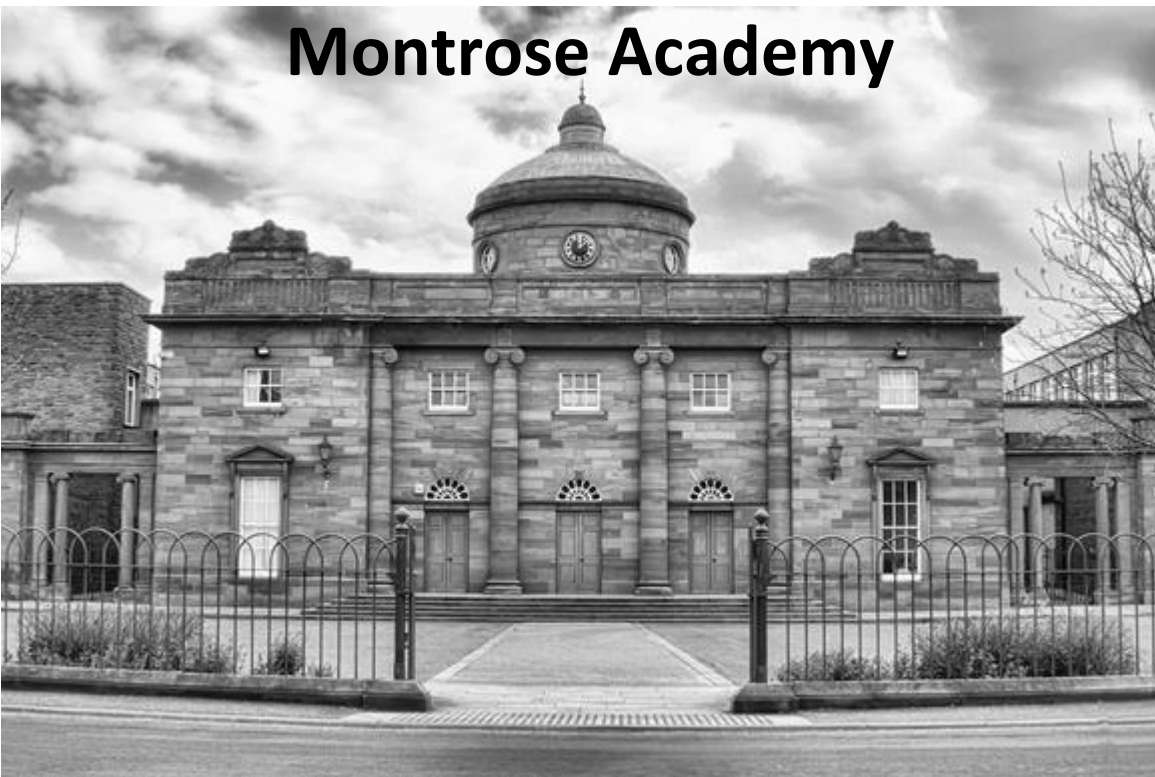


N5 Design & Manufacture

Metalworking Questions

Montrose Academy



What are two differences between ferrous and non-ferrous metals?

Name two products that aluminium is commonly used to make.

Circle two pure metals.

Aluminium Steel Brass Tin Copper Bronze

What is an alloy?

Below are a range of properties, and a description, that metals commonly have. Fill in the blanks, brittleness has been given as an example.

Brittleness – Easily broken, when struck, with little or no bending at the breaking point

Ductility – _____

_____ – Ability to resist a force without breaking

Conductivity – _____

_____ – Able to be hammered out into thin sheets or small bars without cracking

Name the tools shown below.









Describe what a scribe is used for.

You need to mark a line parallel to the edge of your metal, what tool would you use?

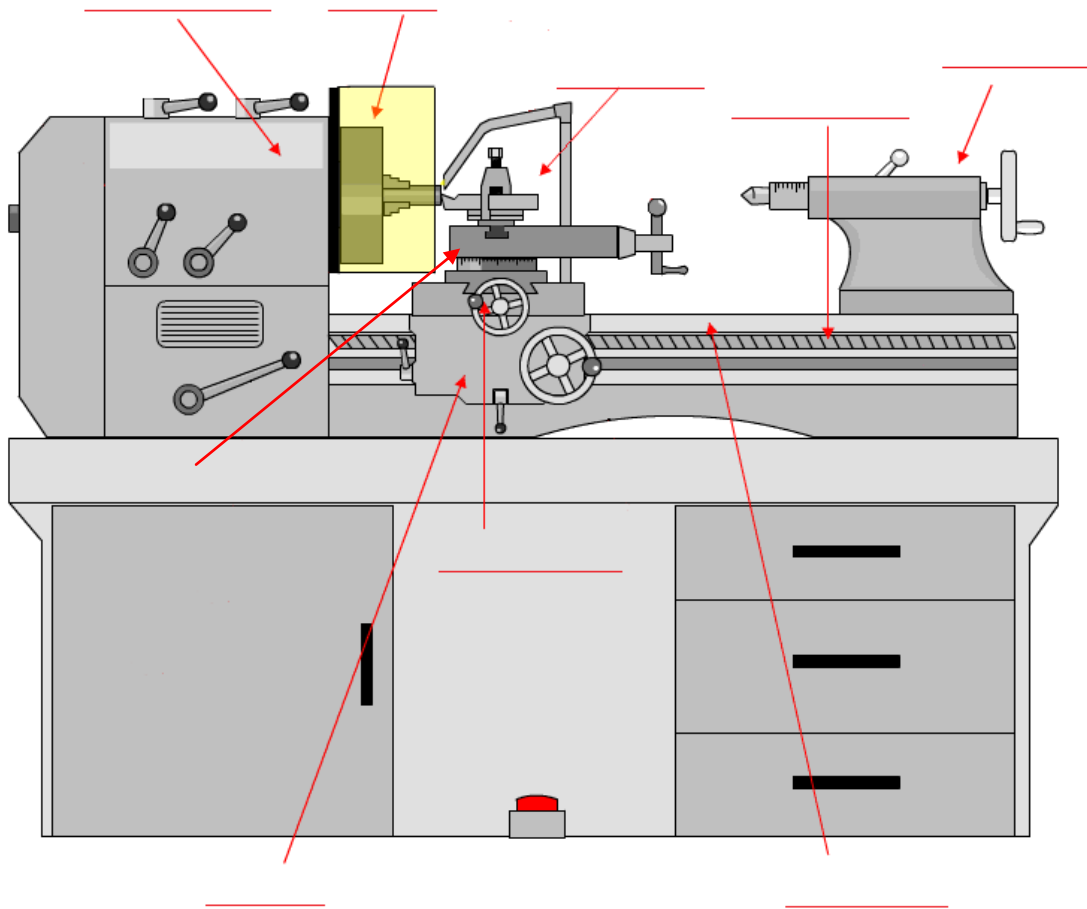
Engineers Square

Odd Leg Calipers

Scriber

What is the metal lathe used for in metalwork?

Label the parts of the metal lathe shown below.



What is stored in the headstock?

Which of the following is used to move the tool post across the face of the work?

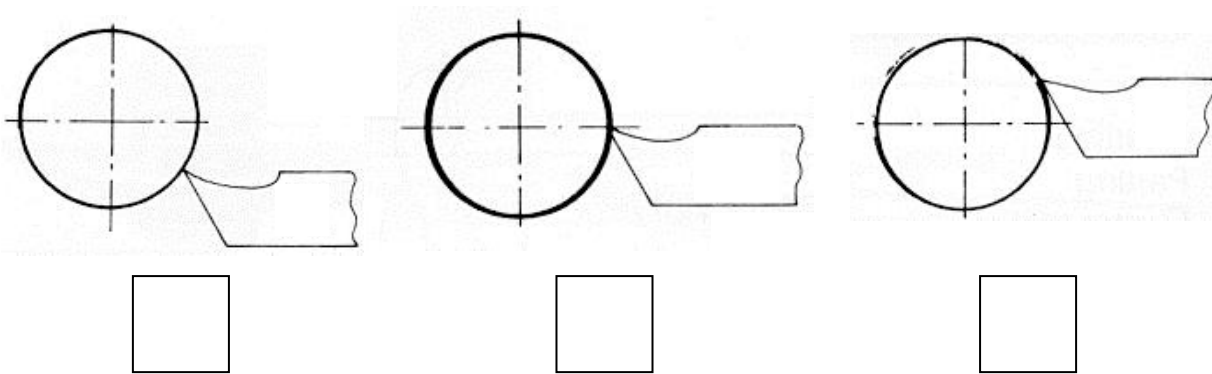
Compound slide

Cross slide

List 4 safety considerations when using the metal lathe.

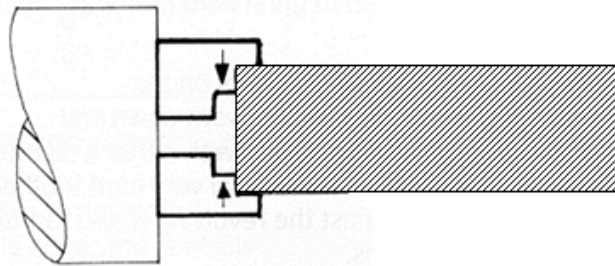
-
-
-
-

Which of these pictures shows the correct way of setting up lathe tools? Tick the correct box.

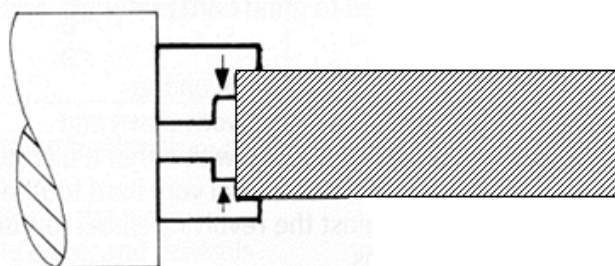


On the following diagrams, draw an arrow to show the direction the cutting tool moves when: Parallel turning; Facing off; and Taper turning.

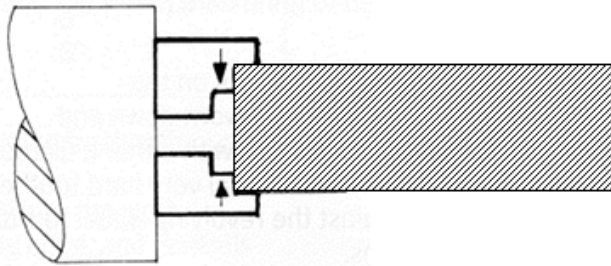
Parallel Turning



Facing Off



Taper Turning



What is a knurling tool used for?

What parts of items have knurled surfaces?

What is the purpose of facing off?

Notching is a process which involves the removal of material from a sheet of metal name one tool that could be used the following environments.

Industrial work place -

A school workshop -

Some metal can be bent using an engineers vice, folding bars and a hide mallet. Explain why a hide mallet is used.

A piece of metal requires bent and notches to be removed, which of these should be done first and why?

Name the two tools shown in the picture below.



There are a number of different types of mallet that can be used during the shaping and bending of metals, please name another two.

Some metals need to be heated to soften them up before they can be shaped or bent, what is this process called?

When shaping sheet metal a wooden former could be used, give two advantages to using a wooden former.

-
-

Forging metal

1. Name four pieces of essential safety equipment required to be worn while working on the Hearth.

- a. _____
- b. _____
- c. _____
- d. _____

2. Why are parts formed via forging stronger than those formed via casting?

3. Label the following picture with the correct names.



Extraction Hood

fire bricks

Brazing Station

Torch

Blacksmiths/chip Forge

Tongs

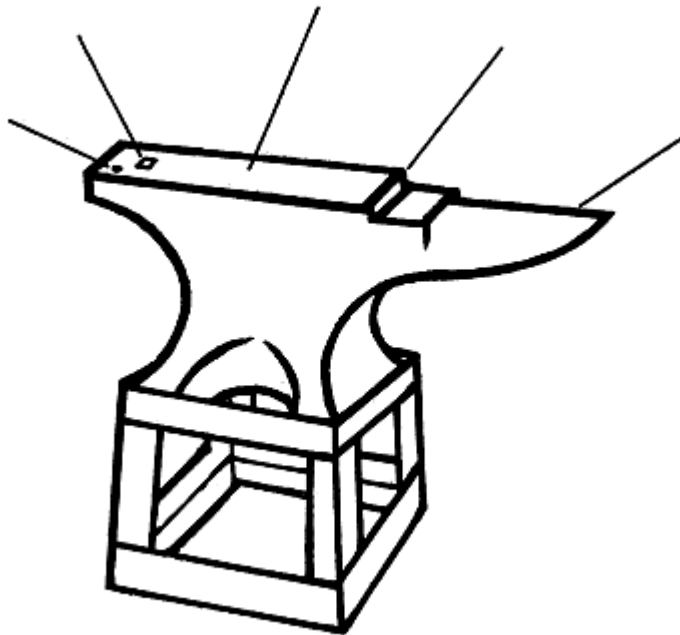
4. What does the hearth use to provide heat?

5. How might you increase the size and heat of the flame produced from the torch?

6. Why might fire bricks be arranged in a semi circle around an object?

7. What would you use to hold hot metals securely?

8. Label the following diagram correctly.



9. How might you use a Hardie?

10. The Swage and Fuller are other tools that use the Hardie Hole, what is their purpose?

11. Why might you have to use a Flatter after using a Fuller?

12. Why does the pein on a straight pein hammer run parallel to the handle?

13. What is the purpose of the round Pein on a Ball Pein Hammer?

14. Once heated, a piece of metal can be worked using the anvil and hammer in order to taper it to a point. What is this process called?

15. Describe how you would use an anvil to bend a piece of metal.

16. What does it mean to upset a piece of metal?

17. Name two forms of punching metal.

18. Name the three main stages of the heat treatment process and describe why they are important.

- a.

- b.

- c.

19. What heat treatment requires the metal to be heated until bright red then allowed to cool naturally?

20. What is the purpose of this process?

21. Describe the difference between Hardening and tempering.

22. What happens when a metal becomes Work Hardened?

Cutting Tools

1. Describe the difference between a Hacksaw and a Junior Hacksaw

2. What tool would be useful for cutting curved shapes into a piece of metal?

3. Why would this tool be better than a Hacksaw for cutting curved shapes?

4. Describe the operation of Snips.

5. When might you use Snips instead of a Hacksaw?

6. Describe the process of shearing metal using a cold chisel.

7. Describe the difference between Pliers and wire cutters.

Finishing metal

1. Why do you need to finish metal after it has been cut?

2. What is the purpose of a file?

3. Why are files most efficient when pushed?

4. Why should you avoid pulling files?

5. Why might you require a file card?

6. Why is it advantageous to use emery cloth rather than paperbacked abrasives when working with metals?

7. What is the purpose of wetting wet and dry paper?

8. What is metal polish?

9. What can metal polish be used to remove?

10. What can be used to ensure metal remains shiny?

11. Describe two methods of protecting ferrous metals?

Holding tools

1. What can be used with the engineer's vice to allow you to work with plastics and soft metals?

2. Why do engineer's vices overhang the edge of the workbench?

3. What is a machine vice used for?

4. What is the purpose of the v shaped grooves in the jaws of the machine vice?

5. When might you use a hand vice?

6. What do folding bars allow you to achieve?

7. Describe the operation of mole grips.

Drilling metal

1. Before drilling any metal it must be _____

2. What three tools can be used to mark out the position of a hole to be drilled?

3. Why would you use a centre punch prior to drilling?

4. Why might the drill bit break as a result of sideways movement?

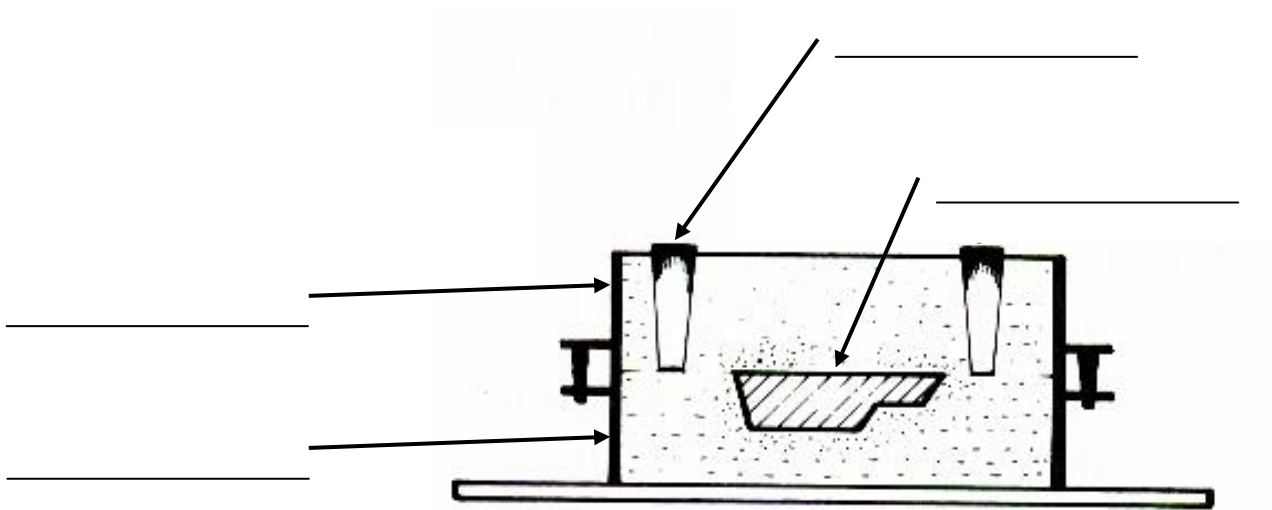
5. How should you hold metal to be drilled?

6. What kind of drill bit should be used when drilling metal?

7. Describe Swarf and how it may be removed?

Sand Casting

Label the parts of the casting box shown.



Sprue pins are used to create channels for the molten metal to be poured. What are the names of these channels? What are these channels used for?

Name of the channel	What is it used for?

The pattern has to have sloping sides on it. Why is this?

What do you have to sprinkle over the pattern before putting sand over it?

How do you know when to stop pouring the metal?

Die Casting

When should die casting be used instead of sand casting?

What is the mould made from in die casting?

Explain, in your own words what happens in the process of die casting.

Die Preperation	
Injection	

Ejection	
Shakeout	

Complete the table below.

Advantages of Die Casting	Disadvantages of Die Casting

Dip Coating

What is dip coating?

What safety equipment has to be used when dip coating?

Explain the process of dip coating.

1	
2	
3	

4	
5	

Metal can also be coated with a number of different materials to protect it.

Painting	
Spray painting	
Lacquering	

Dip Coating	
Galvanising	
Bluing	

Joining Metal

Put the following methods of joining metal into the table. Indicate whether each method is permanent or non permanent.

Epoxy Resin Solid Rivets Pop Rivets Nuts Bolts
 Machine Screws Washers Self tapping screws Threading
 Soldering Brazing Welding Arc Welding
 Spot Welding

Method of joining metal	Process or tool for joining metal	Permanent	Semi permanent
1. Adhesives			
2. Mechanical fixing			
3. Soldering			

4. Brazing			
5. Welding			

Name the rivets below.









Apart from speed of use, name one advantage of using pop rivets over solid rivets.

How does this advantage effect mass production techniques?

Nuts, Bolts & Machine Screws

What is a nut used for?

What does a nut have to be used alongside?

What is one advantage of using a wingnut?

What is the difference between a bolt and a machine screw?

What is a washer?

Why are self tapping screws made of hardened steel?

Name the driving tools shown below.















Taps & Dies

What are Taps used for?

What is the name of this tool and what is it used for?



Name each of the types of taps available and describe the use of each one.

Name of tap	Use

What is meant by a blind hole?

What are Dies used for?

What is the name of this tool and what is it used for?



Why do we chamfer a metal rod before cutting an outside thread in it?

What should we use to help us cut this thread?

Soldering, Brazing & Welding

What tools are used when soldering and does this happen at low, medium or high temperatures?

What tools are used when brazing and does this happen at low, medium or high temperatures?

What is stronger; welding, brazing or soldering?

What can happen if the settings on an arc welder or spot welder are incorrect?

What needs to be produced before a rapid prototyping model is created?

Name the advantages of using rapid prototyping to make models.

1.

2.

3.

4.

5.

6.

7.
