# WOODWORK

## FIELD NOTES



PUPIL NAME

TEACHER

# INTRODUCTION

Whilst many woodworking projects can be completed using only hand tools, there are many instances where using machines can improve the process.

In this unit you will learn to use a selection of machine tools to complete different operations.

Using any tool can be risky, but power tools bring their own level of danger. Never use a tool you are not 100% confident with, and always follow all safety instructions. Your teacher will show you how to check, set-up and use power and machine tools safely.

## COMMON SAFETY & WARNING SYMBOLS



## TASK 1

**Research** and **calculate** the cost to purchase all the power and machine tools for a school workshop. You can download a tool list from DesignClass.co.uk

# MACHINE TOOLS

During this part of the course you will be expected to use a range of machine and power tools. Some of these tools you may have used before, but this is an opportunity to get a deeper understanding of what they do and how they work.

All machine and power tools can be dangerous. Never use a machine or power tool if you don't know how to use it safely.

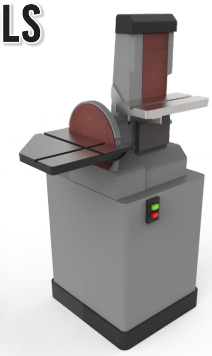
Your teacher will demonstrate how to use each of these machines, or you can watch tutorial videos at DesignClass.co.uk

You will be expected to keep a log-book about using these machines safely, and this could contribute to your overall course award.

## MACHINE TOOLS



Scroll Saw
Used ☐



Belt/Disc Sander
Used ☐



Mortise machine
Used ☐



Pillar Drill
Used ☐




Wood Lathe
Used ☐

## SAFETY CHECKLIST

Write four checks you must do on any power or machine tool before using it:

## QUESTION 1

Safety checks must be completed before using any machine or power tool.
**Describe** three safety checks that should be completed before using a machine or power tool.

# MACHINE TOOL | PILLAR DRILL

The humble Pillar Drill (sometimes called a pedestal drill or drill press) can seem rather simple, boring and easy to use. However, there is more to this machine than meets the eye.

Pillar drills can hold different types of drill bit. The different bits are held in a component called a 'chuck'. Pillar drills usually use a Jacobs Chuck.

The different drill bits have a specific function and work in different ways. Depending on the type and size or drilling bit, the speed (RPM) needs to be adjusted.

Pillar Drills have a movable work surface, called a 'table'. The position of this table can be adjusted. Work must be properly clamped to this table before drilling any holes.



## TASK 2

**Describe** three specific safety checks that must be completed before using a Pillar Drill.

## TASK 3

**Describe** two methods of drilling a hole to a desired depth. Use sketches to support your answer.

## PRACTICE TASKS

| Task | Teacher Checked |
|---|---|
| Change tool in chuck | |
| Move machine bed | |
| Set the depth stop | |

## QUESTION 2

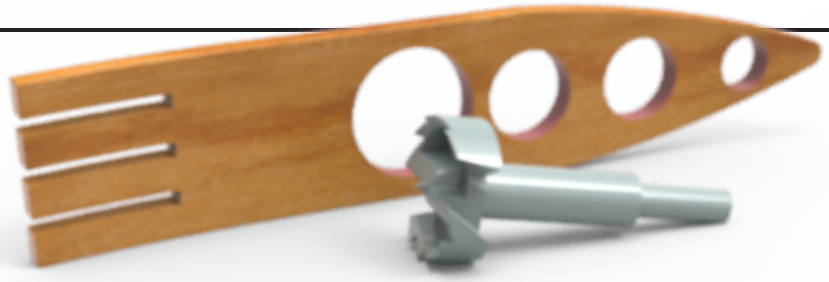
The Jacob's Chuck of a Pillar Drill can hold a range of different drill bits.
**State** the name of **four** different drill bits that can be held.

# SIMPLE PROJECT | SPAGHETTI FORK

Never cook too much spaghetti again!

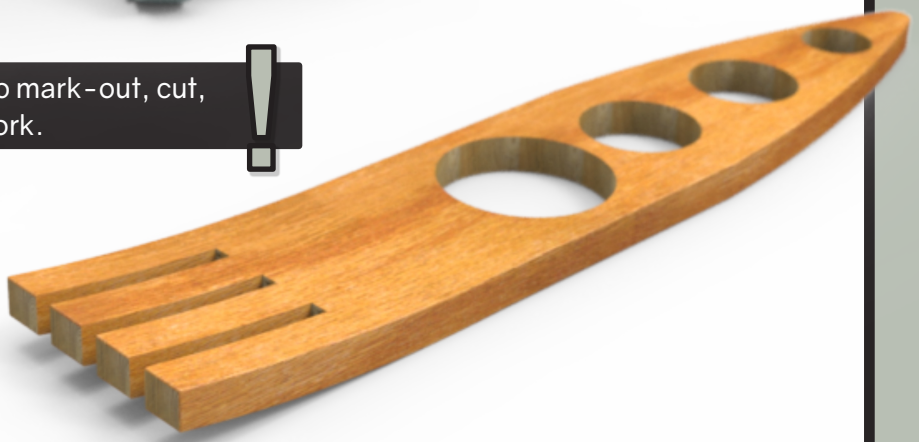
This is a quick, fun project to allow you to practice your marking-out and Pillar Drill skills.

If you have the facilities, you may want to experiment with steam bending the spaghetti fork to create a gentle curve to the front. Be careful - using steam can be very dangerous.



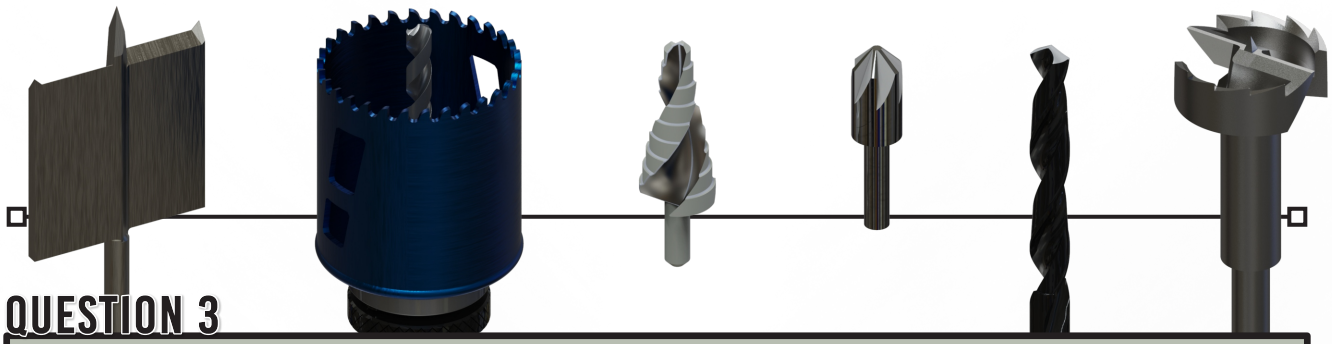
## TASK 4

**Create** a storyboard explaining how to mark-out, cut, shape, drill and finish this spaghetti fork.



## TASK 5

**Label** all the different drill-bits shown below.
Can you explain the purpose of each drill bit?



## QUESTION 3

**State** the name of a suitable finish for the spaghetti fork.
**Explain** your criteria for selecting a finish for the spaghetti fork.

# MACHINE TOOL | SCROLL SAW

The Scroll Saw is a mechanical saw that moves a small, thin blade up and down quickly. The blade is similar in shape and size to those used with coping saws.

Scroll saws are excellent for cutting fine, detailed work in both wood and plastic (very thin sheet metal can also be cut, but this requires speciality blades).

When using a Scroll Saw, great care must be taken not to break the blade. The blades are very thin and fragile. When cutting, do not make sudden changes in direction; always push forward gently, cutting material. Also, ensure you push down on the material, so the saw blade doesn't lift your work off the bed.




*Scroll saws are often known as Hegner Saws. Hegner is one of the largest brands / manufacturers of scroll saws that its' name has become synonymous with the machine.*

## TASK 6

**Cut** out your name, or make a sign from letters cut on a Scroll Saw.

## PRACTICE TASKS

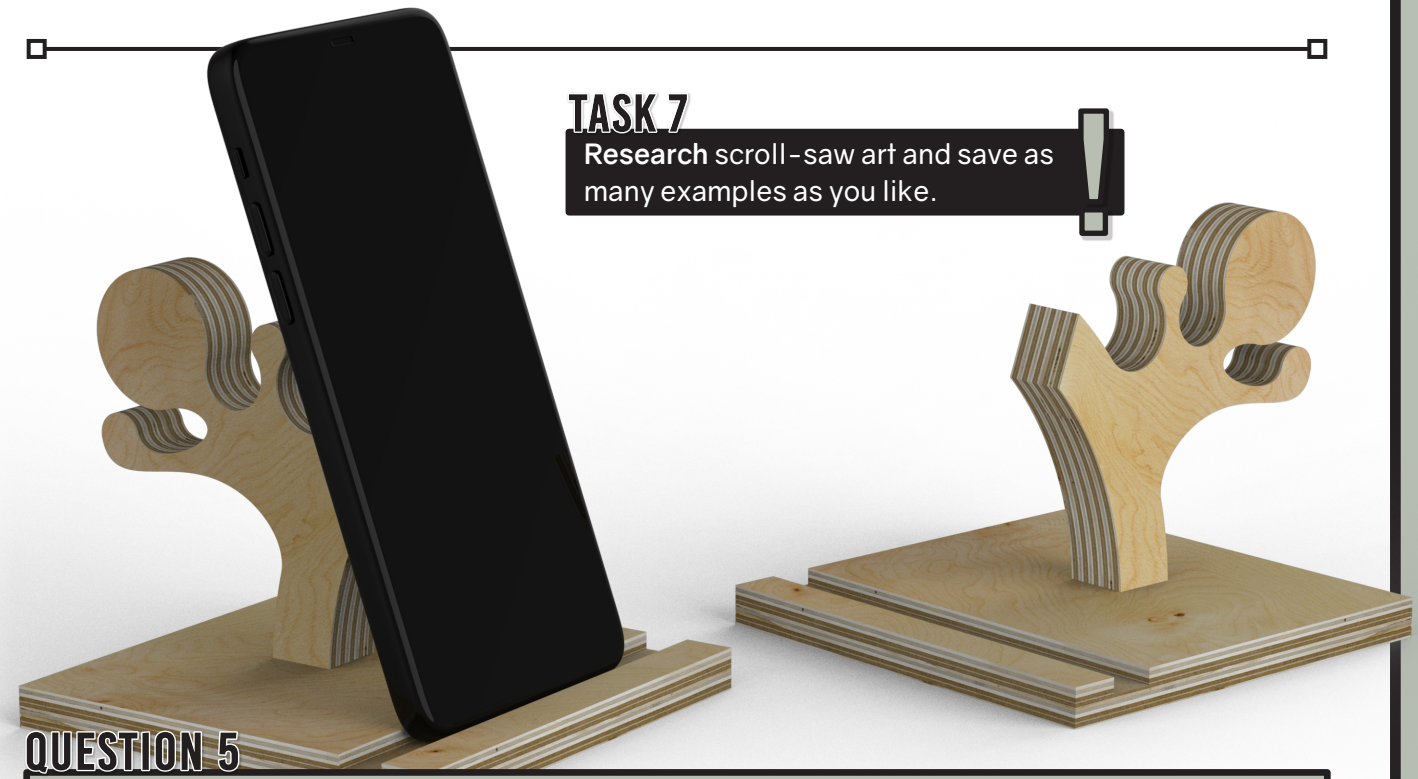
| Task | Teacher Checked |
|---|---|
| Change the blade | |
| Angle the bed | |
| Cut following a line | |

## QUESTION 4

Cutting small details with wood that has a 'wide grain' can be a challenge.
**Describe** the features of a wide grain, and provide an example of wood that is like this.

# SIMPLE PROJECT | PHONE STAND

Keep your phone at the right angle, so you can watch all your favourite films or shows. In this classic phone stand project, you need to use scroll saws and drills with incredible accuracy. You can download drawings and templates from DesignClass.co.uk.



## TASK 7

**Research** scroll-saw art and save as many examples as you like.

## QUESTION 5

**Describe** the process of preparing the wood for a finish.

## QUESTION 6

Dowel joints are a type of '*Knockdown Fitting*'.
**Explain** the term knockdown fitting and why they are popular with furniture manufacturers.

# MACHINE TOOL | BELT SANDER & DISC SANDER

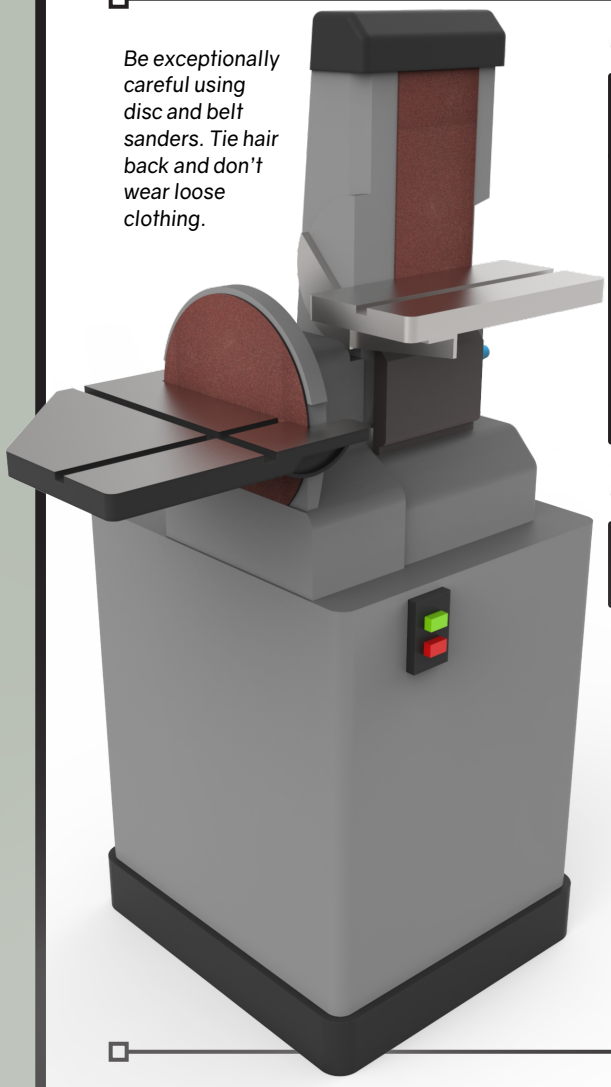
Belt and Disc Sanders are machine tools that use abrasive papers to sand work. They are not typically used to smooth a surface ready for a finish, but remove large blemishes or sand to a line.

Disc and belt sanders can have different types of abrasive paper loaded, with different grit-levels.

Like the grit-paper (sand-paper/glass-paper/silicone-carbide paper) you use by hand, the 'roughness' of the paper is specified by the grit-number.

A P60 or P80 grit is considered coarse, that can remove lots of material quickly. P120-P180 is medium and P220 and above a finishing paper.

*Be exceptionally careful using disc and belt sanders. Tie hair back and don't wear loose clothing.*



## TASK 8

**Describe** three specific safety checks that must be completed before using a Belt or Disc Sander.

## TASK 9

**Sand** the corners of a small square sheet of wood and turn it into a perfect circle.

## PRACTICE TASKS

| Task | Teacher Checked |
|---|---|
| Clean belt / disc | |
| Sand to a line | |
| Sand an angle | |

## QUESTION 7

**Explain** why it is important to have '*extraction systems*' when working with wood.

# MACHINE TOOL | ORBITAL SANDER

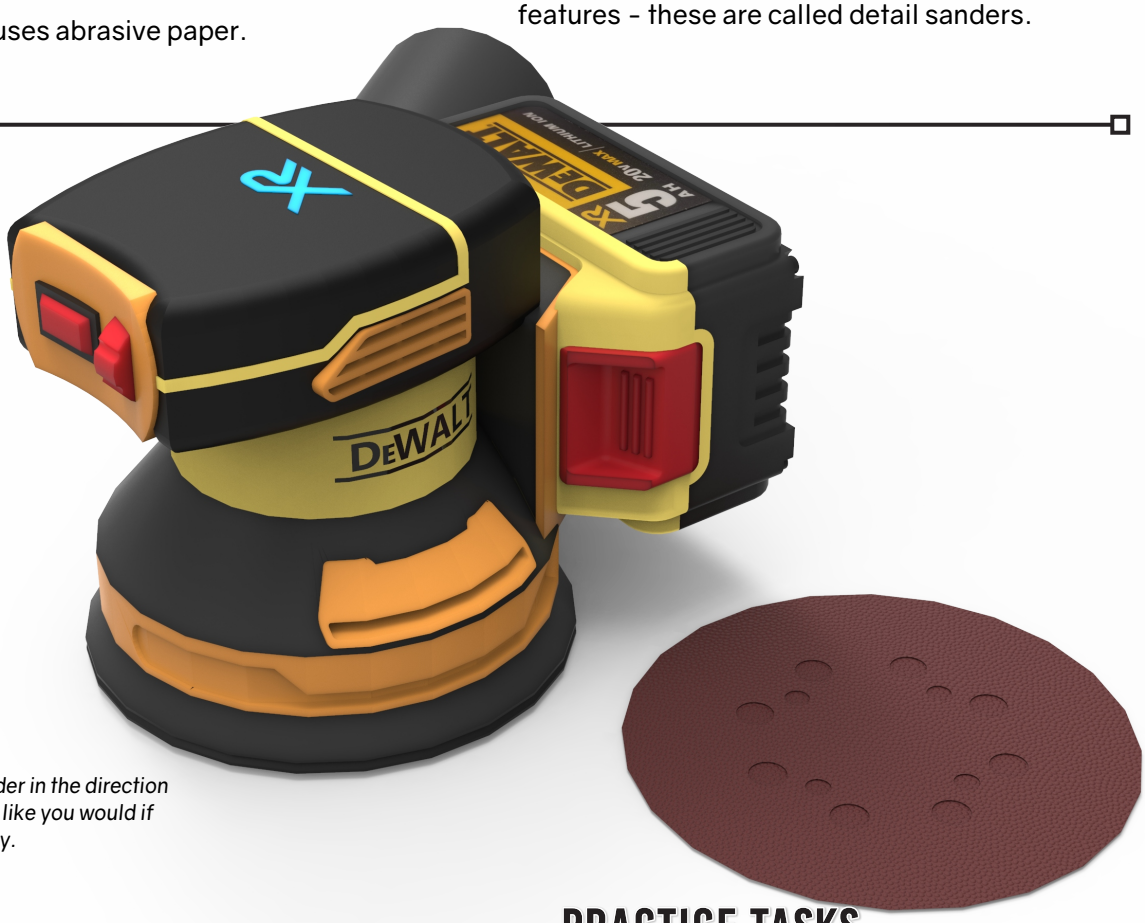
There are several different types of portable electric hand-sander. Three of the most common include:

- Orbital sander
- Pad sander
- Belt sander

Each sander uses abrasive paper.

Some sanders allow you to use sheets of abrasive paper typically used for hand-sanding, whilst others force you to buy propriety paper to fit specific tools.

Electric hand-sanders are not typically used for small parts. You can get specific sanders for small features - these are called detail sanders.




*Use a hand-sander in the direction of the grain, just like you would if sanding manually.*

## TASK 10

**Create** a safety poster about the potential hazards of using a portable sander.

## PRACTICE TASKS

| Task | Teacher Checked |
|---|---|
| Change pad | |
| Charge battery | |
| Check filter / bag | |

## QUESTION 8

Portable sanders can be particularly hazardous.
**Describe** some of the potential hazards and how they can be mitigated.

# MACHINE TOOL | MORTISE MACHINE

The Mortise Machine is a specialist tool for cutting square holes or rectangular slots in wood. It uses a hollow-mortise chisel to cut the wood and an internal auger bit to remove waste material.

A mortise machine makes cutting mortises incredibly quick and easy... As long as you set the machine up properly first!

Mortise machines are similar to pillar drills, also having a 'depth stop'. This allows you to precisely cut to a specific depth.

Mortise machines have a lot of controls. Some move the work-piece side-to-side, some controls move the material back and forward.




## TASK 11

**Describe** three specific safety checks that must be completed before using a Belt or Disc Sander.

## TASK 12

**Label** all the controls of the mortise machine.

## PRACTICE TASKS

| Task | Teacher Checked |
|---|---|
| Clamp material | |
| Set depth-stop | |
| Cut a slot | |

## QUESTION 9

**Describe** the process of marking out a mortise for a mortise-and-tenon joint.
You should use sketches to support your answer.

# INTERMEDIATE PROJECT | FRAME

Using a mortise machine to make a frame offers significant advantages. Firstly, it creates strong and durable joints, distributing weight and stress evenly for a sturdy structure.

The machine's precision and consistency result in accurate and snug-fitting mortises and tenons, while its time-saving features improve productivity.

Additionally, the machine's versatility accommodates various joint sizes and angles, allowing for customised frame designs.

Ultimately, utilising a mortise machine ensures a professional finish with clean and well-defined joints, enhancing the overall quality and aesthetic appeal of the frame.

## TASK 13

**Research** scroll-saw art and save as many examples as you like.





## CUTTING LIST

| Part | Length | Breadth | Thickness | Quantity | Material |
|---|---|---|---|---|---|
| Sides | | | | 2 | |
| Top & Bottom | | | | 2 | |
| Middle spar | | | | 1 | |
| Chalk board | | | | 1 | |
| Lower Back | | | | 1 | Birch ply |
| Hooks | N/A | N/A | N/A | 2 | Metal |

## QUESTION 10

**Explain** the difference between a hardwood and a softwood.
**State** the name of two hardwoods and two softwoods.

# MACHINE TOOL | WOOD LATHE

A wood lathe is a fantastically versatile tool. Material is held either between centres (for long cylindrical parts), or on a face-plate for making bowls and vases.

As the material is spinning, different wood lathe tools can be held on the tool-rest to cut, carve and scrape at the wood. Wood lathes can take years to master, and you can have a career as a Turner.

Wood lathes can also be very dangerous, and you must never take short-cuts or risks when using them.

When using a wood lathe, always use eye and face protection. Ensure long hair is tied back and you have no loose clothing or jewellery and always use extraction.




## PRACTICE TASKS

| Task | Teacher Checked |
|---|---|
| Insert wood | |
| Set tool rest | |
| Set extractor | |

## TASK 14

**Label** all the key parts of the wood lathe.

## QUESTION 11

**Describe** three safety checks that must be completed **on the lathe** before switching it on.

# WOOD LATHE | TOOLS

There are a wide variety of wood lathe tools, each with a specific function. Four of the most basic and common tools are shown below.

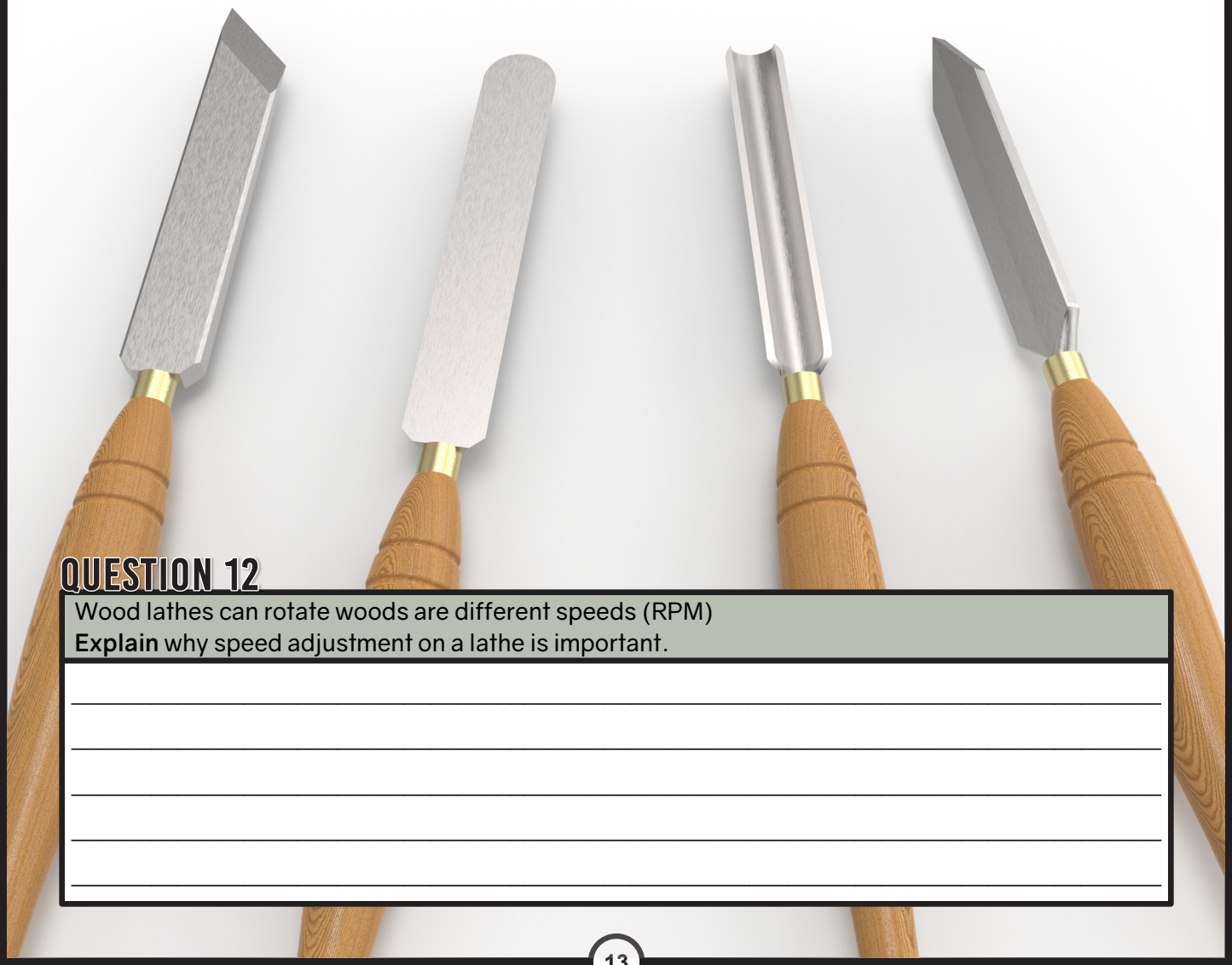
Lathe tools often come with very long handles. This allows for far greater control of the tool and very precise cuts to be made. Try to use the full length of the handle.

The lathe tool should sit upon the tool-rest, and gripped

Your teacher will demonstrate how to use each tool safely. Do not use a lathe until you have been shown how to use it and perform different processes.

## TASK 15

**State** the name of the lathe tools shown below.
**Describe** the specific function / type of cut of each tool.



## QUESTION 12

Wood lathes can rotate woods are different speeds (RPM)
**Explain** why speed adjustment on a lathe is important.

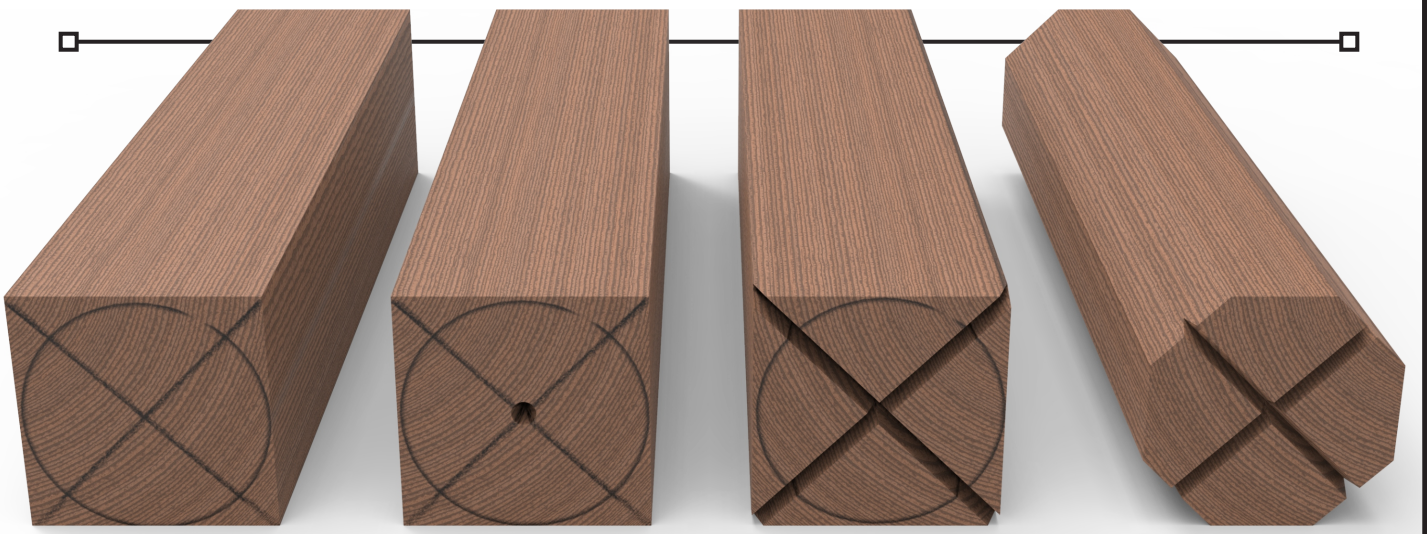
# TURNING | BETWEEN CENTRES

Turning-between-centres is the name used to describe material held between the driving-centre and the tail-stock. This is used to make long cylindrical parts.

The wood must be carefully prepared before putting it onto the lathe. The process for preparing the wood is shown below.

Your teacher will demonstrate how to complete this process by hand.

Always check your material is suitable for turning before preparing it. Look out for 'shakes' (cracks along the grain), holes or knots. Any of these features could cause your problems when turning, or potentially hurt you.



## STEP 1

On both ends of the wood, draw a line from corner-to-corner to locate the centres.

You may want to use a compass to show the diameter your are turning to, but this is not strictly necessary.

## STEP 2

At one end of the wood use a bradawl to mark the centre. This is for the dead or revolving centre of the tail-stock to bind into.

Make sure to not use too much force, or you could split the wood.

## STEP 3

At the opposite end of the wood, use a tenon cut a slot into the wood. This is for driving centre to bind into. Cut one or two slots, depending on the type of driving centre you have.

## STEP 4

Use a plane to remove the corners of the wood. This will reduce wear on your lathe tools and also make the process of turning easier.

## QUESTION 13

**Explain** why you must not over-tighten the tail-stock you your material.

# INTERMEDIATE PROJECT | KITCHEN ROLL HOLDER

Learning to master a wood lathe will take years of dedicated practice. However, you can acquire the basic skills fairly quickly.

A good learning project is shown below - a kitchen roll holder. You will have the opportunity to use four basic lathe tools, and practice different finishing techniques.

Your teacher will show you how to use templates and '*outside callipers*' - the tool we use for measuring diameters.

Once you have manufactured the turned component, can you suggest a suitable joint for the base?

## TASK 16

**Label** all the tools used to cut specific sections of the kitchen roll holder shown to the right.





## QUESTION 14

**Describe** the process of applying a finish, whilst the wood is still on the lathe.
You may use sketches to support your answer.

# TURNING | FACE PLATE

Face-plate turning is the name used to describe the process of turning a block of wood only attached to the head-stock by a metal 'plate'.

The block of wood is attached by several screws. Great care must be taken in the preparation of the wood and plate, as face-plate turning can be dangerous. For instance, a face-plate that isn't balanced can cause the lathe to tip over onto you!

Face-plate turning is used to create vases, cylindrical boxes, wooden cups and bowls.

Your teacher will demonstrate face-plate turning. You may not get an opportunity to do this process, as it is potentially very dangerous and the blocks of wood can be expensive.




*Wood lathes can also have three and four-jaw chucks attached rather than face-plates. Chucks are the preferred modern method.*



*Use a hand-sander in the direction of the grain, just like you would if sanding manually.*

## TASK 17

**Prepare** a blank for face-plate, or bowl turning.

## QUESTION 15

**Describe** the process of preparing a block of wood for face-plate turning.
You should use sketches to support yours answer.

## QUESTION 16

**Explain** why the tool rest must be removed before doing any finishing processes.

# ADVANCED PROJECT | BOWL

Ever lose small items? Well, worry no more with this classy bowl design.

Use face-plate turning to create a wooden bowl. You can use your own sizes or download sizes and template from DesignClass.co.uk.

## TASK 18

**Measure** the size shown by the outside calipers below.



## TASK 19

**Explain** why using a template can help when turning objects.



## QUESTION 17

Screws are used in a variety of woodwork projects.
**State** the name of three holes used when preparing wood for screws. You may use sketches.

# MACHINE TOOLS PROJECT ASSESSMENT

After using a range of machine tools, it will be time to put your skills to the test. The assessment project will involve you using a lathe, scroll saw, pillar drill and belt sander.

You must complete the project to the tolerances specified, but you can use the templates supplied at DesignClass.co.uk. You must also finish and assemble the final model to a high standard.

Safety will be a critical part of your assessment, and you must demonstrate how to keep safe to your teacher/assessor.



## QUESTION 18

**State** the name of a suitable wood glue for the assessment project.

## CUTTING LIST

| Part | Length | Breadth | Thickness | Quantity | Material |
|---|---|---|---|---|---|
| Face | | | | | |
| Base | | | | | |
| Body | | | | | |
| Stem | | | | | |
| Face Details | | | | | |
| Fixings | N/A | N/A | N/A | | |

# ASSESSMENT

Craft is not only about practical skill, but depth of knowledge too. You will complete written-assessments as part of this course to test your knowledge.

Check your knowledge against the list below. If you are struggling with anything talk to your teacher.

## LEARNING CHECKLIST

- [ ] I can identify and explain different safety signs and notices.
- [ ] I can describe safety checks to conduct on a power or machine tool before use.
- [ ] I can name different types of drill-bit and explain their purpose.
- [ ] I can set-up and use a pillar drill correctly.
- [ ] I can set-up and use a scroll saw correctly.
- [ ] I can set-up and use a mortise machine correctly.
- [ ] I can use palm, orbital and electric sander correctly.
- [ ] I can describe how to prepare wood for turning between centres.
- [ ] I can name four lathe tools, and describe their purpose.
- [ ] I can name at least six parts of the wood lathe.
- [ ] I can use inside and outside-callipers to make accurate measurements.
- [ ] I can describe how to drill a hole to a specified depth.

## MODEL CHECKLIST



*Fork*



*Phone Stand*



*Frame*



*Roll Holder*



*Bowl*



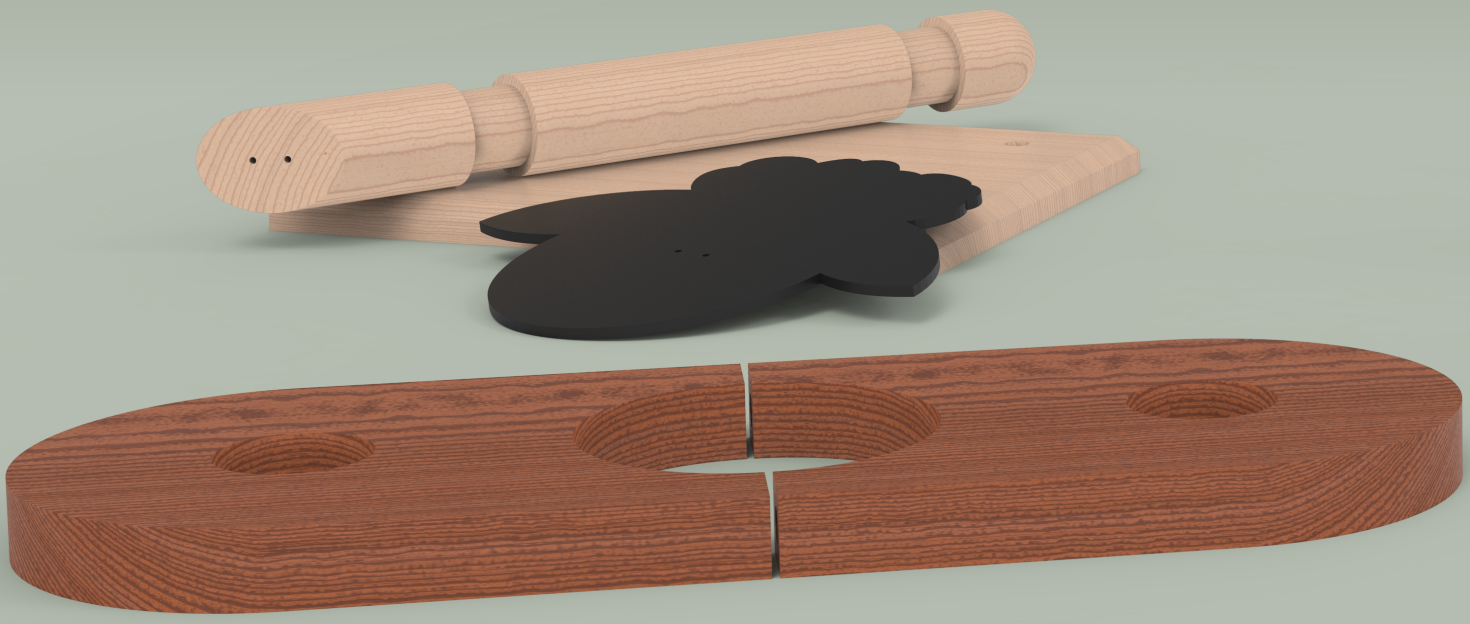
*Assessment*

## GRADE

*Record here the grade your teacher awards you for each of the projects.*

☐ ☐ ☐ ☐ ☐ ☐

# COURSE NOTES V 1.0



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