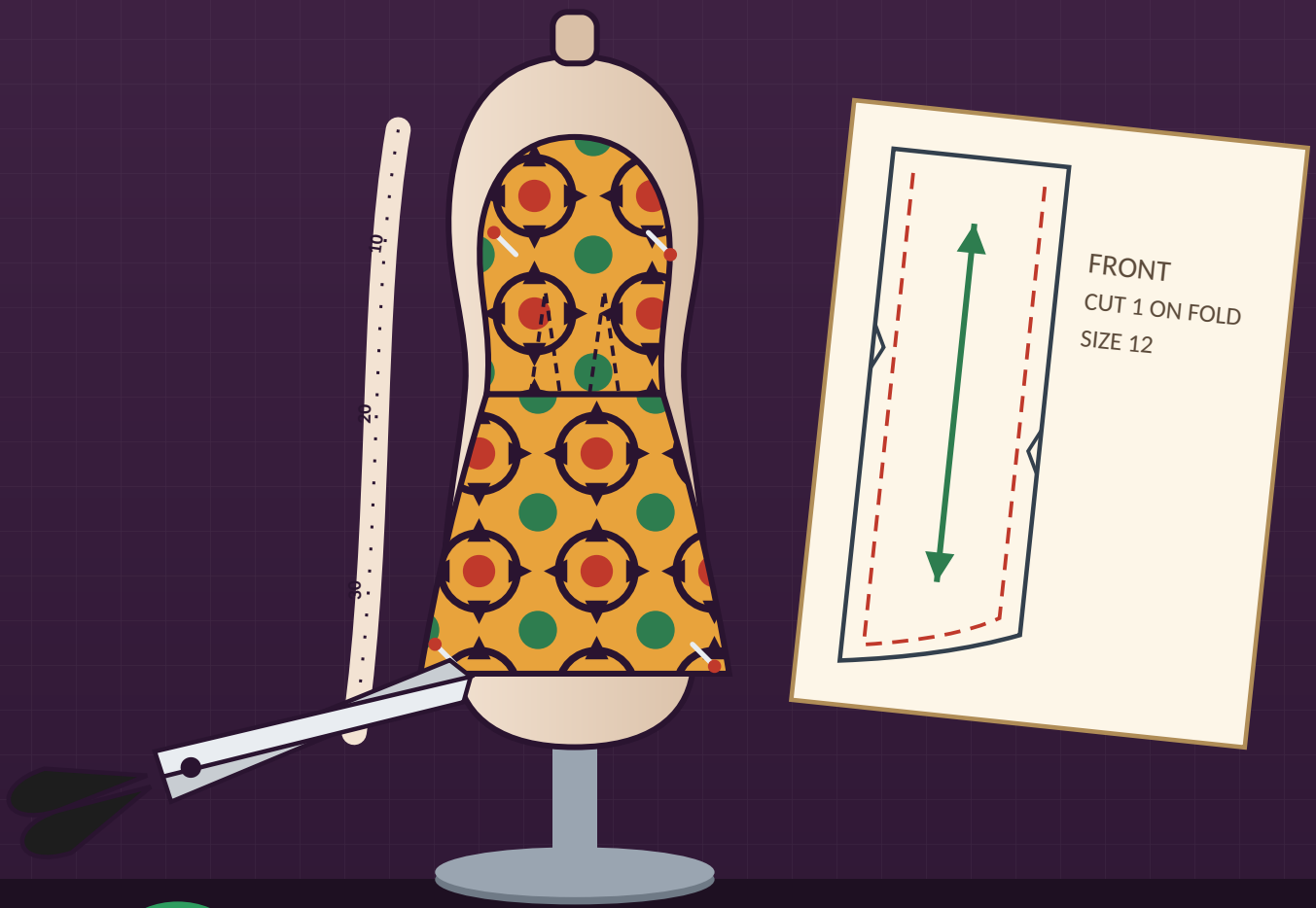
KNQF LEVEL 3 · TVET CDACC CYCLE 3

Fashion Design Level 3

A Practical Study Guide for Kenyan Trainees

Sewing machine operation · Ladies' garments · Gents' garments



Green Skills Edition

Energy-saving machines · less fabric waste · repair and upcycle

Alphonce Kimutai Kirui

Aligned to the TVET CDACC Competency-Based Modular Curriculum, Fashion Design KNQF Level 3

Fashion Design Level 3

A Practical Study Guide for Kenyan Trainees

Sewing Machine Operation · Basic Ladies' Garments Construction · Basic Gents' Garments Construction
Kenya National Qualifications Framework (KNQF) Level 3 · Green Skills Edition

Alphonce Kimutai Kirui

Fashion Design Level 3: A Practical Study Guide for Kenyan Trainees
First edition, October 2026

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About the curriculum

This book is an independent study guide. It follows the topics and units of the TVET CDACC Competency-Based Modular Curriculum and Occupational Standard for Fashion Design, KNQF Level 3 (Cycle 3, greened version, programme code 0212 254B, unit codes FAS/CU/FD/CR/01–03/3/MB). Unit titles and codes are used for reference only. The book is not published, endorsed or approved by TVET CDACC, TVETA or the Ministry of Education. Always follow the current official curriculum and your trainer's guidance.

Safety and accuracy notice

Sewing workshops have real hazards: needles, shears, hot irons, electric machines, dust and long hours at a bench. The methods in this book are for training under the supervision of a qualified trainer. Figures given as "typical" (ease allowances, seam allowances, stitch lengths, needle sizes, drafting formulas, size charts and prices) are general guidance only. Always follow the client's measurements, the machine manufacturer's manual, your trainer's instructions and relevant Kenyan standards. Prices are approximate (2026) and will vary by town and season.

Names of people, shops and places used in examples are made up for teaching.

Illustrations

All drawings and diagrams in this book were drawn for it. They are teaching drawings and are not to scale unless a scale is shown. Pattern drafts show the method; always draft from the real measurements in front of you.

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How to use this book

This book follows the Fashion Design Level 3 course from start to finish. It covers the three core units and the industrial attachment, in the same order as your training. You can read it cover to cover, or study one unit at a time if you are taking a part qualification.

The course at a glance

Part	What it covers	Training time
1. Getting started	The trade, the course, assessment, safety, ethics and green practice	Used throughout
2. Sewing machine operation	Unit 1: Sewing Machine Operation (FAS/CU/FD/CR/01/3/MB)	50 hours
3. Basic ladies' garments	Unit 2: Basic Ladies' Garments Construction (FAS/CU/FD/CR/02/3/MB)	150 hours
4. Basic gents' garments	Unit 3: Basic Gents' Garments Construction (FAS/CU/FD/CR/03/3/MB)	150 hours
5. Attachment and assessment	Industrial attachment, starting out, and getting ready to be assessed	240 hours

What is in each chapter

- **What you will learn:** the chapter's goals, with the unit, learning outcome and training hours it belongs to.
- **Key words:** the trade words you need, explained simply. More are in the Glossary at the back.
- **Explanations and drawings:** each topic explained step by step, with labelled diagrams and pattern drafts.
- **Worked examples:** measurements, fabric quantities and costings worked through with real numbers.
- **Practical tasks:** workshop jobs with the tools, materials, steps and safety points. Do them with your trainer.
- **Check your competence:** a checklist of what an assessor will expect you to show. Tick each item when you can do it without help.
- **Practice questions:** answers are at the back of the book.

Look out for these boxes

> **SAFETY FIRST**
>
> Hazards and how to stay safe. Never skip these.

> **GREEN TIP**
>
> Ways to save fabric, thread, energy and water, to repair rather than replace, and to handle waste correctly. Green skills are part of your assessment.

> **TRAINER'S TIP**
>
> Advice from experienced trainers and tailors to help you work faster and better.

COMMON MISTAKES

Errors trainees often make, and how to avoid them.

IN THE KENYAN WORKSHOP

How the topic looks in real tailoring shops, uniform workrooms and markets in Kenya.

Colours and lines in the drawings

The drawings use the same colours and line styles all through the book, so you can read any pattern draft or construction diagram at a glance. Learn the line styles too: they are the same ones used on commercial paper patterns.

Fabric, right side		Fabric, wrong side	
A second fabric, lining or contrast		Interfacing (often hatched)	
Paper pattern piece		Metal parts of the machine and tools	
Cutting line (solid)		Stitching line and thread (dashed, dark red)	
Fold line (dash-dot, blue)		Grain line arrow (green)	
Measurements and dimension arrows		Green (eco-friendly) items	

PART 1

Getting Started

What a Level 3 fashion designer does, how you will be trained and assessed, and the safety, ethics and green habits you will use every day in the workshop.

Chapter 1: Becoming a Fashion Designer in Kenya
Chapter 2: Safety, Ethics and Green Practice in the Workshop

CHAPTER 1

Becoming a Fashion Designer in Kenya

WHAT YOU WILL LEARN

- Describe the work a Level 3 fashion designer does and who employs fashion designers in Kenya.
- Explain how the Kenyan clothing industry works, from cotton and kitenge to mitumba and school uniforms.
- Plan your growth from Level 3 to higher levels and into related trades.
- Explain the words of competency-based training: unit, element, performance criteria, part qualification and RPL.
- Read your course map and know the hours for every unit and learning outcome.
- Calculate a unit score and decide whether a candidate is competent and at what rating.

Introduction to the qualification · Fashion Design KNQF Level 3 (Cycle 3, greened) · 3 core units + industrial attachment · 590 hours

Every person you pass on the street is wearing something a tailor or a factory machinist made. The school shirt in Sotik, the kitenge dress at a wedding in Kisii and the khaki trousers of a watchman in Nakuru all started as flat cloth. A trained fashion designer turned that cloth into a garment that fits, lasts and looks right. This chapter shows you what the job involves, how your course is organised, how you will be judged competent and how to behave like a professional from your first day in the workshop.

Key words

Fashion designer (Level 3)
A trained person who sketches, drafts, cuts, sews and finishes basic garments and keeps the sewing machine running.

Fundi wa nguo
Kiswahili for a tailor or dressmaker. Many Kenyans use "fundi" for any skilled sewing person.

Garment
Any item of clothing: a skirt, blouse, dress, shirt, pair of shorts or trousers.

CBET
Competency-Based Education and Training. You are trained and judged on what you can actually do.

Unit of competency
One complete area of work, such as constructing basic ladies' garments.

Element
A main task inside a unit, for example developing freehand pattern pieces.

Performance criteria
Statements that say how well each task must be done before you are judged competent.

Learning outcome (LO)
What you must be able to do at the end of one block of training.

Formative assessment
Assessment during training that checks your progress on every performance criterion.

Summative assessment
The final assessment at the end of a unit.

Portfolio of evidence
Your file of signed task sheets, sketches, sample seams, photos and reports that proves your skills.

RPL
Recognition of Prior Learning: being assessed and certified for skills you already have.

1.1 What a Level 3 fashion designer does

A Level 3 fashion designer makes basic garments from a customer's order. You listen to the customer, take body measurements, make a simple sketch, draft a pattern by hand, lay and cut the fabric, sew the pieces together, finish the garment and present it neatly. You also look after the sewing machine, because a machine that skips stitches or breaks thread stops the whole shop. Designing full collections and grading patterns into many sizes come at higher levels. At Level 3 the test is simple: can a customer wear what you made, and will they come back?

Your qualification has three core units. Each unit matches a big part of the job. Table 1.1 shows the main tasks and the chapters where you will learn them.

Table 1.1 Main work of a Level 3 fashion designer

Area of work	Typical tasks in a Kenyan workshop	Unit	Chapters
Sewing machine operation	Set up and thread domestic, treadle and industrial machines, balance tension, sew straight and curved seams, find and fix faults such as skipped stitches, clean and oil the machine, keep a service record, work safely and ethically	Unit 1	2–6
Basic ladies' garments	Take ladies' measurements, sketch a simple skirt, blouse and dress, draft skirt, bodice and sleeve blocks freehand, lay and cut kitenge or polycotton, sew darts, zips and waistbands, hem and press, display and package	Unit 2	7–12
Basic gents' garments	Take gents' measurements, sketch a basic shirt, shorts and trousers, draft them from measurements, cut drill and tetron, sew collars, cuffs, plackets and fly fronts, finish and present	Unit 3	12–15

1.1.1 Who employs fashion designers

Sewing skills are needed wherever people wear clothes, which is everywhere. The main employers and markets are:

- **Small tailoring shops** in towns, market centres and estates. One or two machines, a cutting table and a steady flow of repairs, alterations and made-to-measure orders.
- **School uniform makers.** Primary and secondary schools order shirts, skirts, shorts, trousers, dresses and sweaters every January and at mid-year. A good uniform tailor is busy all year.
- **Garment factories and EPZ firms.** Export Processing Zone factories in Athi River, Nairobi, Mombasa and other towns sew for export. They hire machinists, cutters, quality checkers and machine mechanics.
- **Boutiques and fashion houses** that make Ankara and kitenge wear, church outfits, wedding gowns, bridesmaids' dresses and office wear for customers who want something unique.
- **Institutions** such as hospitals, hotels, security companies, factories and schools that need uniforms, aprons, bedding and curtains, and keep a tailor on staff or on contract.
- **Mitumba traders** who need alterations, repairs and upcycling to sell second-hand clothes at a better price.
- **Self-employment.** Many trained tailors start with one machine at home or in a rented stall, selling through WhatsApp and TikTok and taking M-Pesa payments.

> **IN THE KENYAN WORKSHOP**
>
> In a typical estate tailoring shop the owner cuts and does the fittings, one or two machinists sew, and a learner does hemming, buttons, pressing and errands. As a trained Level 3 fashion designer you should quickly become the person trusted to thread and adjust the machine, cut from the pattern and sew a complete garment without supervision. That trust moves you from learner pay to fundi pay, and later to your own shop.

1.2 The Kenyan clothing industry in brief

You will work inside an industry, not alone. Knowing how it works helps you find the right job and the right customers.

From cotton to cloth. Kenya grows some cotton in the western, coastal and eastern counties, and ginneries and mills in towns such as Thika, Eldoret and Kisumu spin and weave part of it. Much of the cloth you will sew, however, is imported: kitenge and Ankara wax prints, polycotton, tetron, drill and khaki. In Nairobi the big fabric markets are Eastleigh and the area around Gikomba and Kamukunji; every county town has smaller shops stocking the same types at a slightly higher price. The national Kenya Textile Policy aims to grow the whole chain from farm to finished garment.

Factories and export. Export Processing Zone (EPZ) factories employ tens of thousands of Kenyans, mostly women, sewing clothes for export. The work is fast and repetitive, and a machinist may sew only collars all day. Factories need people who sew accurately at speed and look after their machines.

Mitumba. Second-hand clothing arrives in bales and is sold in markets such as Gikomba and in every town. It is cheap and it is strong competition for anyone making ready-to-wear basics. It is also an opportunity. Mitumba customers pay for alterations, and clever tailors buy damaged or oversized pieces by the kilogram and remake them into new garments. This is called upcycling and it is a growing green business.

Steady local markets. Mitumba cannot replace a school uniform in the correct colour and badge, a choir robe, a matching family kitenge set for a wedding, a nurse's uniform or a dress made to a customer's own measurements. These are the markets where a trained Kenyan tailor earns a living. Table 1.2 lists them.

Table 1.2 Steady markets for a Level 3 fashion designer in Kenya

Market	Typical garments	Usual fabrics	When busy
School uniforms	Shirts, blouses, skirts, shorts, trousers, tunics	Polycotton, tetron, drill, khaki	December–January, April, August
Church and choir wear	Robes, matching dresses and shirts, sashes	Kitenge, satin, polycotton	Before Easter, Christmas and church events
Weddings and ceremonies	Bridesmaids' dresses, groomsmen's shirts, family kitenge outfits	Ankara wax print, kitenge, lace, satin	School holidays, December
Office and casual wear	Ankara dresses, skirts, shirts, trousers	Ankara, cotton, polycotton	All year, pay days
Work uniforms	Dust coats, aprons, security and hospitality uniforms	Drill, khaki, polycotton	All year, on contract
Repairs and alterations	Hems, zips, waist adjustments, mitumba resizing	Any	All year, daily cash

The Ankara trend. Over the last fifteen years bright African wax prints have moved from the village to the office and the catwalk, and Nairobi designers now sell Ankara wear online across the world. The skills behind that business are the ones in this book: a good sketch, a correct pattern, careful matching of a bold print and clean finishing.

1.3 Your career path

Level 3 is a starting point, not a ceiling. The Kenya National Qualifications Framework (KNQF) arranges awards in levels. Each level adds skill and responsibility. Figure 1.1 shows a common route upwards and some side moves.

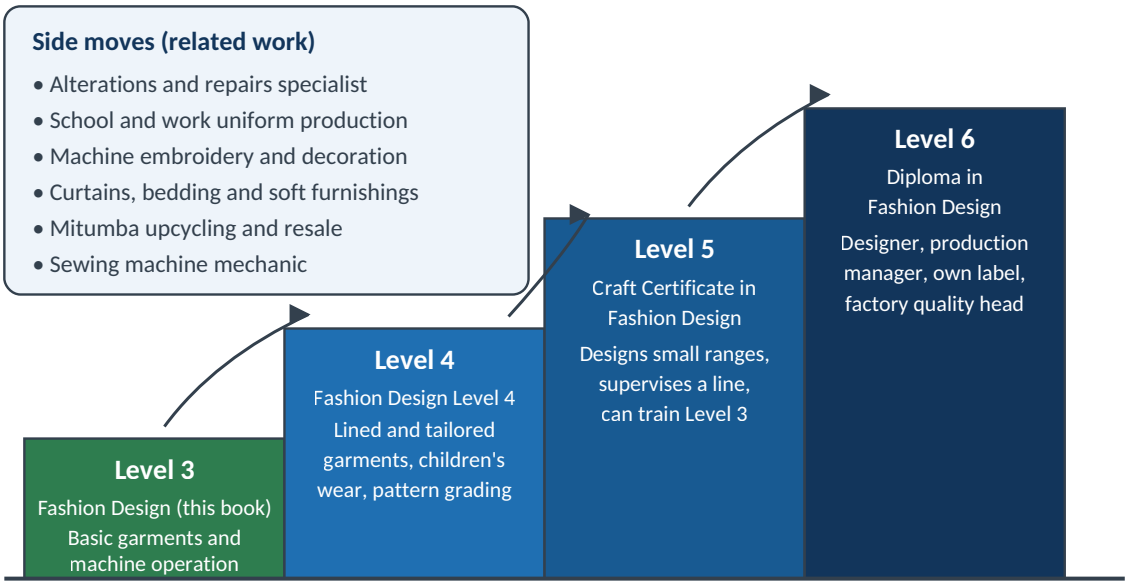


Figure 1.1 A typical career ladder for a fashion designer, with related work you can move into. Award names depend on the curricula in force.

The exact names of higher awards change from time to time, so confirm them with your trainer or institution. The idea stays the same. A Level 3 fashion designer makes a basic garment correctly from an order. A Level 5 or 6 graduate designs the range, costs it, plans production for several machinists and checks quality against the specification.

Side moves also pay. A tailor who can also repair machines is never idle, because every shop in town needs that service. Embroidery adds value to uniforms and church wear. Curtains and bedding use the same straight-seam skills on a bigger scale. And a trainer with a Level 5 certificate and TVETA registration can teach in a county vocational training centre.

1.4 How competency-based training works

Your course follows CBET. In the old exam system you could pass by memorising notes. In CBET you must *show* that you can do the work to the required standard, and explain why you do it that way. Your assessor will watch you thread a machine, cut a skirt and set a zip, and ask you questions while you work.

1.4.1 Two documents behind your course

The **occupational standard** was written with people from the clothing industry. It describes what a competent fashion designer does at work. It breaks each unit into elements, and each element into performance criteria. The **curriculum** turns that standard into training. It lists learning outcomes, content, hours, tools and suggested assessment methods. Your trainer plans lessons from the curriculum. Your assessor judges you against the performance criteria.

Here is how the parts fit, using one example in plain words:

- **Unit:** Construct basic ladies' garments.
- **Element:** Lay and cut garment pieces.

- **A performance criterion, in plain words:** the pattern pieces are placed on the fabric with the grain line parallel to the selvedge and with the least possible waste.
- **Evidence:** your trainer watches you lay the skirt pattern on folded fabric, checks the grain with a tape and signs your task sheet.

1.4.2 Part qualifications and certificates

You do not have to finish the whole course before you receive anything. Each core unit is a separate block of competence. This means you can enter, leave and return to training, and still be recognised for what you have achieved. A trainee who completes Unit 1 and must go home to work can come back a year later for Units 2 and 3. Table 1.3 shows the awards. All of them are issued by TVET CDACC.

Table 1.3 Awards you can earn

Award	What you must show	Example
Statement of Attainment	Competence in one certifiable element inside a unit	You are found competent in servicing and maintaining sewing machines
Certificate of Competency	Competence in one full core unit	You complete all of Basic Ladies' Garments Construction
Kenya National TVET Certificate in Fashion Design Level 3	Competence in all units of the qualification	You complete all three core units and the industrial attachment

1.4.3 Recognition of Prior Learning

Thousands of good tailors in Kenya learned beside a relative or an employer and never went to college. RPL lets such a person be assessed against the same standard and receive part or all of the qualification. The candidate shows evidence from past work, such as photos of garments, customer records and an employer's letter, and then does practical tasks and answers oral questions. If you already sew for money, ask your institution about RPL. If you know a fundi without papers, tell them about it. A certificate opens doors to uniform contracts, factory jobs and county tenders.

1.5 Your course map

The course has three core units and a period of industrial attachment. Hours are converted to credits at ten hours per credit. The core units total 350 hours. Industrial attachment adds 240 hours. The full course is 590 hours, which is 59 credits. Figure 1.2 shows how the hours are shared between learning outcomes, and which chapter of this book covers each one.

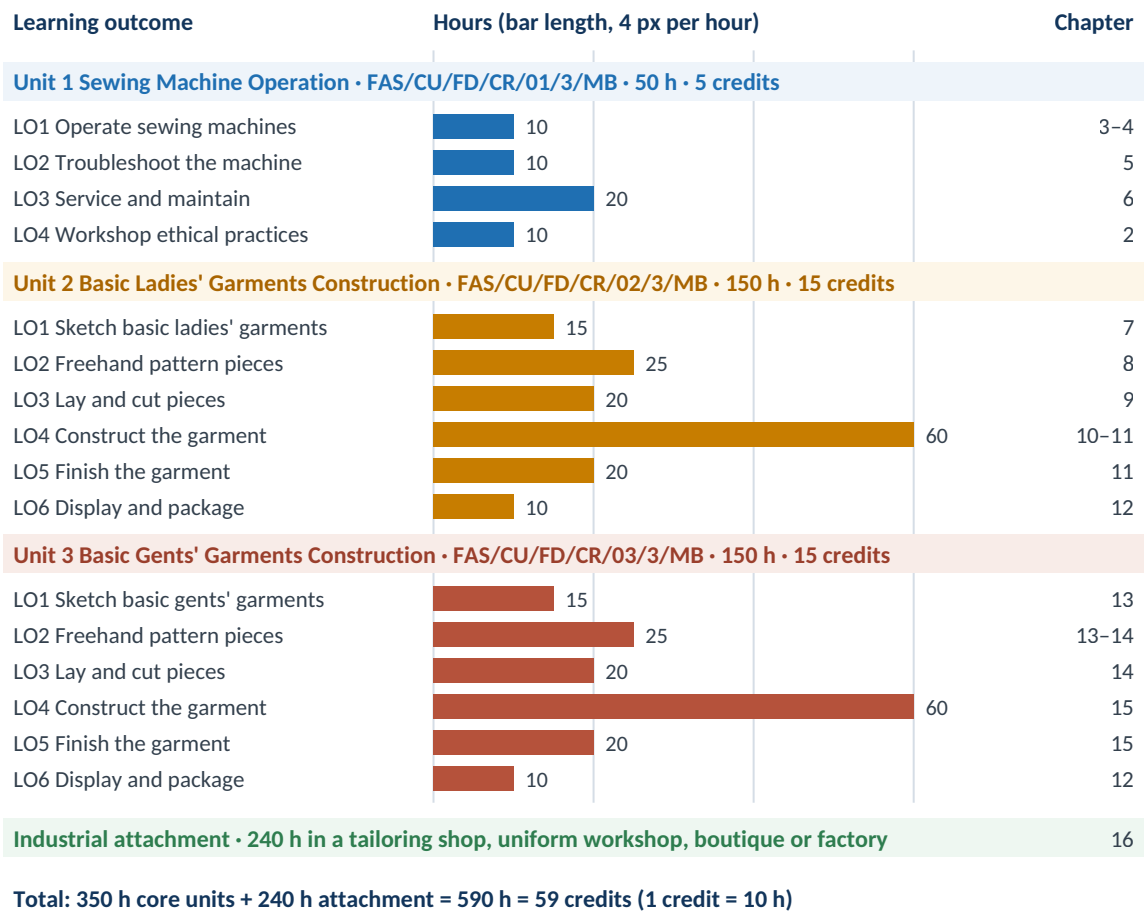


Figure 1.2 Course map. Bar length shows the hours for each learning outcome (LO); the right-hand column gives the chapter of this book that covers it.

Look at where the hours go. Constructing the garment gets 60 hours in each garment unit, four times more than sketching. Servicing and maintaining the machine gets 20 of the 50 hours in Unit 1. Those are the skills that need the most practice, and, as Chapter 16 shows, they also carry the most marks. Learn to use the map. When you start a new learning outcome, turn to its chapter and read ahead.

Industrial attachment is your time in a real workshop, shop or factory. It may come after all the units, or be shared between units if you are studying for a part qualification. Trainees on a dual training programme split their week between the institution and an employer from the start. Your institution will tell you the exact arrangement. Chapter 16 explains how to get the most from it.

1.6 How you will be assessed

Every unit is assessed in two stages. **Formative assessment** happens during training. Your trainer sets practical tasks that cover every performance criterion, and there must be at least as many formative assessments as there are elements in the unit. **Summative assessment** comes at the end of the unit and focuses on the most important parts of the work. In both stages the theory is not a separate written paper. The assessor asks you questions orally while you work: "Why did you choose that needle?" "What is this line on the pattern for?" Figure 1.3 shows how the marks are combined.

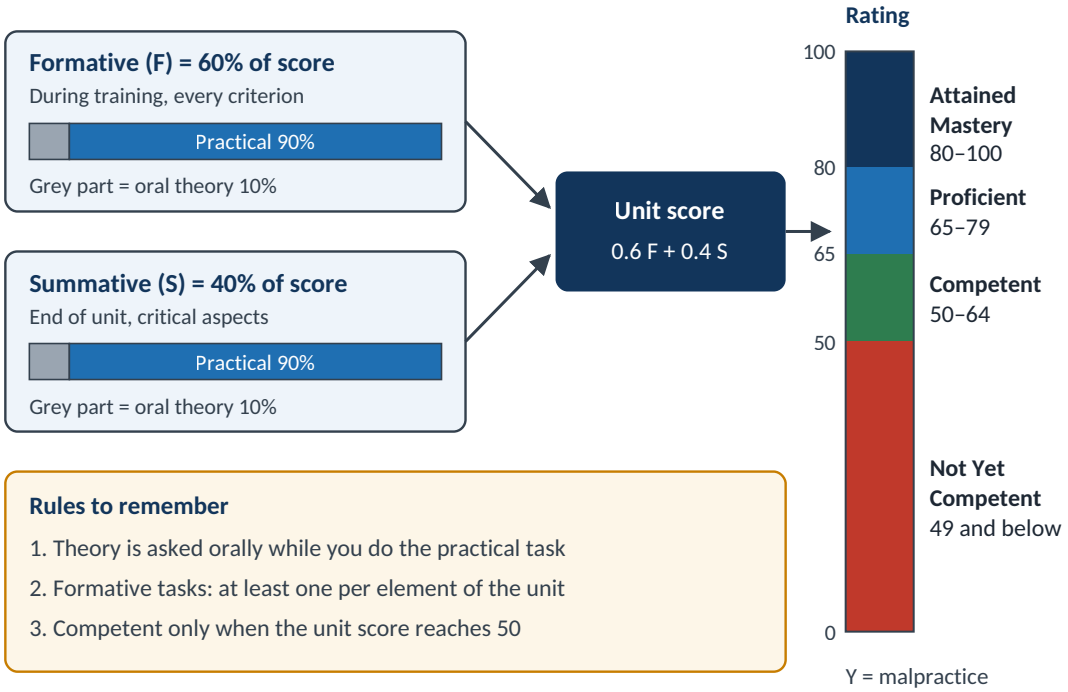


Figure 1.3 How a unit is scored: formative and summative weights, the theory and practical split, the main assessment rules and the rating scale.

For all three units, theory carries only 10% and practical carries 90%. That tells you something important. Your hands decide most of your mark. But do not ignore theory. The oral questions test whether you understand what you are doing, and a trainee who cannot explain why a seam puckered will not fix it next time. Your assessment centre may also set minimum marks for the practical and the oral parts. Ask your trainer about the current rules.

1.6.1 Worked example: working out a unit score

Chebet is assessed in Basic Ladies' Garments Construction. Her marks are:

- Formative: practical 74%, theory (oral) 60%
- Summative: practical 68%, theory (oral) 55%

Step 1. Formative score. (74 × 0.9) + (60 × 0.1) = 66.6 + 6.0 = 72.6

Step 2. Summative score. (68 × 0.9) + (55 × 0.1) = 61.2 + 5.5 = 66.7

Step 3. Unit score. (72.6 × 0.6) + (66.7 × 0.4) = 43.56 + 26.68 = 70.24, about 70

Step 4. Read the rating. A score of 70 falls in the 65–79 band. Chebet is competent, with a rating of **Proficient**.

Now look at how the marks are shared inside the practical. In Chapter 16 you will see that stitching the garment pieces to the sketched design carries about a quarter of all the marks in Units 2 and 3, and that servicing and maintaining the machine carries almost a third of the marks in Unit 1. Spend your practice time where the marks are.

COMMON MISTAKES

- Treating the oral questions as unimportant because theory is "only 10%". A blank answer costs marks and tells the assessor you do not understand the task.
- Rushing to finish a garment in the summative and leaving loose threads, unpressed seams and a crooked hem. Finishing is marked.
- Leaving the portfolio until the end. Missing signed task sheets can delay your results.
- Bringing a garment sewn by someone else, or a pattern copied from another trainee. Malpractice is recorded as "Y" and can cancel the result.

1.6.2 Your portfolio of evidence

Your portfolio is the record that you did the work. Keep it neat from week one. Good evidence includes:

- signed practical task sheets and observation checklists;
- your sketches, measurement sheets and client order forms;
- sample seams, darts, zips and buttonholes sewn on scrap, labelled and dated;
- your pattern drafts on brown paper, folded and labelled;
- dated photos of finished garments, taken with the customer's permission;
- your machine service record and fault log;
- notes of green practice, such as offcuts sorted and reused or electricity saved;
- your attachment logbook and reports from your workplace supervisor.

1.7 Professional conduct

Customers choose tailors they can trust. Skill brings the first order. Behaviour brings the next ten. Every town has a tailor who sews beautifully but never delivers on time, and customers quietly move to one who does. Good conduct in a workshop means:

- **Time.** Open on time, finish orders on the date promised, and call the customer early if there is a delay.
- **Honesty.** Use the fabric the customer paid for and return the offcuts if they ask. Never swap good fabric for cheaper fabric. Quote a price and keep it.
- **Quality.** Sew to the sketch and the measurements. If a design will not work in the fabric chosen, say so before cutting, not after.
- **Safety.** Keep needles, scissors and the iron where they cannot hurt a child or a customer. Chapter 2 covers safety in detail.
- **Respect.** Take measurements with care and privacy. Treat every customer, colleague and learner with courtesy. No harassment, drunkenness or abusive language.
- **Records.** Write every order in a book with the measurements, fabric, price, deposit and delivery date. Send an M-Pesa confirmation or receipt for every payment.
- **Care of tools.** Clean, cover and oil the machine. A well-kept machine is a sign of a serious tailor.

1.7.1 A day in a tailoring shop

Figure 1.4 shows a typical day for a tailor in a small town shop. Notice that the day starts and ends with tasks that are not sewing: checking the machine, cutting, fitting, pressing, recording and cleaning. These tasks protect quality and bring in money, and they are part of the job.

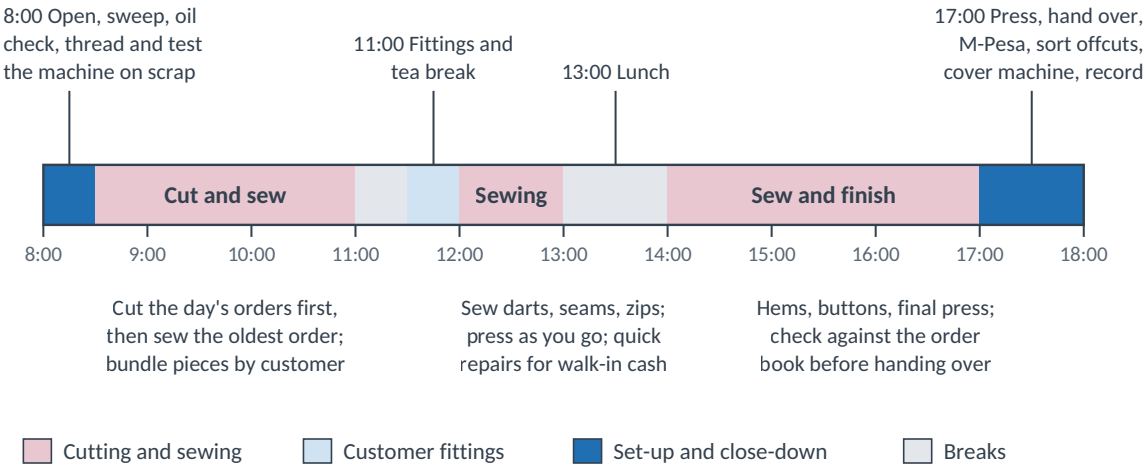


Figure 1.4 A typical day for a tailor in a small town shop. Set-up, fittings, pressing and record keeping are part of quality work, not wasted time.

> **SAFETY FIRST**
>
> Never start a practical without the right protection: a dust coat or apron, closed flat shoes, hair tied back, and no loose sleeves or scarves near the machine. Keep your fingers behind the needle and your foot off the pedal while threading. Chapter 2 covers safety in detail. Read it before your first practical session.

1.8 The green fashion designer

Your curriculum is a "greened" curriculum. Every unit expects you to protect people and the environment while you work. Clothing is one of the most polluting industries in the world. Fast fashion makes cheap garments that are worn a few times and thrown away. Dyeing uses huge amounts of water, machines and irons use power, and cut-offs from poor lay plans go straight to the dump.

A tailor controls many of these things with daily habits. A good lay plan saves fabric. A treadle machine uses no electricity at all and keeps working when the power is off. A servo motor on an industrial machine uses far less power than an old clutch motor and runs silently when the needle stops. Repairing a machine instead of replacing it keeps metal and electronics out of e-waste. Offcuts can be sorted into pieces for patchwork, bags, pot holders, stuffing and rags. Mitumba can be upcycled into new garments. Each of these also saves money, which is why green practice and good business go together.

GREEN TIP

Green habits you will practise in this course: plan the lay before you cut and keep offcuts sorted by size and type; use a treadle or servo-driven machine where you can; switch off the iron and machine when you leave the table; clean the machine with a brush and a little vinegar instead of harsh solvents; repair and reuse zips, buttons and hooks from old garments; wrap finished garments in reusable khanga or paper bags, not single-use plastic; and keep a record of what you saved for your portfolio.

1.9 Study habits that work

Sewing is learned with the hands, but the head must lead. These habits will help you pass and become a better fashion designer:

- **Read before you sew.** Read the chapter before each practical. You will understand the demonstration better and waste less fabric.
- **Sketch and sample everything.** Draw each garment and pattern piece in your notebook with measurements. Sew a 15 cm sample of every seam, dart and finish and keep it. Samples fix the method in your hands.
- **Practise the numbers.** Work every calculation in this book yourself: fabric length from hip and length, thread and zip costs, the price of a school uniform. Customers trust a tailor who can quote quickly and correctly.
- **Ask "why".** Why does the grain line run with the selvedge? Why press a dart before sewing the seam? If you know the reason, you will not forget the rule.
- **Learn from the shops.** Visit tailors near your home. Watch how they handle customers, measure and press. Note good and bad practice.
- **Revise in short daily sessions.** Twenty minutes each evening beats a whole night before the assessment.

TRAINER'S TIP

Keep a small "workshop notebook" in your pocket. Write down every new word, measurement, fabric name and price you hear, with the date. Draw the sketch the customer described and the machine fault you saw fixed. After a month you will have your own reference book, and it will make your portfolio and attachment reports much easier to write.

Practical task 1.1: Tailoring shop observation visit

Tools and equipment

- Notebook and pencil
- Tape measure
- Phone camera (with permission)
- Dust coat or apron

Materials

- Observation sheet from your trainer
- Permission letter from your institution
- Clipboard

Steps

1. With your trainer, visit a tailoring shop, uniform workshop or garment factory. Greet the owner or supervisor first and follow the workshop rules.

2. Note the people in the workshop and their roles: who cuts, who sews, who finishes, who serves customers.
3. List the machines you see by type and brand, and the main tools and materials on the cutting table and shelves.
4. Record the garments being made that day and the fabrics used. Ask what sells most and when the busy seasons are.
5. Measure and sketch one item, for example the cutting table size or the seam allowance on a finished garment. Label the dimensions in centimetres.
6. Record two good safety practices, one hazard and how it could be controlled.
7. Record one green practice you see, such as sorted offcuts or a treadle machine, or one chance to save fabric, power or water that was missed.
8. Thank the owner. Write a one-page report and file it in your portfolio after your trainer signs it.

Safety

- Stay with your group and do not touch a running machine or a hot iron.
- Keep clear of scissors, rotary cutters and needles on the cutting table.
- Take photos only with permission, and never photograph customers or their measurements.

Chapter summary

- A Level 3 fashion designer sketches, drafts, cuts, sews and finishes basic ladies' and gents' garments and keeps the sewing machine working.
- Employers include tailoring shops, uniform makers, EPZ factories, boutiques, institutions and mitumba traders; many tailors are self-employed.
- School uniforms, church and wedding wear, Ankara fashion, work uniforms and alterations are steady Kenyan markets that mitumba cannot replace.
- The course has three core units (50 h, 150 h and 150 h) plus 240 h of industrial attachment: 590 hours, 59 credits.
- In CBET you are judged against performance criteria. You can earn a Statement of Attainment, a Certificate of Competency per unit, and the full national certificate. RPL recognises skills gained at work.
- Unit score = 0.6 × formative + 0.4 × summative, with theory and practical weighted 10:90 and theory asked orally during the practical.
- Ratings: Attained Mastery 80–100, Proficient 65–79, Competent 50–64, Not Yet Competent 49 and below; Y means malpractice.
- Time keeping, honesty, quality, safety, respect, good records and green habits build a tailor's reputation and income.

Check your competence

- [ ] I can describe the main tasks in each of the three core units.
- [ ] I can name at least five types of employer or market for fashion designers in Kenya.
- [ ] I can explain how mitumba competes with, and creates work for, a trained tailor.
- [ ] I can explain the difference between a unit, an element and a performance criterion.
- [ ] I can name the three awards issued by TVET CDACC and what each requires.
- [ ] I can use the course map to find the hours and chapter for any learning outcome.
- [ ] I can calculate a unit score and decide whether the candidate is competent and at which rating.
- [ ] I can list the main rules of professional conduct in a tailoring workshop.
- [ ] I can name four green habits a tailor practises every day.

Practice questions

1. List four kinds of employer or market where a Level 3 fashion designer can find work in Kenya.
2. Explain the difference between the occupational standard and the curriculum.
3. Name the three core units of Fashion Design Level 3 with their hours. How many credits does the full course carry, and how is that figure worked out?
4. What is the difference between a Statement of Attainment, a Certificate of Competency and the Kenya National TVET Certificate in Fashion Design Level 3?
5. Mama Akinyi has sewn school uniforms for fifteen years but has no certificate. What would you advise her, and what will she need to show?
6. Calculate the unit score for a trainee with formative practical 82%, formative theory 70%, summative practical 76% and summative theory 60%. Is he competent, and what is his rating?
7. A trainee scores 45% in the formative practical and 52% in the summative practical, with 50% in both oral theory assessments. Work out the unit score and state the rating.
8. Oral: Give three ways mitumba affects a Kenyan tailor, and two markets where a trained tailor does not compete with mitumba.
9. A tailor sews four school shirts a day and charges KSh 350 labour for each. In a six-day week, how much labour income is that? If a servo motor saves her about KSh 15 of electricity a day compared with a clutch motor, how much does it save in a 26-day month?
10. Practical: Carry out Practical task 1.1 and hand in a one-page report with a dimensioned sketch.

CHAPTER 4

Setting Up and Operating the Machine

WHAT YOU WILL LEARN

- Set up a sewing machine safely: position, light, power cable and your own posture.
- Fit the needle the right way round, wind a bobbin and insert it in a drop-in or a front-loading case.
- Thread the upper thread along the correct path and bring up the bobbin thread.
- Choose a stitch length, test on scrap and read whether the tension is balanced.
- Adjust upper and bobbin tension, then stitch straight lines, curves and corners with back-tacks.
- Shut down and clean the machine in a green way, and work out what a motor costs to run.

Unit: Sewing Machine Operation · FAS/CU/FD/CR/01/3/MB · Learning outcome 1 · About 5 hours

In Chapter 3 you learned the names of the parts and how a lockstitch forms. Now you sit down and make the machine sew. A customer in a tailoring shop in Bomet or Eastleigh does not see your threading; she sees the seam. A seam with even, locked stitches starts with a machine that is set up with care. This chapter takes you from an unplugged machine to a neat test seam, and then to a clean, covered machine at the end of the day. Manual threading, stitch testing and stitch adjustment together carry a large share of the Unit 1 practical marks, so practise them until your hands know the way.

Key words

Shank
The thick top part of the needle that sits in the needle clamp. On domestic needles one side of it is flat.

Scarf
A small hollow cut into the back of the needle just above the eye. It gives the hook room to catch the thread loop.

Bobbin
The small spool that carries the lower thread. It sits under the needle plate.

Bobbin case
The metal cup that holds the bobbin. It has a spring and a tiny screw that control the lower thread tension.

Drop-in bobbin
A bobbin that drops straight into a holder under a clear cover on the bed of the machine (also called top-loading).

Take-up lever
The lever that moves up and down with the needle and pulls the upper thread tight after each stitch. The thread must pass through it.

Tension
The pull on each thread. Balanced tension locks the two threads in the middle of the fabric.

Stitch length
The distance from one needle hole to the next, measured in millimetres (mm). Some old dials count stitches per inch instead.

Back-tack
Three or four reverse stitches at the start and end of a seam so it does not unravel.

Pivot
Turning the fabric at a corner with the needle still down in the cloth.

Scrap
An offcut of the same fabric used to test stitches before sewing the real garment.

Servo motor
An electronic motor that uses power only while you press the pedal. It replaces the older clutch motor on industrial machines.

4.1 Setting Up Safely

A machine that is badly placed tires you, hurts your back and causes accidents. Set it up properly before you touch the thread. Figure 4.1 shows the points to check.

4.1.1 Position and light

Put the machine on a firm, level table that does not shake. Place it so the needle is straight in front of your body, not the centre of the machine. Most of the machine then sits to your right, where your right hand guides the fabric. Light should fall on the needle from the front and slightly to the left, so your hands do not throw a shadow on the stitching. Daylight from a window is best and costs nothing. If you add a lamp, use an LED bulb: it is cool, bright and uses far less power than an old bulb.

4.1.2 Power and cables

Check the machine's rating plate. Kenyan mains supply is 240 V, 50 Hz. Plug into an earthed socket with a switch. Do not chain several multi-plugs together. Run the cable down the table leg and along the wall, never across a walkway where someone can trip and pull the machine off the table. Check the plug, cable and foot-control cable for cracks or bare wire before every session. If you see damage, do not use the machine; report it to the trainer. For a treadle or hand-crank machine there is no cable at all, which is one reason they are still common where power is unreliable.

4.1.3 Posture

Sit on a chair whose height lets your elbows rest about level with the table top. Your back is straight, shoulders relaxed, and both feet are flat, one on the pedal. Your knees are bent at about a right angle. If the chair is too low, your shoulders rise and ache; if too high, you bend forward and strain your neck. Keep your face at least 30 cm from the needle. Get up and stretch for a minute every hour.

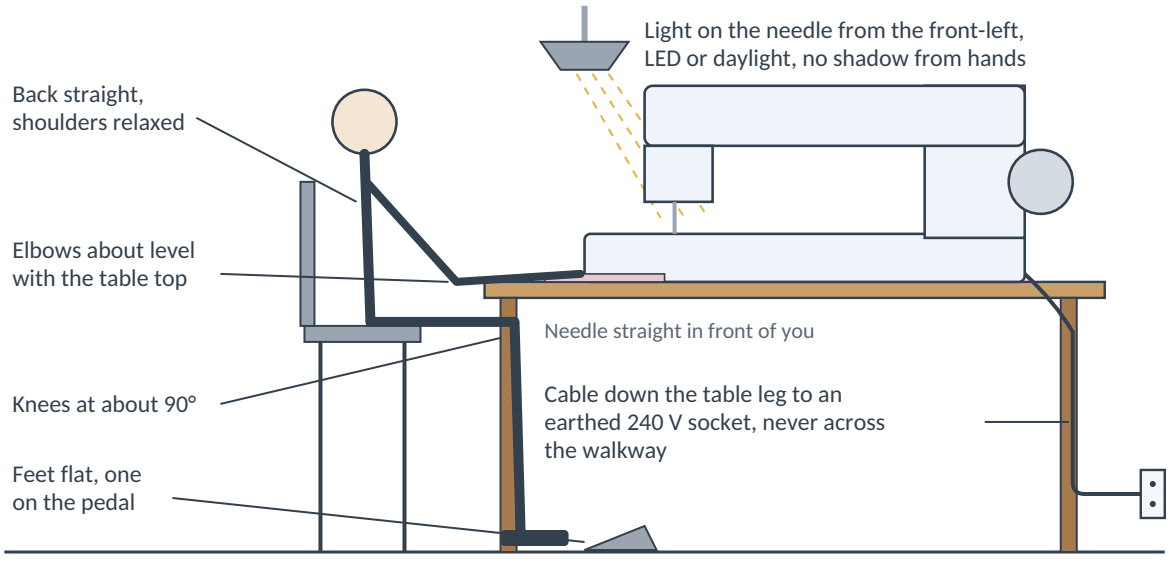


Figure 4.1 A safe set-up: good light on the needle, cable out of the walkway, and a posture that lets you sew for hours without pain.

> **SAFETY FIRST**
>
> Switch off and unplug before you fit a needle, change a bobbin, thread the needle or clean the machine. A foot resting on the pedal while your fingers are near the needle is how trainees get stitched fingers. Keep long hair tied back and avoid loose sleeves, scarves and dangling bracelets near the hand wheel and belt. Never pull a jammed fabric while the motor is on.

4.2 Fitting the Needle

Chapter 3 explained needle sizes: about 70/10 for light fabrics, 80/12 to 90/14 for medium cotton such as kitenge or polycotton, and 100/16 for drill and denim. Choose the size for the fabric and check the needle is straight and sharp. Roll it on a flat table; a bent needle wobbles. Then fit it as in Figure 4.2.

1. Switch off and unplug. Turn the hand wheel towards you to raise the needle bar to its highest point. Lower the presser foot so a dropped needle does not fall into the bobbin area.
2. Loosen the needle clamp screw a little, holding the old needle so it does not drop. Pull it out downwards.
3. Look at the shank of the new needle. On almost every domestic machine the **flat side faces the back**, away from you. The long groove on the shaft then faces the front, and the scarf faces the back, towards the hook. Many industrial lockstitch machines use a needle with a round shank; on these the long groove usually faces left and the scarf faces right, towards the hook. Always check the manual for your machine.
4. Push the shank up into the clamp until it stops against the pin at the top. If it is not fully up, the hook misses the thread loop and stitches skip.
5. Tighten the screw firmly with your fingers or the small screwdriver. Do not force it.
6. Turn the hand wheel slowly by hand for one full turn to check the needle passes through the centre of the needle hole without touching the foot or plate.

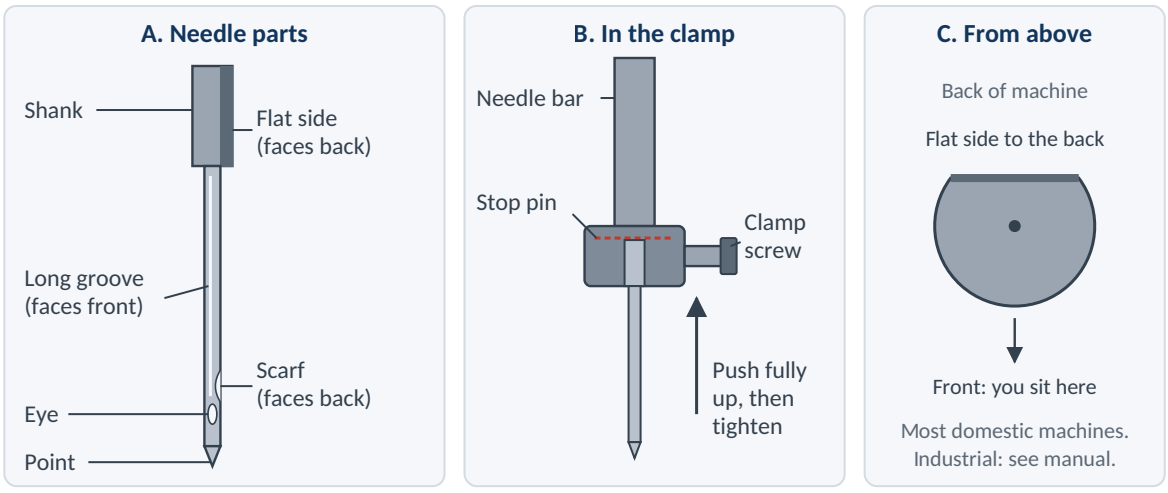


Figure 4.2 Fitting the needle: the flat side of the shank faces the back on most domestic machines, and the shank is pushed fully up to the stop before the screw is tightened.

4.3 Winding and Inserting the Bobbin

The bobbin supplies the lower thread. A badly wound bobbin gives loose, uneven stitches however well the top is threaded. Use the same type of thread on the bobbin as on the top, for example polyester 120 for most garment work. Figure 4.3 shows the steps.

4.3.1 Winding

1. Place the spool on the spool pin and take the thread through the bobbin-winder tension disc. This small disc gives the thread a steady pull so it winds firmly.
2. Pass the end through a hole in the bobbin from the inside and hold it up. Push the bobbin onto the winder spindle and click the spindle across to engage it. On most domestic machines this stops the needle moving; on industrial machines the winder is a separate unit driven by the belt, and you remove the needle thread or raise the presser foot before winding.
3. Run the machine slowly. After a few turns, stop and snip the thread tail close to the bobbin so it does not get trapped later.
4. Wind at a steady speed until the bobbin is about four-fifths full. The thread should lie in even, level layers. Most winders stop by themselves. An overfull or lumpy bobbin jams in the case.
5. Cut the thread and push the spindle back.

4.3.2 Drop-in (top-loading) bobbin

Slide off the clear cover plate in front of the needle. Hold the bobbin so the thread leaves it in the direction shown on the diagram printed beside the holder; on most Brother, Singer and Butterfly domestic machines the thread comes off anticlockwise as you look down. Drop the bobbin in flat. Hold it down lightly with one finger and pull the thread into the slot at the front, then along the guide channel to the left until it clicks under the small tension spring. Leave a tail of about 10 cm. Replace the cover.

4.3.3 Front-loading bobbin case

Older domestic machines and all industrial lockstitch machines use a removable bobbin case. Open the slide plate or the cover under the arm, lift the little hinged latch on the case and pull the case out. Hold the case with its open side facing you and the slot at the top. Put the bobbin in so the thread unwinds in the direction the manual shows, usually clockwise as you look at it. Pull the thread into the slit at the top edge of the case and then under the flat tension spring until it comes out of the small delivery hole. Pull the thread; the bobbin should turn in the case with a light, even drag. Hold the latch open, push the case onto the centre pin of the hook until it clicks and release the latch. The case finger must sit in its notch. If the case is not fully home it rattles, and the needle hits it on the first stitch.

4.3.4 Bringing up the bobbin thread

After the upper thread is in place (Section 4.4), hold the end of the needle thread loosely with your left hand. Turn the hand wheel towards you for one full turn so the needle goes down and comes back up. The needle thread brings a loop of bobbin thread up through the needle hole. Pull the loop out and lay both threads about 10 cm to the back, under the presser foot. Many newer domestic machines let you skip this step, but it is still good practice, because threads left down below tangle on the first stitch.

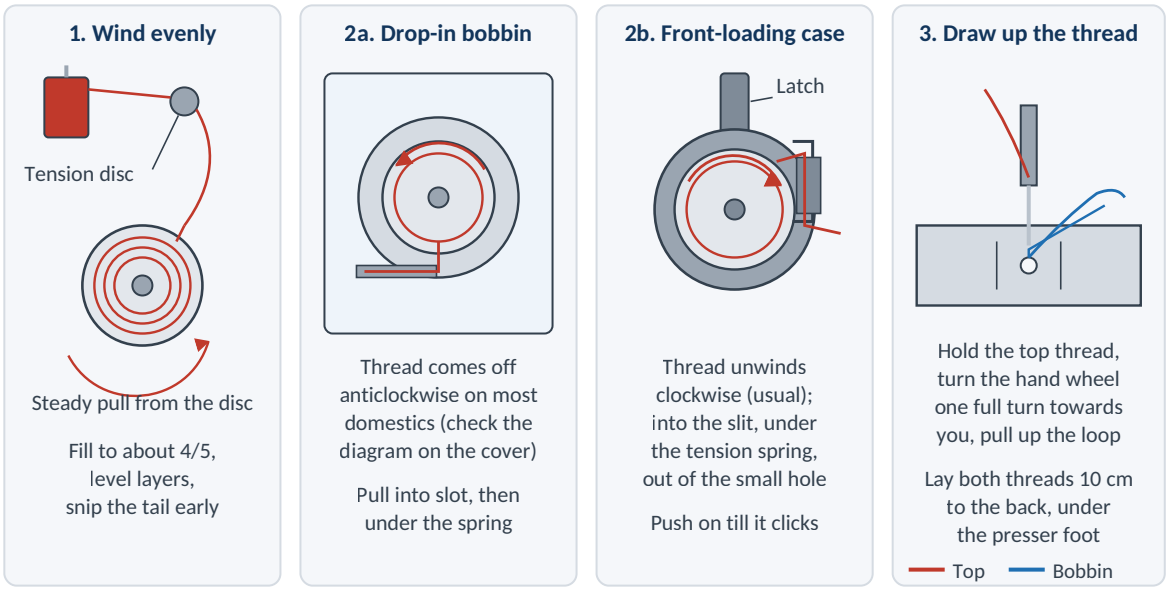


Figure 4.3 Bobbin steps: wind evenly, insert in a drop-in holder or a front-loading case with the thread running the right way, then draw the bobbin thread up through the needle hole.

4.4 Threading the Upper Thread

Every machine has its own threading path, and most have it marked with numbers or arrows on the body. The path always does the same four jobs: it takes the thread off the spool smoothly, puts it through the tension discs, over the take-up lever and down to the needle. Figure 4.4 shows the common domestic route. Before you start, **raise the presser foot**. Lifting the foot opens the tension discs so the thread seats between them. If you thread with the foot down, the thread sits on top of the discs and the machine sews loose loops underneath. Raise the needle to its highest point too, so the take-up lever is at the top where you can see it.

1. Put the spool on the spool pin so the thread comes off from behind, and fit the spool cap on a horizontal pin.
2. Take the thread through the first thread guide on top of the arm.
3. Bring it down the right-hand channel at the front of the head, round the bottom and between the tension discs. Feel it click into place.
4. Take it up the left-hand channel and through the eye of the take-up lever, from right to left. Then bring it straight down.
5. Pass it through the guide or guides on the needle bar.
6. Thread the needle eye from front to back (the groove side to the eye). Leave a 10 to 15 cm tail.

On an industrial lockstitch machine the route is longer: a thread stand, a three-hole guide on top, a pre-tension disc, the main tension discs with the check spring, the take-up lever, and two or three guides down the needle bar. The principle is the same. A quick check for any machine: pull the thread gently with the foot down. You should feel a firm, even drag. With the foot up it should pull freely.

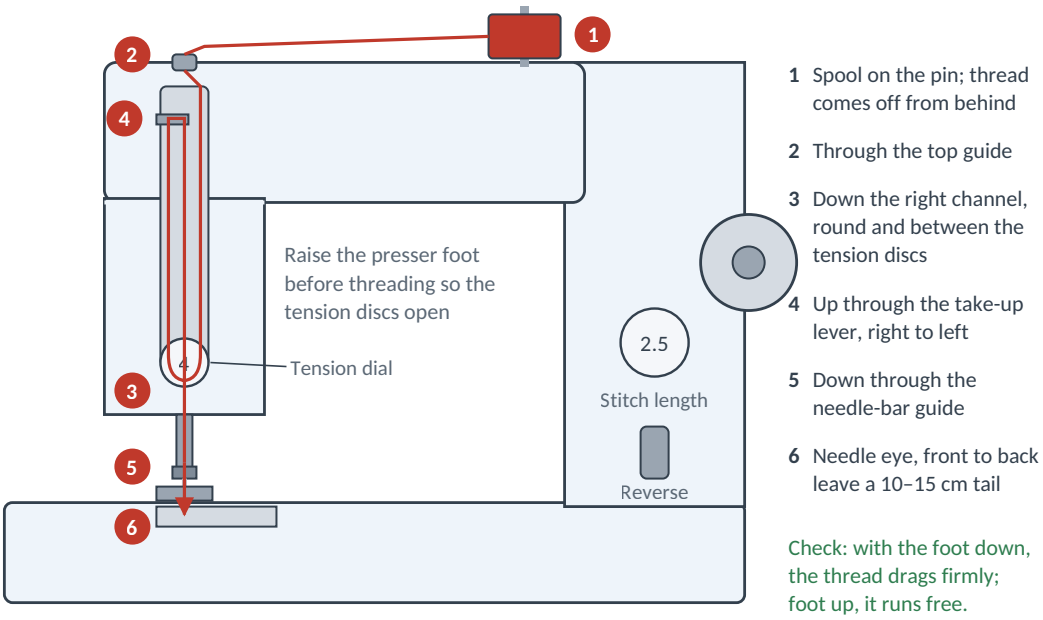


Figure 4.4 The upper threading path on a typical domestic machine. The numbers match the steps in Section 4.4; always follow the markings on your own machine.

COMMON MISTAKES

- Threading with the presser foot down, so the thread never enters the tension discs: loops under the fabric.
- Missing the take-up lever: the thread breaks or the machine jams after a few stitches.
- Needle fitted back to front or not pushed fully up: skipped stitches and broken needles.
- Bobbin put in with the thread running the wrong way: uneven lower tension and a thread that pulls out of the spring.
- Starting to sew with the thread tails short and loose in front of the foot: a "bird's nest" of thread under the plate.
- Pulling the fabric from behind to "help" the machine: bent needle, uneven stitches.

4.5 Choosing the Stitch Length

Stitch length is set with a dial or lever, usually marked 0 to 4 or 0 to 5 mm. Some older Singer machines show stitches per inch (spi) instead, from about 6 to 30, so 10 to 12 spi is about 2.5 to 2 mm. Figure 4.5 shows what the common lengths look like on fabric. The rule is simple: fine fabric, short stitch; heavy fabric, longer stitch; temporary stitching, longest stitch. Table 4.1 gives safe starting points.

Table 4.1 Stitch length guide (starting points; test on scrap)

Stitch length	Stitches per cm	Use	Examples
1.5–2 mm	5–7	Fine and sheer fabrics, curves, reinforcing	Chiffon lining, collar points, crotch seams
2–2.5 mm	4–5	General seams on medium fabrics	Kitenge, polycotton, calico, school shirting
3–3.5 mm	3	Heavy fabrics and topstitching	Drill, khaki, denim, canvas bags
4–5 mm	2–2.5	Tacking (temporary) and gathering	Fitting a skirt before final stitching, gathering a sleeve head

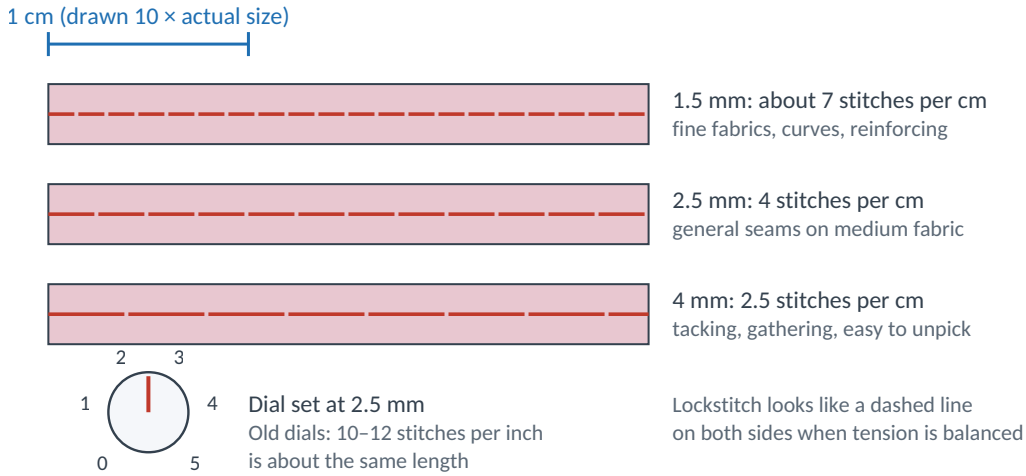


Figure 4.5 What different stitch lengths look like on a 3 cm strip of fabric, and the dial that sets them.

4.6 Test Stitching and Reading the Stitch

Never start on the customer's fabric. Cut two pieces of scrap from the same cloth, about 15 cm by 10 cm, and sew a test seam through both layers. Pull the seam gently sideways and look at both sides. A good lockstitch looks the same on top and underneath: a neat dashed line, with the two threads locked inside the fabric. Figure 4.6 shows how to read the stitch.

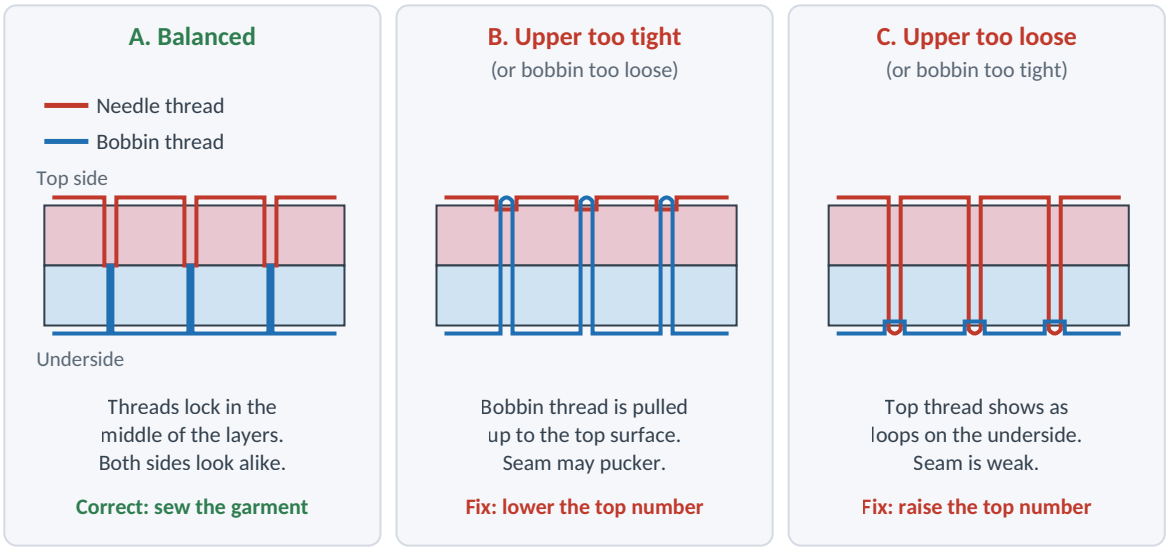


Figure 4.6 Reading the stitch in cross-section: balanced tension locks the threads inside the fabric; a lock on the top or the underside shows which tension to change.

4.6.1 Adjusting the upper tension

The upper tension dial is numbered, usually 0 to 9. A higher number squeezes the discs harder and pulls the top thread tighter. For medium cotton with polyester thread, 3 to 5 is the normal range. Change one number at a time, sew another test seam and look again. If the bobbin thread is being dragged up to the top (Figure 4.6B), the top is too tight: turn the dial to a lower number. If the top thread lies in loops underneath (Figure 4.6C), the top is too loose: turn to a higher number. Table 4.2 lists other things to check, because tension is often blamed for faults that are really threading or needle mistakes.

4.6.2 Adjusting the bobbin tension

Adjust the bobbin only when the top dial cannot cure the problem, because the bobbin setting is meant to stay almost fixed. The tiny screw on the bobbin case spring is the control. Turn it clockwise to tighten and anticlockwise to loosen, a quarter turn at a time, with the small screwdriver, over a cloth so the screw cannot fall into the machine. A quick check for a front-loading case: thread it, hold the thread end and let the case hang. It should stay still, then drop a few centimetres when you give the thread a small jerk. If it slides down freely, tighten; if it will not move at all, loosen. On a drop-in machine the bobbin holder is built in; most manufacturers advise leaving its screw alone and adjusting only the top.

Table 4.2 Reading the test seam: what you see and what to do

What you see on the scrap	Likely cause	What to do
Both sides neat, threads locked inside	Balanced tension	Nothing. Note the dial settings for this fabric.
Small loops of bobbin thread on top; seam puckers	Upper too tight or bobbin too loose	Lower the top dial by 1 and retest; check the bobbin is wound firmly.
Loops of top thread underneath	Upper too loose, or top thread not between the discs	Rethread with the foot up; then raise the top dial by 1.
Big tangle ("bird's nest") under the plate	Thread tails not held at the start; top not in the tension discs	Clear the tangle with power off, rethread, hold tails for the first stitches.
Some stitches missing	Needle not fully up, fitted back to front, bent or wrong size	Refit or change the needle before touching tension.
Stitches very short or fabric not moving	Stitch length near 0; feed dog lowered or clogged with lint	Reset the length; raise and clean the feed dog.

> **TRAINER'S TIP**
>
> Use two different thread colours when you learn: say, red on top and blue in the bobbin. Then you can see at once which thread is showing on the wrong side, and which tension to change. Write the settings that work for each common fabric on a card and keep it with the machine. Change the top tension in small steps and always test again before deciding.

4.7 Controlling the Machine

4.7.1 Speed control

Speed comes from the foot pedal on an electric machine, or from your feet on a treadle. Practise first with no thread and the needle removed, on a sheet of paper. Press the pedal gently and feel where the motor starts. A clutch motor on an industrial machine is jumpy: it either races or stops. Learn to "feather" it with light pressure, and rest your heel on the floor so your foot does not slip. A servo motor is much easier, because its top speed can be turned down with a dial while you learn, and it stops the instant you lift your foot. Many servo machines also have a needle-position setting that always stops the needle down, which is useful for pivoting.

Always turn the hand wheel towards you. Turning it backwards on most machines tangles the thread in the hook. Start each seam with the needle at its highest point and the take-up lever at the top, and hold both thread tails lightly for the first two or three stitches.

4.7.2 Straight seams

Place the fabric under the foot with the raw edge against a guide line on the needle plate. Most plates are marked in millimetres or inches from the needle; the 15 mm (5/8 inch) line is the usual seam allowance. If your plate has no marks, stick a strip of masking tape at the right distance. Lower the foot, then sew. Watch

the fabric edge against the guide, not the needle. Your left hand rests flat on the fabric to the left of the foot; your right hand feeds the fabric from the front and keeps the edge on the line. Let the feed dog move the cloth. Never push or pull it.

4.7.3 Curves

Use a shorter stitch, about 2 mm, and slow down. Turn the fabric little by little as you sew, with your fingers near the foot. For a tight curve, stop every few stitches with the needle down, lift the foot a little, turn the cloth slightly, lower the foot and continue. Necklines, armholes and pocket curves are all sewn this way.

4.7.4 Corners

Sew up to the corner point. Stop with the **needle down** in the fabric, exactly at the turning point. Lift the presser foot. Turn the fabric about the needle until the new edge lines up with the guide. Lower the foot and sew on. This is called pivoting. If you lift the needle before turning, the corner stitches wander and the point looks blunt. On very sharp points, such as collar points on a shirt, take one small stitch across the point before turning; it gives room for the seam allowance when the collar is turned out.

4.7.5 Back-tacking and finishing a seam

A lockstitch unravels if the ends are not secured. Start about 1 cm into the seam, hold the reverse lever and sew back three or four stitches to the edge, then release and sew forward. At the end, sew to the edge, reverse three or four stitches, then forward again to the edge. Stop with the needle up, lift the foot, draw the fabric to the back and cut the threads leaving 10 cm tails under the foot ready for the next seam. On tacking stitches, do not back-tack: you want them to pull out easily. Figure 4.7 is a practice sheet that puts all these skills together.

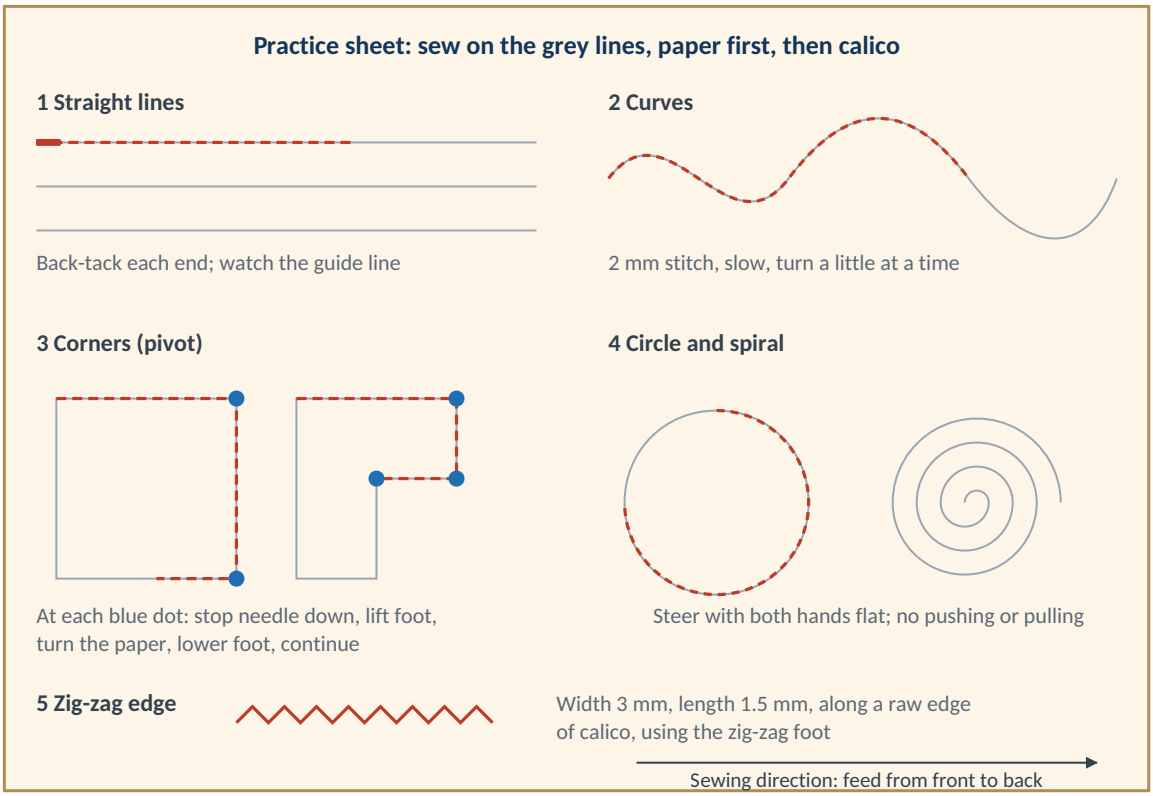


Figure 4.7 A practice stitching sheet. Trace it on paper or draw it on calico with chalk, then sew each exercise until the stitching sits on the line.

> **IN THE KENYAN WORKSHOP**
>
> Mama Chebet runs a two-machine shop near the Bomet matatu stage. Her Juki industrial has a servo motor, but her second machine is an old Singer treadle. When the power goes off, she moves to the treadle and keeps sewing school uniforms; customers still collect on time. New trainees in her shop spend their first day on the treadle with no thread, learning to keep a steady rhythm with their feet while their hands guide paper. "If you can sew straight on the treadle," she says, "the electric one is easy."

4.8 Zig-Zag Basics

Most domestic machines also sew zig-zag. The needle swings from side to side while the fabric feeds forward. Two settings control it: the **width** (how far the needle swings, 0 to about 5 or 7 mm) and the **length** (how far the fabric moves between swings). A width of 3 mm and a length of 1.5 mm is a good general setting for neatening a raw edge. Set the length to almost 0 and the stitches pile up into a satin stitch, used for bar tacks and appliqué. Zig-zag also makes stretch seams on knit fabric and sews on buttons with the length at 0.

Before you select zig-zag, fit the **zig-zag presser foot** and the needle plate with the wide hole. A straight-stitch foot has a small round hole; the swinging needle hits it and snaps. Turn the hand wheel by hand through one full swing to check the needle clears the foot. Industrial lockstitch machines sew straight only; zig-zag needs a separate industrial zig-zag machine.

4.9 Overlock Threading Overview

An overlock (serger) trims the edge and wraps it with two, three or four threads at once. You will meet it in Unit 2 for finishing seams, so here is only the outline. Each thread has its own colour-coded path printed inside the looper cover: usually the **upper looper** first, then the **lower looper**, then the right needle and last the left needle. Thread in that order, with the thread stand antennae pulled up straight, each thread seated in its tension disc and the presser foot raised. The loopers do not have eyes you can see easily; use the tweezers from the accessory box and the manual's diagram. Once threaded, pull all tails to the back under the foot and run the machine slowly to form a chain of stitches on air before you feed fabric. The simplest way to rethread an overlock is the **tie-on method**: cut each old thread near the spool, tie the new thread to it with a small knot, raise the foot, open the tension discs and gently pull the knots through to the needles, then thread the needle eyes by hand. The knife is sharp: keep fingers away and never try to thread with the power on.

4.10 Energy and the Green Workshop

The greened curriculum asks you to think about the energy a machine uses. There are three choices: a **clutch motor**, a **servo motor** and **no motor** (treadle or hand-crank). A clutch motor spins at full speed all the time the switch is on, even while you are pinning or cutting, and the clutch simply connects the belt when you press the pedal. A servo motor draws power only while sewing and uses less even then. A treadle uses your legs. Worked example 4.1 puts figures on the difference.

Worked example 4.1: electricity cost of one machine

Assume electricity costs KSh 25 per kilowatt-hour (kWh), including levies and taxes (approximate, 2026; check your own bill). A clutch motor is rated about 400 W and runs the whole time the machine is switched on. A servo motor is rated 200 to 250 W but draws power only while sewing, so over a working hour it averages about 200 W. The machine is used 8 hours a day, 26 days a month.

Step 1: energy per hour. Energy (kWh) = power (kW) × time (h).
Clutch: 0.4 kW × 1 h = **0.4 kWh**. Servo: 0.2 kW × 1 h = **0.2 kWh**. Treadle: **0 kWh**.

Step 2: cost per hour. Cost = energy × tariff.
Clutch: 0.4 × 25 = **KSh 10**. Servo: 0.2 × 25 = **KSh 5**. Treadle: **KSh 0**.

Step 3: cost per month. Hours = 8 × 26 = 208 h.
Clutch: 208 × 10 = **KSh 2,080**. Servo: 208 × 5 = **KSh 1,040**. Saving = KSh 1,040 per month, or about **KSh 12,480 a year**.

Step 4: payback. A servo motor costs about KSh 9,000 to 12,000 fitted (approximate, 2026). 10,000 ÷ 1,040 ≈ 9.6, so the motor pays for itself in about **10 months**, and after that the saving is profit. A shop with five machines saves five times as much. The treadle costs nothing to run but sews more slowly, so it suits small shops and places with unreliable power.

Table 4.3 Running cost of one sewing machine at KSh 25 per kWh (Worked example 4.1)

Drive	Average power while switched on	Energy per hour	Cost per hour	Cost per month (208 h)	Other points
Clutch motor	400 W	0.4 kWh	KSh 10	KSh 2,080	Noisy, hums while idle, hard to control at slow speed
Servo motor	about 200 W (only while sewing)	0.2 kWh	KSh 5	KSh 1,040	Quiet, speed limit for learners, needle-down stop
Treadle or hand-crank	0 W	0 kWh	KSh 0	KSh 0	Works in power cuts; slower; keeps old machines in use

GREEN TIP

Switch the machine off whenever you stop to cut, pin or press, not just at lunch. A clutch motor idling for two hours a day wastes about 0.8 kWh, roughly KSh 20, for nothing. When a clutch motor fails, replace it with a servo rather than another clutch, and keep the old motor for its parts or hand it to a licensed e-waste collector. Use daylight and LED lamps, and iron in batches so the iron is not heating an empty board.

4.11 Housekeeping at the End of the Session

A machine left dirty, threaded and uncovered gathers lint and dust and starts the next day with faults. Housekeeping is part of operating, and assessors watch for it. Follow this routine every time:

1. **Switch off and unplug.** Hold the plug, not the cable. Coil the cable loosely and hang it on the table, off the floor.
2. **Lower the needle into a scrap** of fabric and lower the presser foot. The needle is protected and the thread cannot unthread itself.
3. **Brush out lint.** Open the bobbin area and brush lint from the feed dog, hook and bobbin case with the small brush. Do not blow it in with compressed air; that drives it deeper.
4. **Wipe the surfaces.** Dampen a soft cloth with distilled white vinegar diluted half and half with water, wipe the bed, arm and table, then dry with a second cloth. Vinegar lifts finger grease and chalk without the fumes of chemical sprays. Keep it off the needle plate hole and the hook area, and never pour liquid onto the machine. Oiling is covered in Chapter 6.
5. **Store tools.** Scissors, screwdrivers, bobbins, needles and feet go back into their compartments in the accessory box or drawer. Used and bent needles go in a labelled sharps tin, never in the dustbin.
6. **Sort the waste.** Fabric offcuts larger than a hand go into the "reuse" bin for pockets, bias strips, patchwork and practice; smaller scraps go to the "stuffing or rags" bin; thread ends and paper go to general waste; plastic spools and broken plastic parts go for recycling. Nothing is swept onto the floor or burned.
7. **Cover the machine** with its cloth or plastic cover and push the chair in. A kitenge offcut makes a good cover.
8. **Record** any fault you noticed in the machine logbook so the next user or the trainer can act on it.

Practical task 4.1: Set up, thread, test and shut down a lockstitch machine

Tools and equipment

- Domestic or industrial lockstitch sewing machine with manual
- Universal needle 80/12 or 90/14, small screwdriver, tweezers, lint brush
- Two empty bobbins, seam ripper, small scissors
- Ruler or tape, tailor's chalk
- Dust coat, closed flat shoes

Materials

- Polyester thread 120 in two colours (one for top, one for bobbin)
- Calico scraps, about 30 cm × 20 cm, four pieces
- A copy of the practice sheet (Figure 4.7) on paper
- Soft cloths and diluted white vinegar

Steps

1. Check the table, chair, light and cable as in Figure 4.1. Adjust the chair until your elbows are level with the table. Check the plug and cable, then plug in and switch on. Switch off again before step 2.
2. Fit a new needle: flat side as the manual directs, pushed fully up, screw tight. Turn the hand wheel by hand to check it clears the plate.
3. Wind a bobbin to four-fifths full and insert it with the thread running the right way. Pull the thread through the tension slot.
4. Raise the presser foot and the needle. Thread the upper thread along the marked path, through the take-up lever, and into the needle front to back.
5. Draw up the bobbin thread and lay both tails to the back under the foot.
6. Set the stitch length to 2.5 mm. Sew a 10 cm test seam through two layers of calico, back-tacking both ends. Read both sides and compare with Figure 4.6. Adjust the top tension one number at a time until the stitch is balanced. Record the final settings.
7. Sew the practice sheet on paper without thread, then with thread on calico: three straight lines 1.5 cm from the edge, the curves, the two corner shapes with pivots, and the circle.
8. Fit the zig-zag foot, set width 3 mm and length 1.5 mm, check the needle swing by hand and zig-zag one raw edge.
9. Shut down: switch off, unplug, needle down in scrap, brush out lint, wipe with vinegar cloth, store tools, sort the scraps into the labelled bins, cover the machine.
10. Show your test seams and practice piece to the trainer and explain any adjustment you made and why.

Safety

- Power off and foot off the pedal whenever your fingers are near the needle.
- Fingers stay at least 3 cm from the needle while sewing; use the hand wheel for slow starts.
- Report any damaged cable, loose plug or unusual smell or noise at once.
- Used needles go in the sharps tin.

Chapter summary

- Set the machine on a firm table with the needle in front of you, good light from the front-left, an earthed socket and the cable off the walkway; sit with elbows level with the table and feet flat.
- Fit the needle fully up with the flat side to the back on domestic machines (check the manual for industrials), and check it clears the plate by hand.
- Wind bobbins evenly to four-fifths full and insert them with the thread running the direction the manual shows; pull the thread under the tension spring.
- Thread the upper path with the presser foot raised: spool, top guide, tension discs, take-up lever, needle-bar guide, needle eye front to back. Then draw up the bobbin thread.
- Use about 2.5 mm stitches for medium fabric, shorter for fine fabric and curves, 4 mm for tacking; test on scrap and read both sides before sewing the garment.
- Balanced tension locks the threads in the middle; change the top dial one number at a time and touch the bobbin screw only as a last step, a quarter turn at a time.
- Control speed with light pedal pressure, guide the edge along the plate marks, pivot corners with the needle down and back-tack seam ends.
- A servo motor halves the electricity of a clutch motor and a treadle uses none; switch off, unplug, clean with diluted vinegar, sort waste and cover the machine at the end of every session.

Check your competence

- [ ] I can prepare a safe working position: table, chair height, lighting, cable route and power check.
- [ ] I can select and fit the correct needle for the fabric, the right way round and fully home, following the manual.
- [ ] I can wind a bobbin evenly and insert it correctly in a drop-in holder and in a front-loading case.
- [ ] I can thread the upper thread of a domestic and an industrial lockstitch machine without the diagram.
- [ ] I can bring up the bobbin thread and start a seam without a thread tangle.
- [ ] I can select a stitch length for the fabric and the job and set it on the machine.
- [ ] I can sew a test seam on scrap, read both sides and say whether tension is balanced.
- [ ] I can correct unbalanced tension by adjusting the top dial, and the bobbin spring when needed, in small steps.
- [ ] I can sew straight lines, curves and pivoted corners with back-tacked ends, and a basic zig-zag edge.
- [ ] I can shut down and clean the machine in an eco-friendly way, store tools and sort workshop waste.

Practice questions

1. List five things you check about the table, chair, light and power before you switch on a sewing machine.
2. Describe how to fit a needle on a domestic machine, and explain what happens if it is not pushed fully up or is fitted the wrong way round.
3. Explain the difference between inserting a drop-in bobbin and a front-loading bobbin case, including the direction the thread should run.

4. Why must the presser foot be raised when threading the upper thread? What fault appears if it is not?
5. Give a suitable stitch length for each of the following and say why: a polycotton school shirt side seam, a chiffon neckline curve, tacking a skirt for fitting, topstitching a khaki trouser hem.
6. Oral question: "Your test seam shows small loops of bobbin thread on the top side and the fabric puckers. What is wrong, and what will you do first?"
7. Describe how to turn a square corner and how to secure the start and end of a seam.
8. A school uniform workshop runs four machines with clutch motors for 9 hours a day, 25 days a month. Each clutch motor draws 400 W while switched on. Electricity costs KSh 25 per kWh. (a) Find the monthly electricity cost. (b) If each machine were fitted with a servo motor averaging 200 W, how much would the workshop save per month and per year? (c) If a servo motor costs KSh 10,000 fitted, in how many months do the four motors pay for themselves?
9. List six housekeeping steps at the end of a sewing session and explain why diluted white vinegar is preferred to chemical sprays.
10. Practical: On an unthreaded machine, fit a new needle, wind and insert a bobbin, thread the machine and sew a balanced 10 cm test seam with back-tacks on two layers of calico, within 10 minutes, while explaining each step to the assessor.