



Chinese Puzzle

PROJECT FOR EARLY SECONDARY

An ideal starting project, with no variation. Enjoyable for pupils, very easy on the department budget. Ideal filler project.

POINTS OF INTEREST

- Easy and enjoyable to make.
- Students can play with the finished job.
- Cross curricular with maths and graphics.
- Assessment on accuracy and finish.
- No variation for whole class.



CHINESE PUZZLE PROJECT, BASIC SKILLS.

- Introduction to the workshop.
- Workshop safety.
- Hand tool safety.
- Material selection.
- Wood as a medium.
- Importance of accuracy.
- Finishing a project.

A quick, effective project aimed at the first few years of secondary technology, this project has the flexibility to offer differentiation throughout the year groups.

All three components should be prepared prior to the lesson so that students find it easy to engage with minimal supervision.

It is a great starting or filler project, as weaker students find it possible

to keep up with the pace, whilst all students develop good workshop practice.

The stages of manufacture have been compiled to aid the advancement of the class as a unit, rather than the individual.

TEACHING POINTS

Some students will try to freehand the measurements.

Accuracy is vital to a successful project.

Occasionally, pupils try to chisel out the slots. This will split the wood.

Do not force tight fitting joints. Again, it will split the wood.

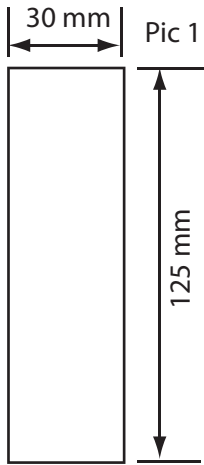
Over-cleaning with sandpaper will cause a loose fitting job.

Split work can be glued and used if left to dry



STARTING WITH THE CUTTING LIST:

3 off 125mm × 30mm × 13mm (Pine)



Three pre-cut strips per student.



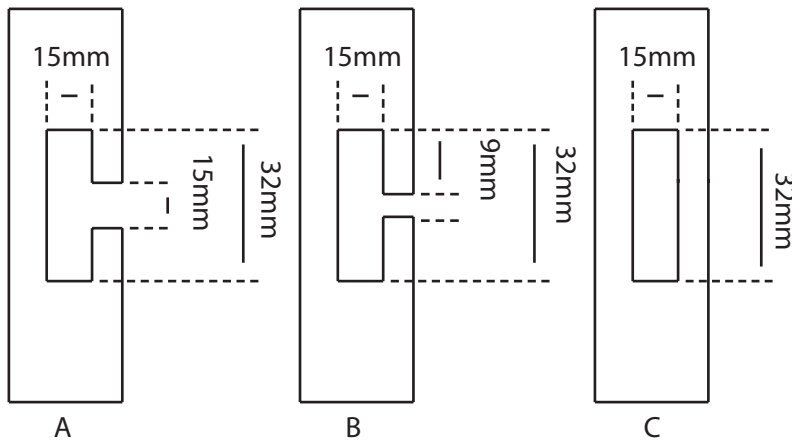
The puzzle works best if the strips are clean and have no knots. Knots are difficult to cut and some will fall out, causing irregular shapes.

It is important that the strips are 13 mm thick for the puzzle to work.

When cleaning, sand with the grain, not across the grain.

CONSUMABLE MATERIALS: NONE

STEP 1 MARKING OUT THE STRIPS.



Accuracy at this stage is vital to the end product.

Hardwood with a tight grain is ideal for this project.

Pine with no knots is also suitable, although more prone to split.

STEP 2 PUTTING THE PUZZLE TOGETHER

Once the three pieces have been marked out, they can be cut. If the lesson incorporates hand tools, a coping saw should be used. It can also be cut using a vibro saw or, for speed, it is possible to cut on a band saw.



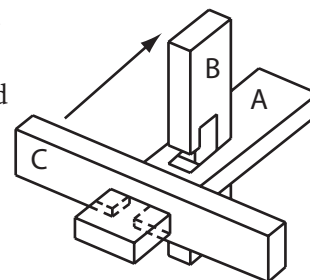
The three parts of the puzzle

IMPORTANT

Cut inside the lines and clean excess out with a file. If the holes are made too big, the puzzle will be too loose and will fall apart.

Do not force any pieces together.

If the strips are over-sanded, this will also result in a loose finish.



HOW TO DO THE PUZZLE

Insert piece B half way into slot in piece C.

Slide A down C and lock into B.

Clip C into place



WORKSHEET 1

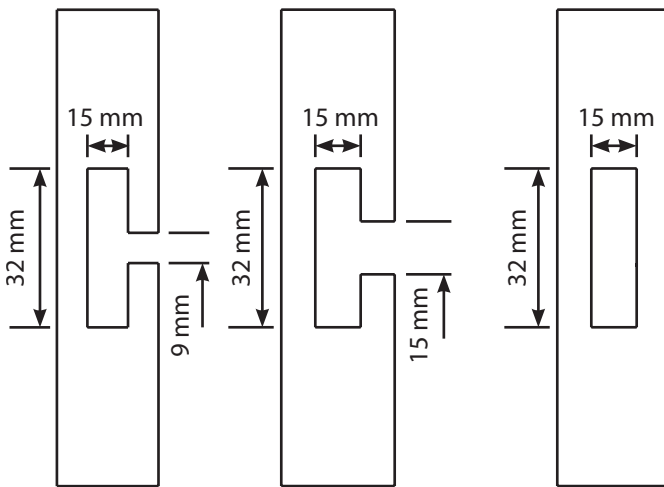
NAME: _____

Before marking out your cuts on wood, mark on the 3 templates below. The three templates shown here are the same size as the actual job. Use these to practise.



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Although the information (dimensions) is limited, there is enough to be able to reproduce all the pieces (hint, find the centre lines).



Accuracy is a very important skill to master in Technology. Use a ruler, pencil and a rubber. Getting it right now will save lots of time and problems later.

Teacher comment:

GRADE: _____



WORKSHEET 2

NAME: _____

COMPLETE THE DRAWING BELOW.

Why? Because knowing your project will make the task so much easier and you can visualize what it will look like when finished.



Use a ruler and take your time. Think before drawing.

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1. Name the type of wood used in the pieces of the project. _____
2. Choose wood without _____
3. The grain of the wood should run across the width of the pieces. True/False
4. What is the name of the saw used to cut out the pieces _____
5. If the slots are too big, the job will be _____
6. If the slots are too tight, the parts will _____
7. Split pieces can be glued, although they must be allowed to set for _____ hours.
8. Holes should be drilled then _____ and _____ to size.



9. What should be avoided when cleaning the pieces? _____

10. This project is a test of _____

EVALUATION

(This is an important stage of learning and understanding)

If you could start again, what would you do differently? What went wrong in the making?

What could be done better?

Grade yourself 1 to 6:

Teacher grade 1 to 6: (with 6 highest)

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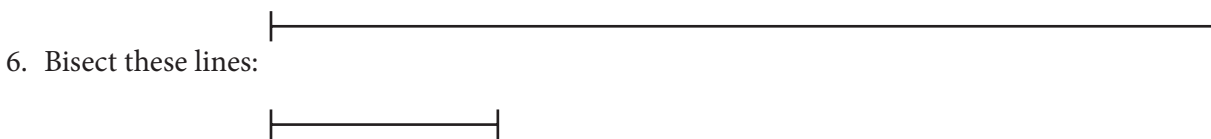


WORKSHEET 3

NAME: _____

CALCULATIONS WITH REFERENCE TO THE PUZZLE

1. Half of 125 = _____ (Length of piece)
2. Half of 30 = _____ (Width of piece)
3. Half of 32 = _____ (Length of slot)
4. Half of 15 = _____ (Width of slot)
5. Half of 9 = _____ (Width of opening in piece A, B or C)



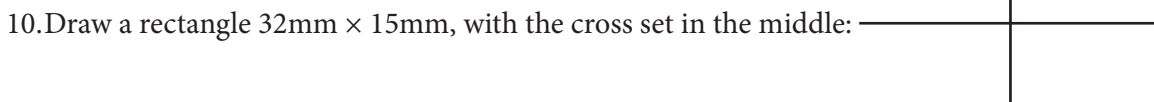
7. Mark a section of 32 mm centred on the mid-point of this line:



8. Mark a section off, 15 mm centred on the mid-point of this line:



9. Draw a rectangle 32mm × 15mm:



11.. What is the surface area of the face of part C? (Clue, Length × Width = _____)

Part C: Length × Width = _____ × _____. So the area = _____ (X)

What is the surface area of the cut out section?

Part C: Length × Width = _____ × _____. So the area = _____ (Y)

Surface area of part C = X - Y = _____

Therefore the Volume is C × thickness (13mm)

Volume = _____ (Volume is written in mm³).

GRADE: _____

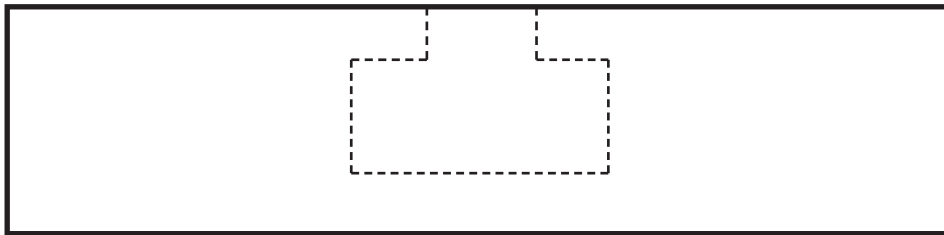
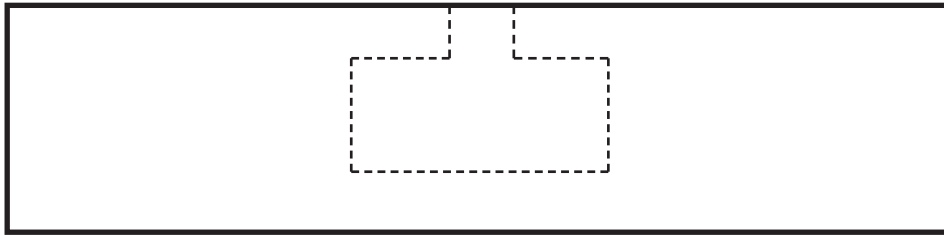
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WORKSHEET 1

ANSWERS

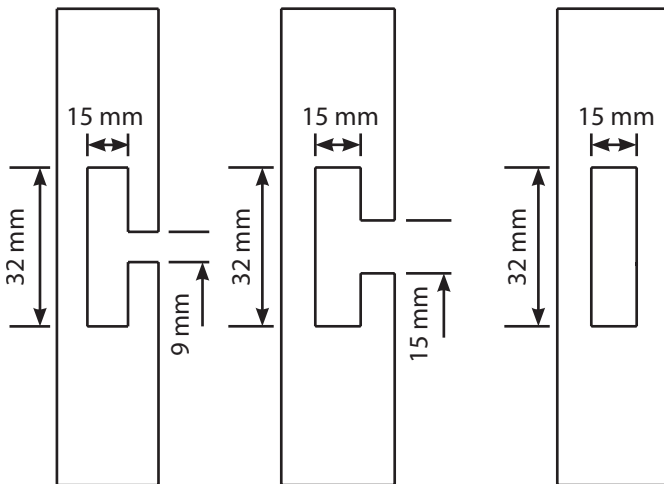
Before marking out your cuts on wood, mark on the 3 templates below. The three templates shown here are the same size as the actual job. Use these to practise.



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Although the information (dimensions) is limited, there is enough to be able to reproduce all the pieces (hint, find the centre lines).

Accuracy is a very important skill to master in Technology. Use a ruler, pencil and a rubber. Getting it right now will save lots of time and problems later.



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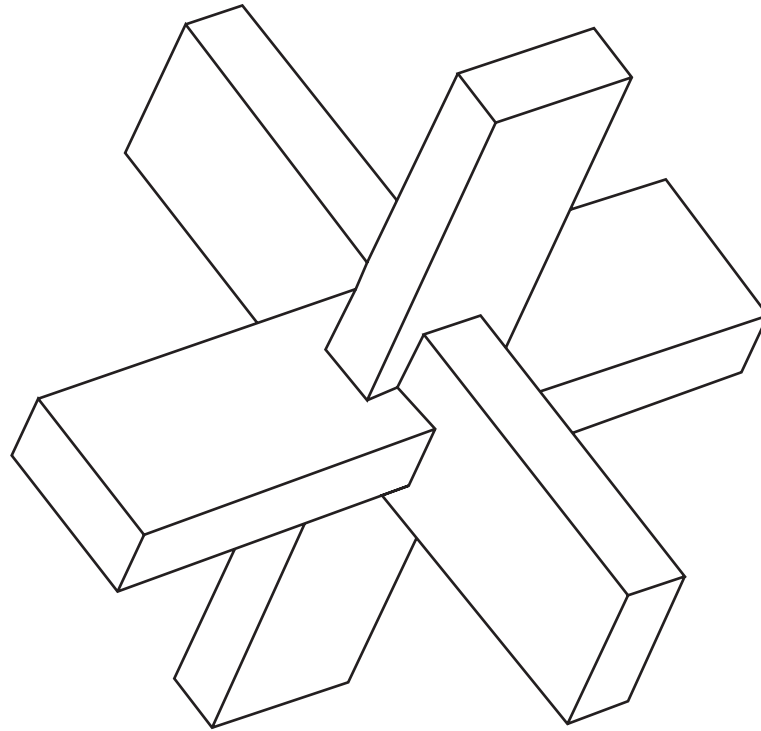


WORKSHEET 2

ANSWERS

COMPLETE THE DRAWING BELOW.

Why? Because knowing your project will make the task so much easier and you can visualize what it will look like when finished.



1. Name the type of wood used in the pieces of the project. **Pine**
2. Choose wood without **Knots**
3. The grain of the wood should run across the width of the pieces. **False**
4. What is the name of the saw used to cut out the pieces **Coping Saw**
5. If the slots are too big, the job will be **Loose**
6. If the slots are too tight, the parts will **Split**
7. Split pieces can be glued, although they must be allowed to set for 24 hours.
8. Holes should be drilled then **drilled** and then **filed** to size.



9. What should be avoided when cleaning the pieces? If it is over cleaned or too much material is removed, the project will be too slack or loose.

10. This project is a test of Accuracy.

EVALUATION

(This is an important stage of learning and understanding)

If you could start again, what would you do differently? What went wrong in the making?

What could be done better?

Horizontal lines for writing answers.

Grade yourself 1 to 6:

Teacher grade 1 to 6: (with 6 highest)

M Y P D e s i g n & T e c h n o l o g y

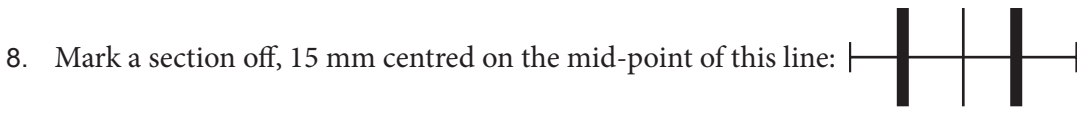
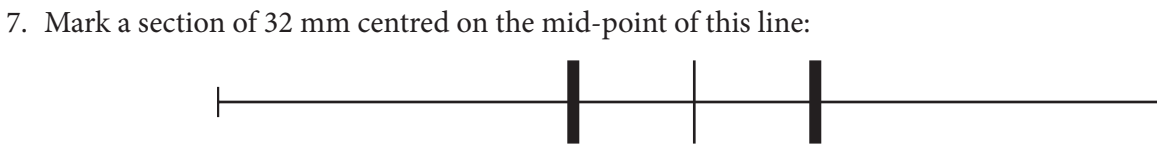


WORKSHEET 3

ANSWERS

CALCULATIONS WITH REFERENCE TO THE PUZZLE

1. Half of 125 = 62.5 (Length of piece)
2. Half of 30 = 15 (Width of piece)
3. Half of 32 = 16 (Length of slot)
4. Half of 15 = 7.5 (Width of slot)
5. Half of 9 = 4.5 (Width of opening in piece A, B or C)



9. Draw a rectangle 32mm × 15mm:



11.. What is the surface area of the face of part C? (Clue, Length × Width = _____)

Part C: Length × Width = 125 mm × 30 mm . So the area = 3750 mm²

What is the surface area of the cut out section?

Part C: Length × Width = 32 mm × 15 mm . So the area = 480 mm²

Surface area of part C = X – Y = 3750 – 480 = 3270 mm²

Therefore the Volume is C × thickness (13mm)

Volume = 3270 × 13 = 42510 mm³ (Volume is written in mm³).

GRADE: _____

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SCHEME OF WORK

The Scheme of work may look something like this:

Lesson	Lesson Objectives	Activities	Materials	Assessment Cross-curricular	Homework
1	Analyzing the task, problem, design brief client and brainstorm	Project introduction, discussion on puzzle design, construction and problems.	Storyboard, A4 paper. Pre made game. Example material.	English, Maths, IT (research), Graphics. Teacher observation.	Collection of images of games. A4 sheet. Complete classwork.
2	Research and selection of construction, material. Look at existing products.	Isometric demo, visual blow up of cuts and why. Investigate products.	A4 paper, Examples of joins. Alternative puzzle ideas. Fabrication points.	English, Maths, IT (research), Graphics and teacher observation.	Compile preferred images. Complete class work. Rough sketch of parts.
3	Marking out wood, using correct measurements and cutting material.	Teacher demonstration of each section. Individual practical session. Use of hand tools.	Pine (type) wood (no knots), pre cut. PVA, pencils, rules, etc.	Maths. Graphical ability. Quality and accuracy. Teacher observation.	Produce a material and equipment list used for lesson tasks.
4	Finish cutting the three parts. Clean burs and marks from job.	Practical lesson to finish cutting of blocks. Cleaning using sandpaper.	Pine (type) wood (no knots), pre cut. PVA, pencils, rules, etc.	Maths. Graphical ability. Quality and accuracy. Teacher observation.	Student self evaluate the project, list of personal improvements.
5	Learn importance of accuracy through marking out and checking.	Finish practical work, clean and stain. Play with project. Evaluate finished job.	Project boards, PVA, sandpaper, pencils, rules, A3 paper.	Maths. Graphical ability. Quality and accuracy. Finished job.	Students self evaluate the project and compile a list of improvements.

This scheme of work is only a guide. Yours may differ depending on your teaching styles.



ASSESSMENT RUBRIC

	0 Level	1-2 Level	3-4 Level	5-6 Level
B Design	The student does not reach any of the standards described by the descriptors to the right.	The Student has completed some of the four design brief worksheets. S/he has shown a basic understanding of the project in drawing form.	The Student has completed the four design brief worksheets. S/he has shown a fair understanding of the project. S/he has constructed a fair representation, in isometric form, of the project.	The Student has completed the four design brief worksheets to a high standard. S/he has shown a good understanding of the project. S/he has produced a high standard isometric drawing of the project.
C Plan	The student does not reach any of the standards described by the descriptors to the right.	The student has limited understanding of task management. S/he has not been able to complete the project.	The student has an understanding of task management. They have been able to complete the project on time.	The student has planned out the use of time over available equipment. S/he understood and managed the tasks effectively.
D Create	The student does not reach any of the standards described by the descriptors to the right.	The student created the product. S/he worked safely.	The student created the product according to the approved design and following the plans. They worked safely and tidily throughout the unit.	The student created the product according to the approved design and following the plans. Their work is accurate and well finished. S/he has worked safely and tidily throughout the unit.
E Evaluate	The student does not reach any of the standards described by the descriptors to the right.	The student provides a very basic rating of his/her performance.	The student provides a basic rating of his/her performance. Reflects possible improvements in future work.	The student provides an overall rating of his/her performance. Justifies the rating and reflects possible improvements in future work.
F Attitudes in Technology	The student does not reach any of the standards described by the descriptors to the right.	The student provided a little evidence of personal engagement with the subject.	The student provided evidence of personal engagement with the subject (a generally positive attitude) in technology.	The student provided evidence of personal engagement with the subject (independence, general positive attitude) in technology.



■ TIME FRAME AND DURATION:

- 6 to 8 Weeks at 2 × 45 min per week.

■ AREA OF INTERACTION

- Approaches to Learning, Human Ingenuity

■ INTERDISCIPLINARY AND CURRICULUM LINKS

- Maths

■ SIGNIFICANT CONCEPTS

- Outline the design brief.
- Design a test to evaluate the product against the design specification.
- Evaluate the designs against the design specification.
- Use a range of appropriate techniques and equipment competently.
- Suggest ways in which performance could be improved.
- Carry out units of work in technology using materials and techniques safely and responsibly.

■ MYP UNIT QUESTION

- Why is it important to be able to accurately mark out a piece of work in technology?

SUB QUESTIONS

- Why should we know the project before making the object?
- Why is accuracy important?



■ ASSESSMENT:

Students will:

- Complete the four worksheets provided for this project.
- Accurately mark out work using previously completed worksheets.
- Follow the stages correctly for fabrication of project, using appropriate tools and machinery.
- Produce a dimensioned isometric drawing of the finished project.
- Evaluate their work and also the project in general.

■ MYP OBJECTIVES TO BE ADDRESSED

- Design, Plan, Create, and Evaluate. Attitudes to Technology.

■ ASSESSMENT CRITERIA TO BE USED:

- B, C, D and E, F

■ PREVIOUS KNOWLEDGE AND SKILLS TO BE USED

- Mathematic skills, for the marking out and preparation prior to fabrication.
- English skills for understanding the task to be performed.
- Art experience for the ability to draw and create working diagrams/drawings.

■ APPROACHES TO LEARNING

- The unit is aimed at developing in the students a limited understanding of the processes involved in design technology. Students will become familiar (by use) with tools and equipment as well as the safety aspects involved.



■ LEARNING EXPERIENCES

- Students will initially work from the pre developed worksheets to gain an understanding of the unit. They will see finished work prior to starting to show direction. They will receive safety instructions for using the various equipment required to complete the project.
- Students will acquire knowledge by completing the various tasks. Several tasks will be opened to them. All must be completed (student centred learning will take place).
- It is expected (or presumed) that students have a little prior knowledge of the subject.

■ TEACHING STRATEGIES

- Assessment will be based initially on the worksheets i.e. completion and presentation. Student understanding (and therefore assessment) will become obvious once the practical work begins. Feedback on the tasks will be marked on the sheets and verbal teacher input during practical work should also occur.
- The project is aimed at student centred learning. The student should be aware of what is required and should manage the tasks to suit availability of equipment and stages needed.
- The project has huge scope for differentiation either in the starting point or the stages (can be adjusted) as required by the teacher.
- This is a highly visual project and students with language difficulties and, to some extent, learning difficulties can follow the step by step pictorial guide in the notes.

■ RESOURCES

- The project will be based solely in the Design & Technology room to allow students to become familiar with the workshop. However, teachers should make frequent reference to external manufacturing and material availability.



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