SCOUTS BUSHCRAFT

SKILLS FOR LIFE

Fire Skills & Fire Lighting

A Practical Guide for Scouts

Skills | Safety | Techniques | Practical Learning

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Introduction to Fire and Safety

Fire is a vital bushcraft skill. It keeps us warm, dry and safe, allows us to cook food, boil water and can be used for signalling. With these benefits comes responsibility. Fires must always be built and used safely and with care.



Learning Aims

- Understand the importance of fire.
- Learn how to use fire safely.
- Know the basic fire lighting methods.
- Be able to set up and light a small, safe fire.

Fire Safety Rules

- Always check the local fire restrictions.
- Only light fires in a safe and suitable place.
- Keep fires small and under control.
- Never leave a fire unattended.
- Keep water or a fire blanket nearby.
- Make sure the fire is fully out before leaving.

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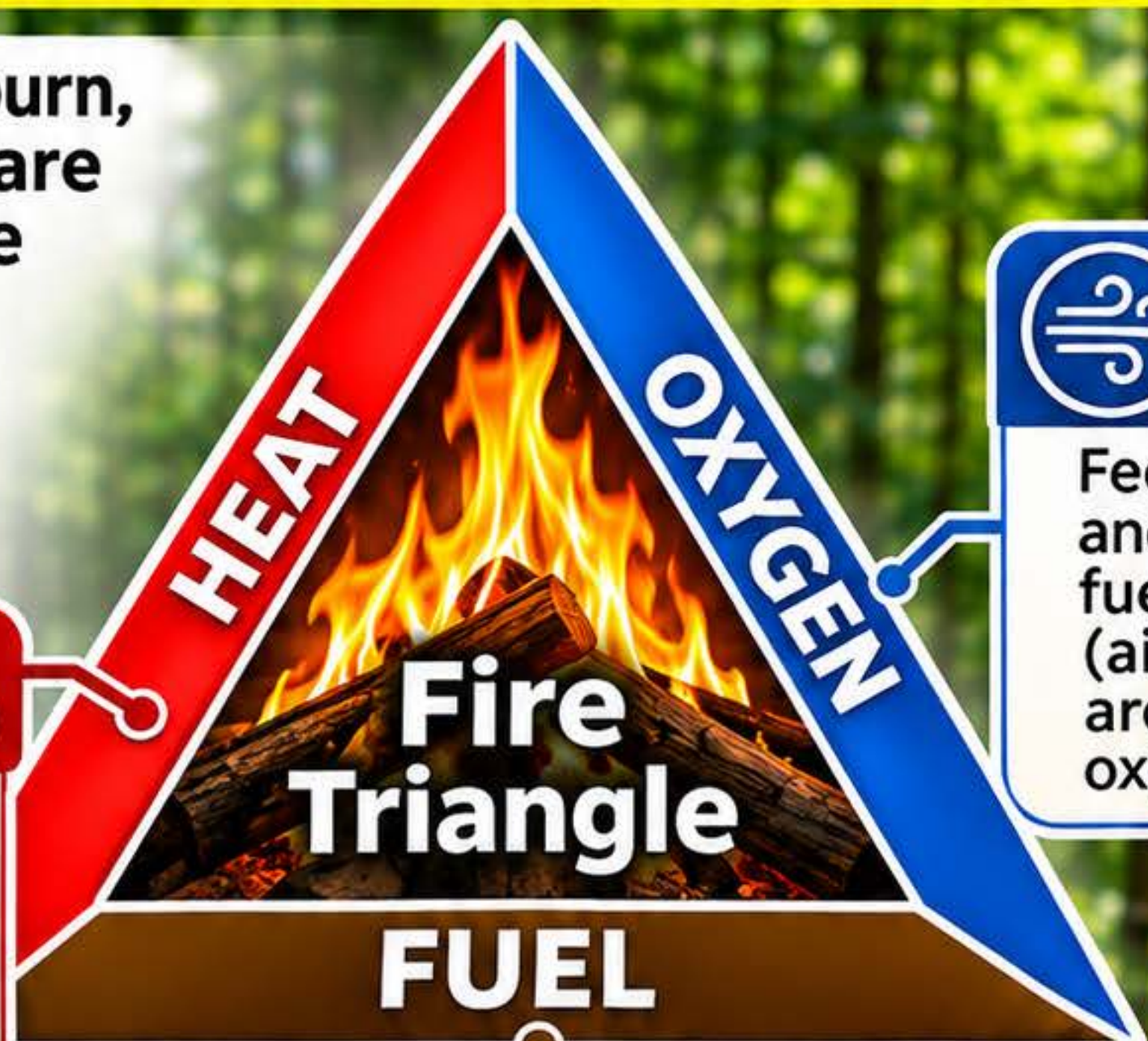
The Fire Triangle
Tinder, Kindling and Fuel

For a fire to burn, three things are needed at the same time. This is called the Fire Triangle.



Heat (Ignition)

Provides the energy to start the fire and keep it burning (e.g. a spark, flame or friction).

Oxygen (Air)

Feeds the fire and allows the fuel to burn (air contains around 21% oxygen).

Fuel (Combustible Material)

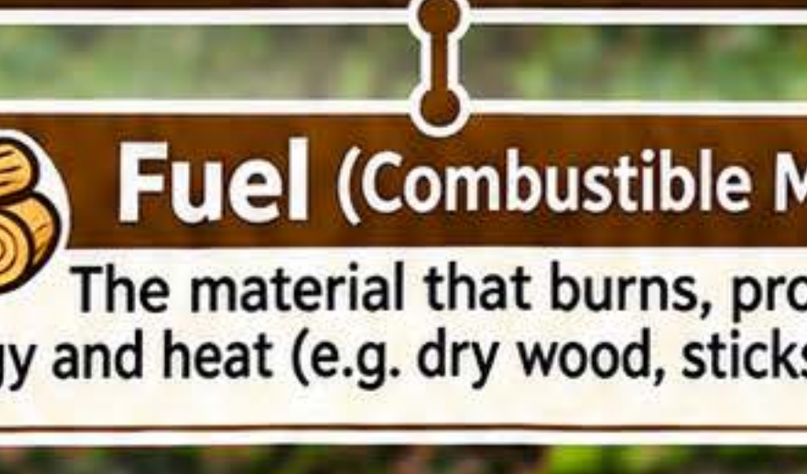
The material that burns, providing energy and heat (e.g. dry wood, sticks or logs).

Tinder



Fine, dry and easy to ignite.
(e.g. dry grass, bark, feather sticks or wood shavings).

Kindling



Small, dry sticks that catch easily and build heat.
(about pencil thickness).

Fuel



Larger, dry wood that keeps the fire burning and provides long lasting heat.
(e.g. wrist to arm thickness).

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Preparing the Fire Site

A well-prepared fire site helps keep the fire safe, efficient and under control.



1 Choose a safe location.

A flat, clear area away from tents, trees, long grass and other flammable materials.



2 Clear the area.

Remove leaves, twigs and anything that could catch fire (about 1 metre around the fire).



3 Prepare the fire base.

Use a fire pan, existing fire circle or a small fing of stones to contain the fire and protect the ground.



4 Check the conditions.

Consider wind, ground type and local fire restrictions (e.g. dry weather or high fire risk).



The Fire Bucket

Always have a fire bucket nearby when lighting and using a fire.

- ☑ Filled with water before lighting the fire.
- ☑ Use to quickly extinguish the fire in an emergency.
- ☑ Ensure the fire is fully out before leaving the site.



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Steps to Light a Fire

Follow these simple steps to build and light a small, effective fire.

1 Gather your materials.

Collect dry tinder, kindling and fuel.



2 Prepare the fire site.

Clear and make a safe, stable base.



3 Build your fire lay.

Arrange tinder and kindling in a suitable structure (e.g. teepee or log cabin).



4 Ignite the tinder.

Use a match, fire striker or other chosen method.



5 Feed the fire carefully.

Add kindling, then larger fuel as the fire builds.



6 Maintain and use safely.

Keep the fire controlled and always follow safety rules.



FIRE SAFETY REMEMBER

- Use dry materials
- Avoid windy conditions
- Keep water nearby
- Never leave a fire unattended

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Structure of Fire (Fire Lays)

The way you build your fire is called a fire lay. Different lays suit different conditions and uses.



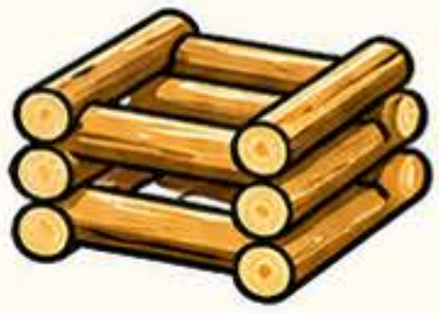
Teepee Fire



Quick and easy to light. Good for a fast, hot fire.



Log Cabin Fire



A stable, longer lasting fire that gives good heat.



Star Fire



Logs laid like a star. Feed the fire by pushing the logs in as they burn.



Lean-To Fire Lay



A simple and efficient fire lay that reflects heat. Good for cooking and staying warm.

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Techniques – Simple Start (Using Matches)

Using matches is the most straightforward and reliable way to light a fire, especially for beginners.

What you need:

- ☑ **Matches** (preferably waterproof)
- ☑ **Dry tinder** (e.g. dry grass, bark, feather sticks)
- ☑ **Kindling** (small, dry sticks)
- ☑ **Fuel** (larger, dry wood)



Method:

1 Prepare your fire lay.
Set up a suitable fire lay (e.g. teepee or log cabin).



2 Place the tinder.
Put a good amount of dry tinder in the centre of the lay (e.g. dry grass, bark or feather sticks).



3 Add kindling.
Add a small amount of kindling around the tinder, leaving space for air to flow.



4 Strike the match.
Strike the match firmly on the box strike strip, away from wind.



5 Light the tinder.
Hold the match to the tinder until it catches and starts to burn.



6 Build the fire.
Allow the fire to build, then add larger fuel gradually to keep it burning.





⚠ Safety Tips

- ✔ Use dry, suitable materials.
- ✔ Keep the fire small and controlled.
- ✔ Be aware of wind direction.
- ✔ Keep water or a fire bucket nearby.
- ✔ Ensure the fire is fully out before leaving the site.

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Techniques – Fire Striker and Flint & Steel

A fire striker (ferro rod) or flint and steel can create a shower of sparks to ignite dry tinder.



Fire Striker (Ferro Rod)



Flint and Steel

Method (Fire Striker):

1 Prepare a tinder nest.
Use dry, fluffy tinder (e.g, wood shavings, dry grass or bark).



2 Hold the rod close to the tinder.
Place the end of the ferre rod just above the tinder nest.



3 Scrape the striker down the rod.
Use fnm, quick strokes with the striker (at about 45°) to create sparks.



4 Catch the sparks and build the fire.
Let the sparks land in the tinder, gently blow until it glows and add kindling.



Method (Flint & Steel):

1 Prepare char cloth or fine tinder.
Use char cloth (burnt cotton) or very dry, flufty tinder.



2 Strike the steel against the flint.
Hold the flint firmly and strike the steel at a sharp angle.



3 Catch the spark in the char cloth.
Aim the sharks ente the char cloth until it glows (an ember forms).



4 Gently blow and build the fire.
Blow on the ember until it glows hotter, then place it in a tinder nest and add kindling.



Top Tips

- Use very dry, fluffy tinder.
- Keep the striker and flint dry.
- Practise the technique before you need it.
- Carry a small piece of char cloth – it makes ignition easier.

Safety Notes

- Use the techniques in a safe, open area.
- Keep sparks away from clothing and gear.
- Work on a stable, non-flammable surface.
- Have water or a fire bucket nearby.
- Ensure the fire is fully out before leaving the site.

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Techniques – Using the Sun

The sun can be used to create enough heat to ignite tinder by focusing the sunlight.



What you need:

- ☑ **A magnifying glass** (or a lens from binoculars or camera)
- ☑ **A parabolic / concave mirror** (e.g. solar cooker mirror, signal mirror or DIY concave mirror)
- ☑ **Dry, fluffy tinder** (e.g. cotton, dry grass, char cloth or finely shredded bark)

Two Methods to Use the Sun

Magnifying Glass



A simple and effective way to concentrate the sun's rays onto a small area.

Parabolic / Concave Mirror



A curved mirror (parabolic or concave) collects and focuses more sunlight, creating a hotter and larger focal point for a quicker ignition.

Method – Step by Step

1. **Find a sunny spot.** Choose a bright, wind-free area.



2. **Prepare your tinder.** Use dry, fluffy material (e.g. cotton, dry grass or char cloth).



3. **Focus the sunlight.** Aim the magnifying glass or concconcave mirror at a small, bright spot on the tinder.



4. **Hold it steady.** Keep the lens or mirror still until the tinder begins to smoke.



5. **Encourage ignition.** Once the tinder smokes and starts to glow, gently blow to help it catch.



6. **Build the fire.** Transfer the glowing tinder to a fire lay and add kindling, then fuel.



Safety Notes

- ✓ Use the sun only in a safe, open area.
- ✓ Be patient – it can take several minutes.
- ✓ Never look directly at the sun through a lens (it can damage your eyes).
- ✓ Keep the lens or mirror away from flammable materials and people.
- ✓ Respect the environment and leave no trace.

Top Tips

- ✓ Use very dry, fine tinder for best results.
- ✓ A concave mirror (parabolic) creates a hotter focal point and can work faster than a magnifying glass.
- ✓ Keep the lens or mirror clean for maximum focus.
- ✓ Work in bright, direct sunlight (midday is best).

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Techniques – Bow Drill

The bow drill is a traditional friction fire method that uses a bow, drill (spindle) and fire board to create an ember from heat and friction.



Equipment:

- ✓ **Bow** – a curved stick with a strong cord (e.g. paracord or natural cordage)
- ✓ **Spindle** – a straight, dry, smooth stick (e.g, hazel, willow, or sycamore)
- ✓ **Fire board** – a soft, dry wood (e.g, willow, lime, poplar) with a V-notch
- ✓ **Handhold** – a socket or rounded piece of wood (e.g. hardwood or stone) to apply pressure
- ✓ **Tinder** – dry, fluffy material (e.g. dry grass, bark, or plant fibres)



1 Burn-In and Notch Carving

- **Wrap** your **bowstring** once around the **middle** of the spindle (it should be very tight).
- Place the blunt end of the spindle onto your hearth board, put the handhold on top, and use long, smooth bow strokes to spin the spindle until it burns a dark, shallow pit into the board.
- Stop and carve a **V-shaped notch** from the edge of the board right into the **centre** of this **new pit**. The notch should **widen toward** the bottom to allow the hot **wood dust** to fall through.
- Place a thin **leaf**, piece of bark, or wood **chip** under the notch to catch the dust.







2 Body Mechanics & Stance

- **The Foot:** Place your non-dominant foot firmly on the hearth board next to the notch to hold it completely still.
- **The Arm:** Wrap your non-dominant arm **tightly** around the front of your shin. Lock your wrist against your shin bone. This keeps the **handhold and spindle** perfectly **vertical** and stable.
- **The Bow:** Hold the bow with your dominant hand. Ensure it stays parallel to the ground.



3 Creating the Ember

- Begin sawing the bow back **and forth** using **long, slow, smooth** strokes. **Apply light** downward pressure on the handhold.
- As you see black dust building up in the notch, gradually increase your **speed and downward pressure.**
- When thick, heavy smoke starts billowing continuously from the pile, give it **10–15** more fast strokes, then carefully remove the spindle.



4 Blowing into Flame

- Look closely at the pile of black dust. If it continues to smoke on its own after you stop bowing, you have a **live ember.**
- Gently fan it with your hand to help the ember grow and solidify into a glowing coal.
- Carefully lift the leaf or bark catching your ember and drop the glowing coal into the centre of your tinder bundle.
- Fold the bundle loosely around the coal, lift it to eye level, and blow into it with long, steady, gentle breaths until it bursts into flame.





Key Tips

- ✓ Use dry, soft woods (e.g. willow, lime, poplar).
- ✓ Keep the bow cord tight and centred.
- ✓ Use long, smooth strokes and steady pressure.
- ✓ Work at a steady, even speed.
- ✓ Use very dry, fine tinder (e.g. grass, bark fibre, plant down).

Safety Notes

- ✓ Practice in a safe, open area (away from tents and flammable materials).
- ✓ Be patient – it takes practice to get good results.
- ✓ Use only natural, dry materials.
- ✓ Allow the fire to build safely in a controlled fire lay (see Fire Lays guide).

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PUMP DRILL

FIRE LIGHTING FOR SCOUTS

- ✓ Traditional skills
- ✓ Practical learning
- ✓ Real adventures



HOW TO USE A PUMP DRILL



WIND THE CORD

Lift the handle to wind the cord around the spindle.



PUSH DOWN

Push the handle smoothly downwards. The cord unwinds and spins the spindle.



LET THE FLYWHEEL LIFT

Allow the flywheel to raise the handle. Don't pull it up yourself.



KEEP A STEADY RHYTHM

Continue pumping with smooth, controlled strokes. Let the flywheel maintain the rotation.



LOOK FOR SMOKE

Fine dark dust will collect in the notch. Keep going until you see smoke and hopefully a glowing ember.



TRANSFER TO TINDER

Carefully stop, allow the ember to develop, then transfer to your prepared tinder and gently blow until it flames.

KEY POINTS

- ✓ Use dry, suitable wood
- ✓ Smooth, steady pumping action
- ✓ Let the flywheel do the work
- ✓ Maintain good downward pressure
- ✓ Prepare your tinder in advance
- ✓ Patience and practice pays off

SAFETY FIRST

- ⚠ Adult supervision at all times
- ⚠ Use in a suitable outdoor area
- ⚠ Complete a risk assessment
- ⚠ Keep spectators at a safe distance
- ⚠ Check equipment before use
- ⚠ Have water available
- ⚠ Never leave an ember or fire unattended
- ⚠ Follow Scouts guidance and local fire restrictions

GREAT FOR SCOUTS

- ✓ Hands-on traditional skill
- ✓ Learn about friction, heat and energy
- ✓ Builds patience and problem-solving
- ✓ Excellent for camps and events
- ✓ Can be used as a STEM activity
- ✓ Fun, challenging and rewarding

SCOUTS BUSHCRAFT | WOOD + FRICTION = FIRE = ADVENTURE

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HOW THE HAND DRILL WORKS

Friction + Heat + Patience = Ember

The hand drill is a friction-fire technique.

A wooden spindle is rotated between the palms against a hearth board. Friction creates heat, turning fine wood dust into a glowing ember. The ember is then transferred to a tinder bundle and blown into a flame.

THE HAND DRILL SYSTEM



Spindle
A straight, dry piece of wood (around 20–30 cm / 8–12 in long) of suitable wood.

Hearth Board
Flat, dry piece of wood.

Notch
V-shaped cut from the edge to the burn-in hole.

Burn-in Hole
A small depression created by initial spinning.

Ember Catcher
Placed under the notch to catch the ember (e.g. a leaf, bark or thin wood).

THE PROCESS: FROM FRICTION TO FLAME

1 SET UP



Create a burn-in hole near the edge of the hearth board and cut a V-notch to the hole. Place an ember catcher underneath.

2 SPIN THE SPINDLE



Place the spindle in the hole and roll it rapidly between your palms. Use downward pressure and steady speed.

3 MAKE DUST AND SMOKE



Fine wood dust appears in the notch and begins to smoke as the temperature increases. Keep going!

4 CREATE AN EMBER



The dust chars and forms a glowing ember. This is the goal – keep the pressure and speed steady.

5 TRANSFER THE EMBER



Carefully slide the ember onto your prepared tinder bundle (e.g. dry grass, bark and fine twigs).

6 BLOW TO FLAME



Gently blow on the ember until the tinder glows and bursts into flame. Add kindling and enjoy your fire!

THE KEY FACTORS

SPEED
Fast, steady spindle rotation.

PRESSURE
Firm downward pressure without crushing.

DRY WOOD
Dry spindle and hearth board.

STAMINA
Sustained effort and don't give up too soon!

REMEMBER

- Prepare everything before you start.
- Have your tinder bundle ready.
- Practice, patience and persistence are the secret.

PRACTICE SAFE FIRE LIGHTING AND LEAVE NO TRACE

Techniques – Fire Roll (Rüdiger Roll)



The fire roll (Rüdiger Roll) is a friction fire technique that compresses fine dry wood ash inside a tight roll of 100% cotton, rolled vigorously between two flat, rough wooden boards to generate an ember.

Equipment:

- ✓ **Pure cotton** (100% natural cotton)
- ✓ **Fine dry wood ash** (from a clean, cold fire)
- ✓ **Two flat, rough wooden boards** (e.g. softwood, with a rough surface)
- ✓ **Tinder nest** (dry grass, bark, fine twigs)
- ✓ **Water bucket** (for fire safety)

Method – Step by Step:

1 Prepare the cotton and ash.



Flatten a piece of 100% cotton into a rectangle (about 10–15 cm long) and sprinkle a thin, even layer of fine, dry wood ash over the surface.

2 Roll it tightly.



Roll the cotton tightly from one end to the other to make a firm, compact cylinder (cigar shape).

3 Set up the boards.



Place the cotton cylinder horizontally on a flat wooden board. Position the second board on top, ready to roll.

4 Roll with firm pressure.



Roll the upper board back and forth with firm downward pressure, using long, smooth strokes (around 30 cm / 12 inches).

5 Build heat and check for an ember.



Continue rolling vigorously for 15–20 seconds. Stop and carefully check the end of the roll for smoke and a glowing ember.

6 Transfer to tinder and ignite.



Carefully open the roll or tease out the ember and place it into your prepared tinder nest. Gently blow on it with steady breaths until it bursts into flame.

Top Tips

- ✓ Use **100% natural cotton** (e.g. cotton wool, an old T-shirt or cotton cloth).
- ✓ Use a **fine, dry wood ash** (from a clean, cold fire).
- ✓ Roll the cotton tightly and evenly.
- ✓ Keep firm, even pressure throughout.
- ✓ Use long, smooth strokes (around 30 cm).

Avoid These Common Mistakes

- ✗ Using synthetic fibres (they won't work and can melt).
- ✗ Adding too much ash (it can prevent friction and heat build-up).
- ✗ Rolling the cotton too loosely (less friction and heat).
- ✗ Using short or jerky strokes (doesn't generate enough heat).

Safety Notes

- ✓ Adult supervision at all times.
- ✓ Carry out the activity in a suitable outdoor, fire-safe location.
- ✓ Keep a fire bucket of water nearby.
- ✓ Be aware of fire risks and local restrictions.
- ✓ Fully extinguish the fire afterwards (ash cool to the touch).

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Short Tinder Guide

Tinder is fine, dry material that catches a spark easily and helps to ignite your fire.

Dry Grass



Fine, dry grass is light and airy and catches a spark quickly.

Birch Bark



The papery, resin-rich layers of birch bark ignite easily, even when slightly damp.

Dead Bracken



Dry bracken is light, fluffy and burns well once it catches.

Feather Sticks



Thin, curled shavings from dry wood that provide a large surface area to take a spark.

Dry Leaves



Crisp, dry leaves (such as oak or beech) can be shredded to make effective tinder.

Cattail Fluff



The soft, fluffy seed head from cattails (bulrush) is highly flammable and catches easily.

Char Cloth



Partially burnt cotton fabric that catches a spark readily and produces a glowing ember.

Fungus *(Tinder Fungus)*



The dry inner layer of certain fungi (e.g. hoof fungus) can be prepared as a reliable tinder.

Cotton Wool (Emergency)



Cotton wool (or cotton pads) is a reliable emergency tinder. It catches a spark quickly and burns well.

Key Tips

- ✓ Use natural, dry materials whenever possible.
- ✓ Keep your tinder dry and protected from moisture.
- ✓ Combine different types (e.g. a spark tinder with fine shavings) for best results.
- ✓ Prepare your tinder before you start lighting the fire.
- ✓ Carry a small emergency supply (e.g. cotton wool or char cloth).

Safety Notes

- ✓ Use only natural materials from the groound – do not damage living plants.
- ✓ Collect responsibly and follow the Countryside Code.
- ✓ Keep tinder away from the fire until you are ready to use it.
- ✓ Use your fire in a safe, controlled area (see Fire Safety guide).
- ✓ Always have water or a fire extinguisher nearby.

Review and Knowledge Check

1 What are the three parts of the fire triangle?

_____

2 Give two examples of tinder.

_____ , _____

3 Name two fire lays and when you might use them.

_____ , _____

4 List three rules for fire safety.

_____ , _____ , _____

5 Which fire lighting technique was new to you?

_____

6 What did you learn from this session?

_____

_____

Reflection:

- ☐ I can explain how to build and light a small, safe fire.
- ☐ I understand the importance of fire safety.
- ☐ I can name different fire lighting techniques.
- ☐ I know how to choose and prepare suitable tinder, kindling and fuel.



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