tall, cylindrical thread holder.
18. The ***stitch length control*** is a dial that adjusts the length of the stitches per inch made by the machine based on the purpose of the stitch. For example, a longer stitch (a larger number on the dial), such as a baste stitch, is designed to be easily removed once sewn.
19. ***Stitch patterns*** are different shapes, patterns, and formations that may be created by the sewing machine. Many of the sewing machines today have built-in or pre-set stitch formations (e.g., zigzag, satin, blanket, and overcast).
20. The ***stitch pattern control*** is a tool that regulates the stitch patterns.
21. The ***stitch width control*** is usually a dial that regulates the position of the needle to control the width of stitch patterns.
22. A ***take-up lever*** is the part of the upper threading sequence that helps control the flow of the thread. It is on the front of the machine and moves up and down while stitching. It controls the amount of thread pulled from the spool.
23. A ***tension disc*** is a device that controls how tight or how loose the thread is when passing through the needle. NOTE: Tension discs are the first thing to check when the stitches on the machine are not correct. Sewing machines have several tension discs.
24. The ***thread guides*** are part of the upper threading sequence that directs the flow of thread through the machine. They are located to help the upper thread move from the spool pin to the needle without tangling. It is important to

thread through all the thread guides. They help thread move at a consistent speed when stitching.

25. The ***throat plate*** is the flat surface below the needle that the needle goes through when making a stitch. ***Needle plate*** is another name for throat plate. The feed dogs run through it. On most throat plates, a person finds seam width guidelines for easier sewing.
26. The ***thread cutter*** is a blade tool located at the back of the needle bar that allows the sewer to cut the needle thread when finished stitching. The thread cutter may not be found on all machines, but it is handy when it is available.

Teaching Strategy: *Many techniques can be used to help students master this objective. Use VM–A through VM–C to review. Then place a large picture of a standard sewing machine without the parts labeled on a whiteboard, projector, etc. Create laminated labels for each part of the sewing machine listed above. Give each student one or two of the premade labels to individually place on or by the machine part. (If you are using a whiteboard, you can use a magnetic strip on the back of each label. Otherwise, tape will do.) Make this activity available for struggling students for additional practice. As a class, decide if each label is correctly placed. If not, make the correct changes. Discuss the purpose of each part as the labels are positioned on the machine.*

Objective 2: Thread a machine, and wind a bobbin.

Anticipated Problem: How is a sewing machine threaded, and how is a sewing bobbin wound?

II. Threading a machine and winding a bobbin

A. Sewing machines must be correctly threaded, and the bobbin must be evenly wound to create accurate stitches. All machines thread in the same basic process, as follows:

1. Thread must be placed on the spool pin.
2. Thread must be run from the spool pin through a thread guide to the tension disc.
3. The thread should be continued from the tension disc to the take-up lever.
4. Thread should be pulled through the remaining thread guides. (The number of thread guides varies by machine.)
5. Finally, the needle should be threaded from the front to the back.

B. Sewing machines make a complete stitch when the thread from the top and the bottom of the machine are a connected loop. A bobbin holds the bottom thread in place during stitching. It must be evenly wound before placing it in the machine. A bobbin is wound in one of two ways: in the open case method or on a bobbin winder.

1. Open case: Winding the bobbin in the open case under the throat plate requires following the machine's manual and placing the bobbin in the bobbin case. The manual has step-by-step instructions to wind the bobbin and bring the thread from the bottom of the machine over the throat plate.
2. Winder: Many machines require the bobbin to be wound on a spool or bobbin winder and then placed into the bobbin case. To use a bobbin winder:
   a. Thread should be placed on the spool pin.
   b. Thread should be run through the thread guides to the empty bobbin.
   c. The hand wheel (flywheel) should be loosened to stop the needle from moving while winding the bobbin.
   d. Thread should be run through the hole in the bobbin.
   e. The thread should be securely wrapped two to three times around the bobbin and placed on the bobbin winder spool.
   f. The bobbin should be pressed against the bobbin winder while holding the end of the thread.
   g. The sewing machine should be run until the thread is wound evenly on the bobbin. It is important to avoid overfilling the bobbin.

C. The bobbin must be placed in the machine.
1. It is necessary to open the slide plate and to insert the bobbin into the open bobbin case (or take out the bobbin case, if removable).
2. It is important to follow the machine instructions and to wind the threads in the correct direction through the tension guides. (For the removable bobbin case, a person must insert the case into the machine. After both the needle and the bobbin are threaded, the bobbin thread is moved up through the hole in the throat plate.)
3. To move the bobbin thread to the top of the machine, most machines instruct a person to hold the needle thread in the left hand and, with the right hand, manually turn the hand wheel toward the sewer until the needle goes into the throat plate. The sewer keeps turning the hand wheel until the needle comes back up and brings the bobbin thread with it.
4. It is essential to pull the needle and the bobbin threads *behind* the needle. Then the machine is ready to sew.

Teaching Strategy: *Many techniques can be used to help students master this objective. Use VM–D through VM–E. Assign LS–A. [NOTE: The Job Aid cards are a short sequential writing activity for the threading and winding demonstration event and serve as a "take-away" for later use.]*

Objective 3: Conduct maintenance for a standard sewing machine.

Anticipated Problem: How is a standard sewing machine maintained?

III. Maintenance of a standard sewing machine: Keeping the machine cleaned and oiled is necessary for it to work in top condition. The amount of maintenance and cleaning required depends upon the amount of the use. A good rule of thumb is to clean the machine before each use and to place a cover on the machine when not in use to keep the machine free of dust.

A. Lint removal

1. The machine should be unplugged.
2. Lint should be removed. ***Lint*** (dust, threads, and minute fabric shreds) from the fabric collects along the needle bar and in the bobbin area. It is important to remove the bobbin cover or throat plate and to brush, blow, vacuum, or use compressed air to eliminate the lint from the working mechanism of the machine. Lint attaches to the moving parts, absorbing the lubricant (oil) needed for smooth operation. In turn, lint creates extra wear and tear on the parts.
    a. A lint brush is a small brush that generally comes as part of the tools provided with the sewing machine. If the machine does not have a lint brush, a small paintbrush or other small brush will work.
    b. Compressed air can be used to eliminate the lint. Yet some controversy exists about the use of canned air. Some experts contend that the use of canned air adds unneeded moisture to the machine, and the moisture could result in rust. Other experts contend that the force of the "blowing" air can push lint into the working mechanism of the machine. In general, compressed air should be used from the sides of the throat plate to reduce the amount of lint trapped in the moving parts.

B. It is critical to oil the machine. The machine manual should be consulted for oiling instructions. Some newer standard machines have built-in oiling systems, and others will provide specific directions for the placement of the oil and the frequency of oiling. Sewing machine oil is specialty lubricant—usually clear; only oil specified for sewing machines should be used. Any excess oil should be wiped off to avoid staining the fabric being sewn. It is advisable to create a few lines of stitching on scrap fabric to ensure no oil drips stain a project fabric. A soft cloth should be used to wipe down the machine and to wipe up any excess oil.

C. Service schedule

1. The machine should be professionally serviced every two years. This service should provide a "stitchout" as proof of straight and zigzag stitch tension balance. The basic professional service includes:
    a. Cleaning
    b. Oiling
    c. Tension balancing

2. Every five years, it is essential to conduct a complete sewing machine service, depending upon use. A few additional checks are done during this service.

> **Teaching Strategy:** *Many techniques can be used to help students master this objective. Demonstrate how to clean and oil a sewing machine (include use of the lint brush, compressed air, and sewing machine oil). Encourage students to ask questions during the demonstration. OPTIONAL: Have students demonstrate the tasks on their lab machines.*

- **Review/Summary.** Use the student learning objectives to summarize the lesson. Have students explain the content associated with each objective. Student responses can be used in determining which objectives need to be reviewed or taught from a different angle. If a textbook is being used, questions at the ends of chapters may be included in the Review/Summary.

- **Application.** Use the included visual master(s) and lab sheet(s) to apply the information presented in the lesson.

- **Evaluation.** Evaluation should focus on student achievement of the objectives for the lesson. Various techniques can be used, such as student performance on the application activities. A sample written test is provided.

- **Answers to Sample Test:**

Part One: Matching

1. d
2. f
3. a
4. e
5. c
6. b

Part Two: Completion

1. take-up lever
2. throat plate
3. tension disc
4. thread guides
5. sewing machine oil
6. bobbin winder
7. lint
8. sewing machine (or standard sewing machine)

Part Three: Short Answer

1. All machines thread in the same basic process, as follows:
   a. Place thread on the spool pin.
   b. Run thread from the spool pin through a thread guide to the tension disc.
   c. Continue the thread from the tension disc to the take-up lever.
   d. Pull thread through the remaining thread guides. (The number of thread guides varies by machine.)
   e. Finally, thread the needle from the front to the back.
2. A bobbin must be wound evenly to ensure accurate stitching. Sewing machines make a complete stitch when the thread from the top and the bottom of the machine are connected and make a loop. A bobbin holds the bottom thread in place during stitching. It must be evenly wound before placing it in the machine. A bobbin is wound in one of two ways: in the open case method or on a bobbin winder.

Sample Test

Name _____

Sewing Machines

Part One: Matching

Instructions: **Match the term with the correct definition.**

a. needle clamp
b. bobbin
c. hand wheel
d. presser foot
e. reverse button
f. spool pin

_____1. The mechanical device that sits below the needle and above the feed dogs that holds the fabric in place when stitching

_____2. A tall, cylindrical thread holder

_____3. The piece that holds the needle in place

_____4. The device that, when engaged, allows the machine to stitch backwards

_____5. The device that controls the take-up lever to adjust the position of the needle

_____6. A cylinder or spindle on which thread is wound

Part Two: Completion

Instructions: **Provide the word or words to complete the following statements.**

1. The part of the upper threading sequence that helps control the flow of the thread is the _____.
2. The flat surface below the needle that the needle goes through when making a stitch is the _____.
3. A device that controls how tight or how loose the thread is when passing through the needle is a/an _____.

4. Parts of the upper threading sequence that direct the flow of thread are a series of _____.
5. The specialty lubricant, usually clear, is _____.
6. A device (a spool pin pressed against a winder and threaded through a tension disc) that evenly coils the thread to fill a bobbin is the _____.
7. Dust, threads, and minute fabric shreds from the fabric collects along the needle bar and in the bobbin area as _____.
8. A device with a mechanically driven needle that stitches cloth and other materials together with thread is a/an _____.

Part Three: Short Answer

Instructions: **Answer the following.**

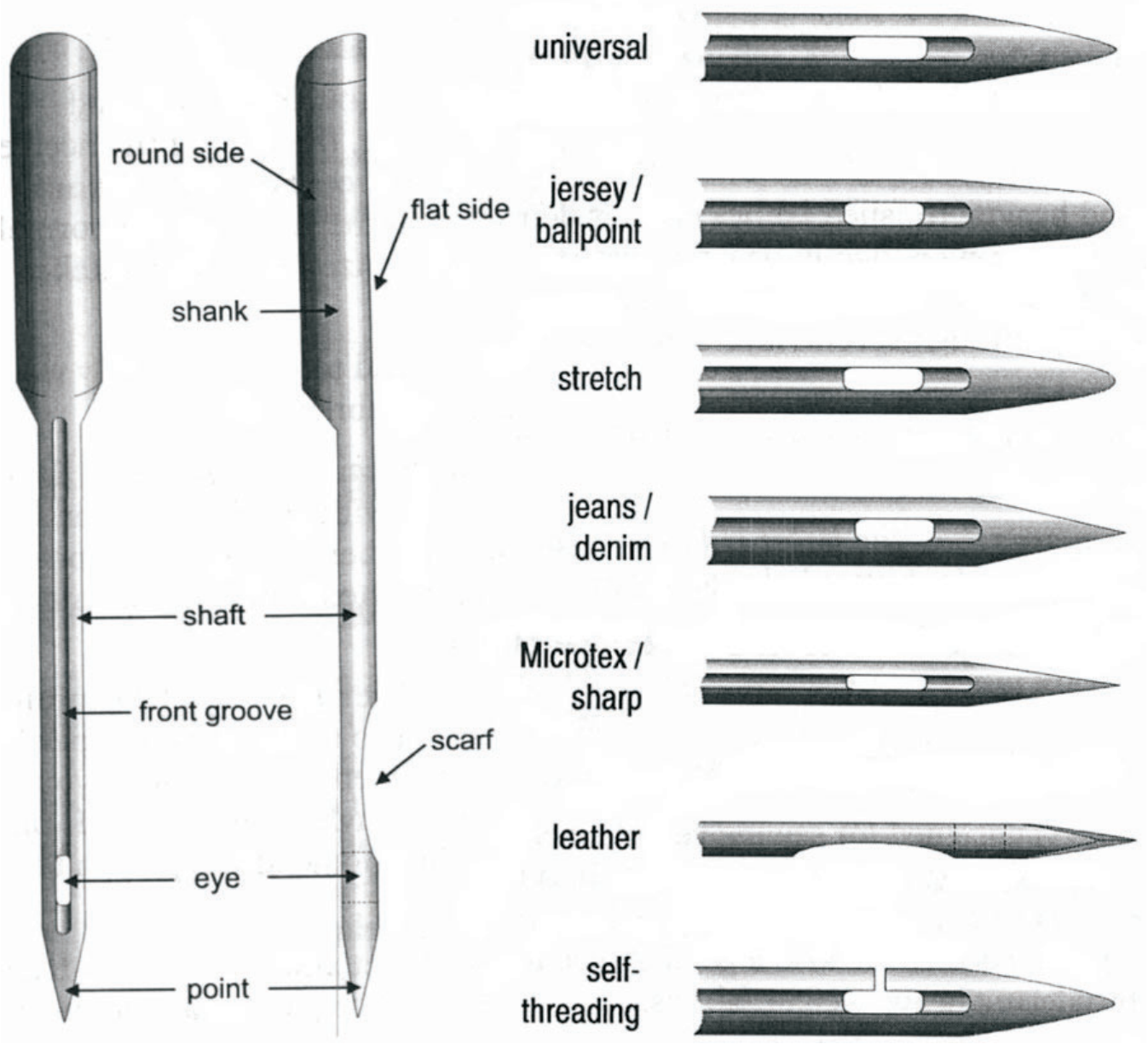
1. List the basic steps to thread a sewing machine.

2. Explain the importance of winding a bobbin evenly.

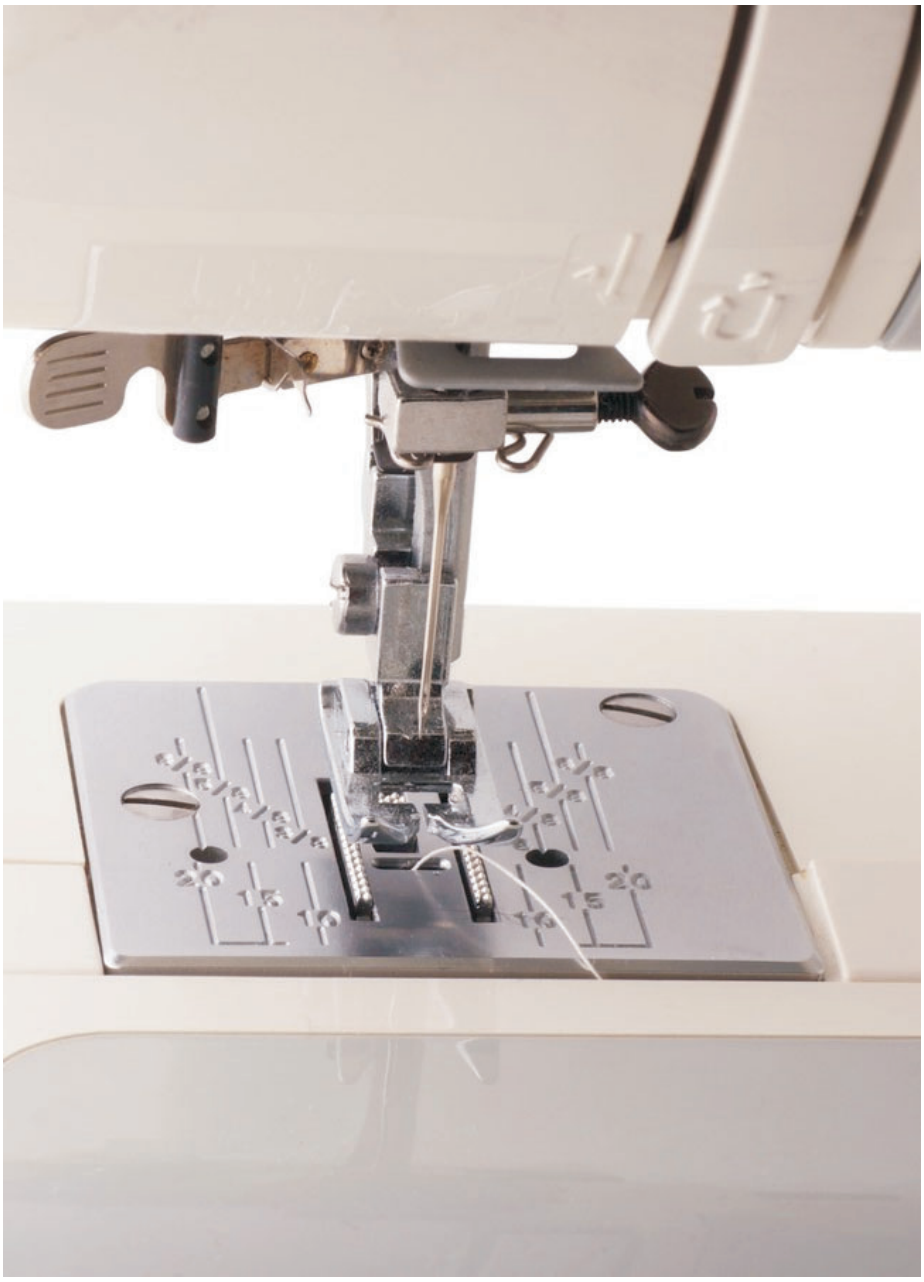
SEWING MACHINE NEEDLE

The sewing machine needle is a specialized needle shank inserted into the needle bar with several characteristics that differ from a hand needle. Notice the needle groove "faces" the sewer.

SEWING MACHINE NEEDLE PARTS



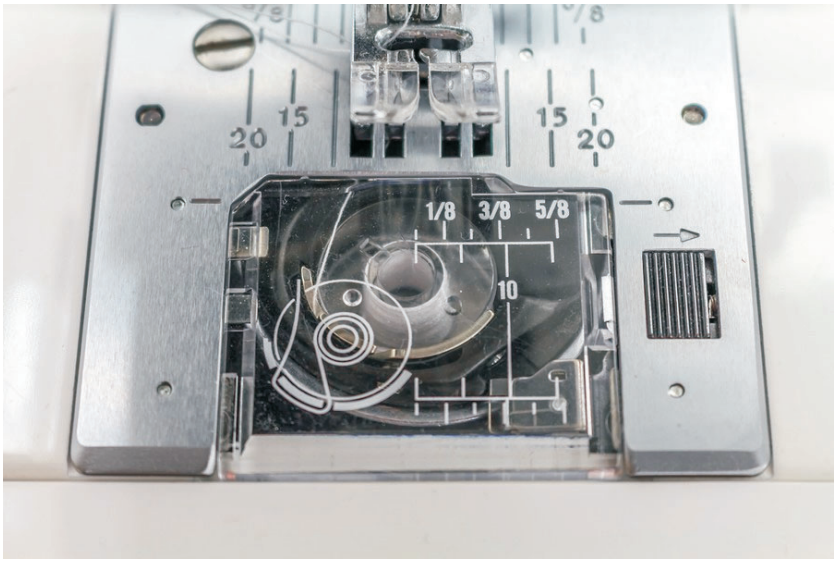
SEWING MACHINE PARTS



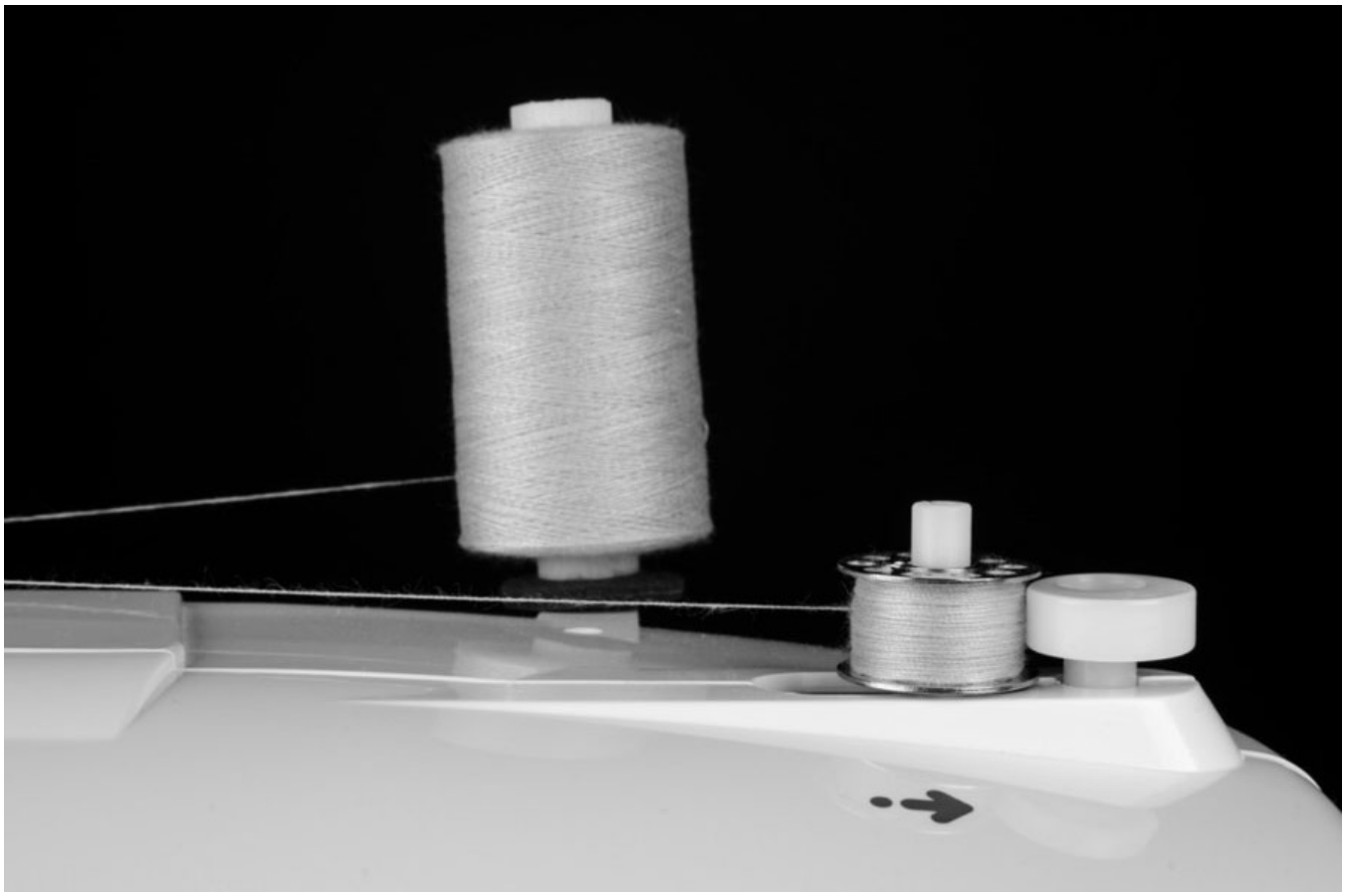
Can you identify the following sewing machine parts: needle, thread guides, presser foot, throat plate, and feed dogs? What other parts are pictured?

BOBBIN CASE AND BOBBIN

A bobbin is a cylinder or spindle on which thread is wound. It holds the bottom thread that will show on the backside of the fabric. A bobbin case is the outer covering that houses the bobbin, holds it in place, and regulates the tension of the bobbin thread. The bobbin cover or slide plate is the machine part that opens and allows access to the bobbin.



BOBBIN WINDER MECHANISM



Sewing machines must be correctly threaded and the bobbin evenly wound to create accurate stitches. Some machines wind the bobbin inside the machine (open case), and others use a bobbin winder mechanism. Then the bobbin is slipped into the bobbin case and the threads wound through the tension mechanism.

Name _____

Machine Threading and Bobbin Winding Demonstration

Purpose

The purpose of this activity is to accurately thread a sewing machine and evenly wind a bobbin.

Objectives

1. Thread a sewing machine (according to manual instructions).
2. Wind a bobbin (according to manual instructions).
3. Troubleshoot and correct any threading or winding issues.
4. Write two job aid cards.
5. Demonstrate even stitches.

Materials

- lab sheet
- class notes
- sewing machine
- thread
- bobbin
- scissors
- four index cards (or other sturdy stock)

Procedure

1. Review your class notes about threading a sewing machine and winding a bobbin. Remember: Sewing machines must be correctly threaded, and the bobbin must be evenly wound to create accurate stitches.
2. Work with a partner at a sewing machine to thread the machine and to wind the bobbin.
3. Individually, practice threading a machine and winding a bobbin.
4. Then demonstrate the following tasks for your instructor:
    a. Thread a sewing machine.
    b. Wind a bobbin.
    c. Place the bobbin in the case, and insert it into the machine.
    d. When directed, bring up the bobbin thread, and prepare the machine to stitch.
    e. As directed, check the finished threading and winding tasks completed by your partner. Together, troubleshoot and correct any issues.
    f. For your instructor: Stitch a line 12 inches long as a demonstration of accurate threading and winding.
    g. Then remove the bobbin and the thread. Your partner will complete the assignment.
5. Create two job aids (a list of sequential steps) for your own use:
    a. Job Aid 1: Thread a Sewing Machine
    b. Job Aid 2: Wind a Bobbin
6. Participate in a class discussion of the threading and winding processes. Then continue the discussion to include upcoming sewing projects.
7. As directed, turn in your Job Aid cards for your instructor's review.

Machine Threading and Bobbin Winding Demonstration

1. The purpose of this activity is to ensure that all students are "ready to sew" and to identify any student who may require extra help threading the sewing machine accurately and/or winding a bobbin accurately. It is important that all students are able to "get the machine ready to sew." The observation protocol would look similar to the following:

   a. Pairs are at a sewing machine.
   b. Observe individual students threading the machine, winding the bobbin, and placing the bobbin in the machine. If necessary, direct each student to bring the bobbin thread up and have the machine ready to stitch.
   c. Ask the partner student to check the student who has just finished threading and winding. If the student has made a mistake, have the partner help the first student troubleshoot and complete the process correctly. (This step allows each student to complete the process and review by helping another student.)
   d. Then direct the student being observed to remove the bobbin and the thread for the next student to complete the assignment.
   e. Repeat Steps *a* through *d* with the partner student.
   f. Direct students to write two job aid cards:
      (1) Job Aid 1: Thread a Sewing Machine
      (2) Job Aid 2: Wind a Bobbin
   g. When all students have completed the demonstrations, lead a discussion. Ask students to declare their comfort level and ability to begin a sewing project. Talk about some of the exciting things they can do now that they know how to use the machine.

2. OPTIONAL: Ask any student who needs, or expresses a need for, extra help to view an online video about threading a machine and winding a bobbin, such as "Sewing Basics 1: How to Thread Your Machine" at https://www.youtube.com/watch?v=r0uXsuatcL0 or "First Steps: Threading a Sewing Machine" at https://www.youtube.com/watch?v=iQvt-XozXwA. Then the student may demonstrate machine threading and bobbin winding to you again. Then conduct the same observation and coaching process as before.