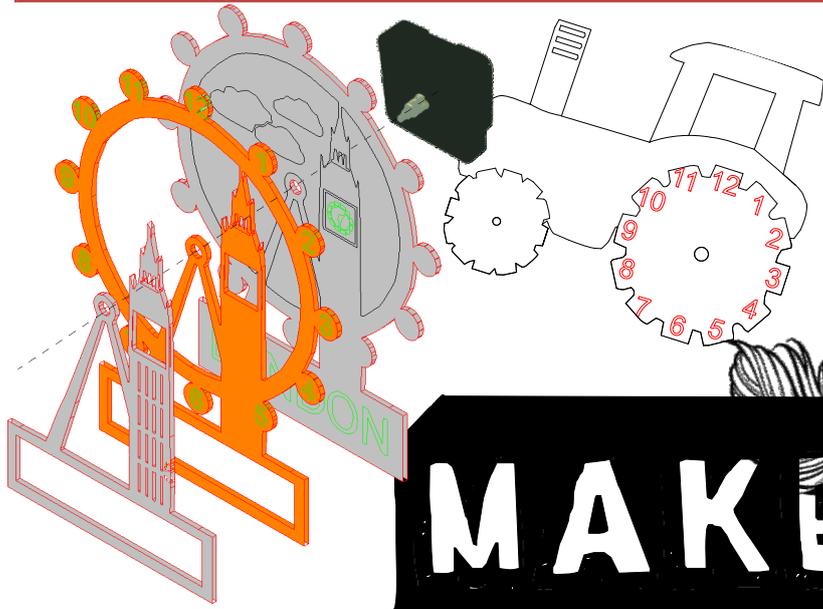


Name:		D&T Group:	
Teacher:		Tutor Group:	



Subject: Design & Technology

Progress band target: _____

This is the target for the end of Year 11. Targets will become more specific as you move up the year groups.

Your work will be marked as:

Below / On / Above / Well Above
the path to this target.

MAKE

time

Homework

Homework 1: 1.) Look around your home and find an example of a clock. 2.) Draw a diagram of the clock using notes to explain its key design features, what it is made from and what you think of the design.

Homework 4: Adhesives table... Complete the table provided. Fill in with information about the uses of the adhesives listed and relevant health and safety information.

Homework 2: On a blank sheet of paper, sketch a method of attaching a clock to a wall, and a method of allowing a clock to be free standing on a flat surface. Use notes to explain your methods.

Homework 5: Make a copy of your templates, full size and then using a ruler and / or compasses, divide the templates up into large shapes of circles, squares or others as identified at the bottom of page 18.

Homework 3: Review your final design and make sure you have all the important details that you need including: sizes, colours, notes on materials, and assembly methods.

Homework 6: Evaluation time. Complete a detailed evaluation of your finished product. Follow the guidance given to you.

Designing

This work is

Below / On / Above / Well above
your minimum target path

Making

This work is

Below / On / Above / Well above
your minimum target path

Marking Summary

Use this space to keep track of your marks throughout the different sections of the project.

Evaluating

This work is

Below / On / Above / Well above
your minimum target path

Technical Knowledge

This work is

Below / On / Above / Well above
your minimum target path

Overall Project

This work is

Below / On / Above / Well above
your minimum target path



A BRIEF HISTORY OF CLOCKS

The earliest known timekeeping device was the sundial which allowed people to track local solar time using a light spot or shadow cast by the position of the sun. The earliest discovered sundials were ancient Egyptian shadow clocks dating back to around 1500BC. Sundials were regularly used after their introduction and you can still see many sundials around today. The oldest sundial in England is the one built into the Bewcastle Cross in Cumbria and dates back to the early 8th century.

The water clocks and hourglass followed as methods of measuring time. The hourglass is something you'll still see around today in the form of egg timers but water clocks were a bit more interesting. These were marked containers filled with water – water dripped out of it allowing people to measure the time by the level of water against the markings.

These were the methods of measuring time most commonly used up until a massive step forward in the history of time-keeping in the 14th century. The mechanical analogue clock.



— DESIGN BRIEF & SPECIFICATION —

In the box below, Write a concise Design Brief and Specification for your Project.

The Design Brief should be a paragraph explaining exactly what it is that you are hoping to design and manufacture. You should also consider who it is for and where it will go.

The Design Specification is a list of important considerations and features that your final product must include. Remember to justify each point...

Design Brief:

.....

.....

.....

.....

Design Specification Points:

- 1.).....
- 2.).....
- 3.).....
- 4.).....
- 5.).....
- 6.).....

In the space below describe the difference between a digital and an analogue clock.

.....

.....

.....

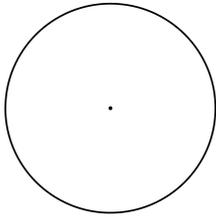
.....

.....

CIRCULAR GEOMETRY

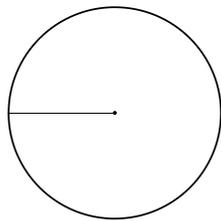
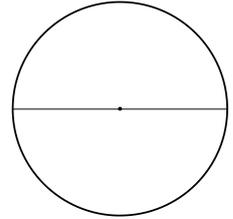
The clock you will be designing and making will be based on a traditional analogue layout. As this style of clock is traditionally based around a circular shape it is important to know the key words and mathematics that will help you with circular geometry.

How many degrees are there in a complete circle?



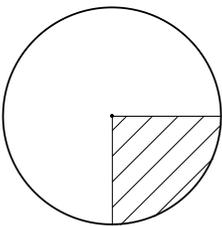
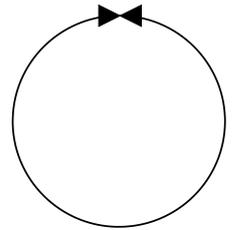
The middle of a circle is called the

The distance all the way across a circle is called the



The distance between the middle and the edge of a circle is called the

The distance all the way around a circle is called the



A quarter of a circle is called a

As you will have mentioned in your design brief, the clock you will soon be designing must be assembled from parts cut from sheet materials. The two main sheet materials you have available are 3mm MDF and 3mm acrylic. In the space provided below describe each material and the advantages and disadvantages of each when used in products.

MDF _____

ACRYLIC _____

3 - Layered Clock

Designs are drawn up in 2D Design, a CAD program, then once drawn as one drawing it is copied 3 times with sections deleted on each layer, so that when they are put back together after machining it makes a 3D clock.

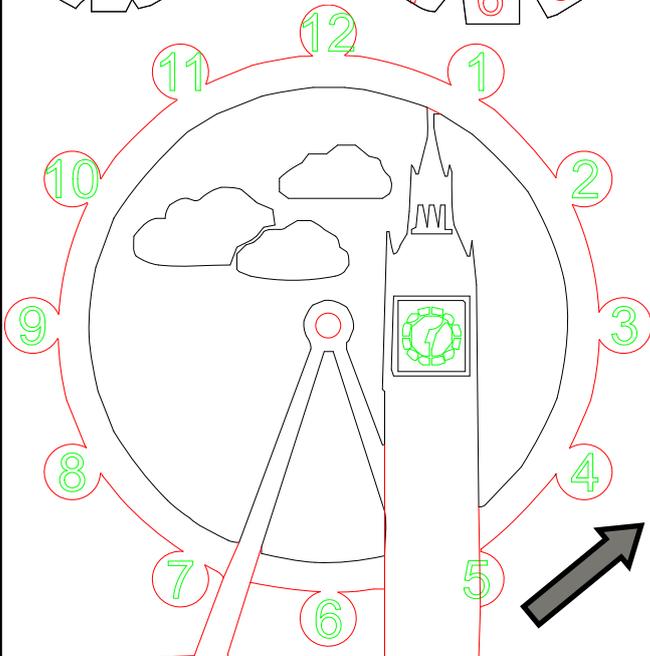
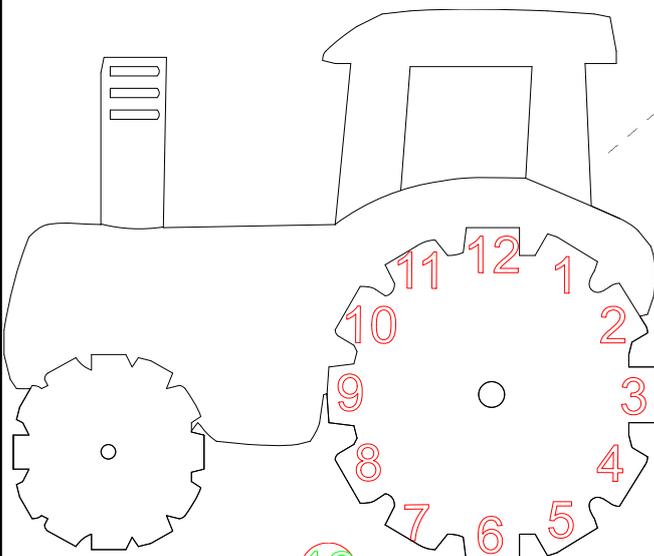
You will have access to a sheet of MDF that is 600mm wide and 300mm tall. This is equivalent to three A4 sheets of paper.

Your task is to design and make a clock using CAD and machine it out on the CNC Laser Cutter.

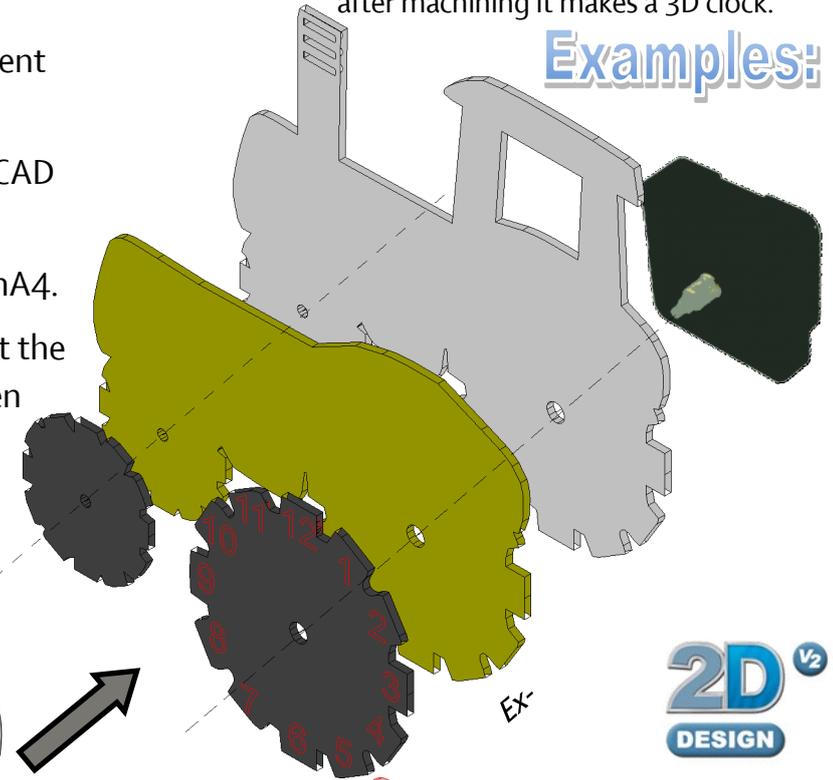
Each layer of your clock must be no larger than A4.

A layer can be made of more than one part but the parts must not be bigger than 1 A4 sheet when

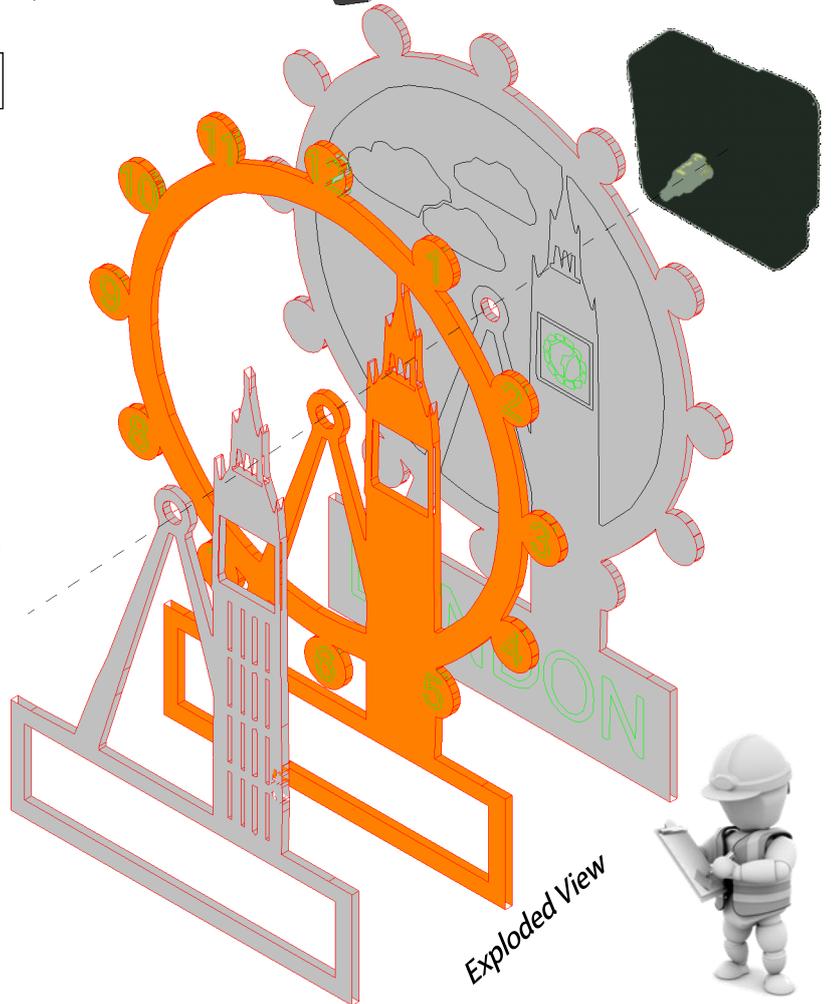
Examples:



LONDON

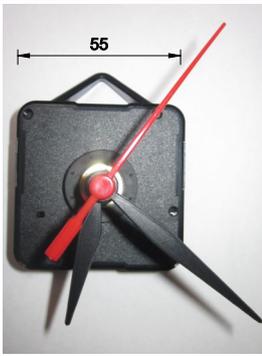


2D^{v2}
DESIGN



Exploded View





YOUR CLOCK MECHANISM

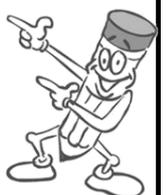
Your clock mechanism is pictured left with key dimensions of width and height. The mechanism is 16mm deep and will require an 8mm hole for the hand actuator (Pinion). The mechanism is powered by a single AA sized 1.5 volt battery which must be able to be accessed for replacement. When you are designing your product keep these important technical factors in mind.

Take your time in the design phase and make sure your ideas fulfil your specification.



DESIGN TIME..

In the space below you need to come up with at least *two* different clock designs. Remember, designs are a combination of sketches, notes about materials, sizes, how it works and thoughts—not just a drawing!





--- DESIGN IDEA ONE EXPLODED VIEW ---



Layer 3

Layer 2

Layer 1





--- DESIGN IDEA TWO EXPLODED VIEW ---



Layer 3

Layer 2

Layer 1



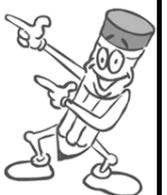
Year 8 = Make Time





— FINAL DESIGN DETAILS & SIZES —

Use this page to give the full details that are needed to create your final Clock. All the details on this page need to be accurate enough that they could be followed by another person in order to make your clock. Remember— materials, sizes of all parts / holes, notes on how things assemble, colours and types of finish.



FEEDBACK TIME



Designing

This work is
Below / On / Above / Well above
 your minimum target path

Peer Feedback

Teacher Feedback

RAS based on feedback given:

D&T : Marking Summary : Designing Skills

	Designing Skills	Tick Box	
		Student	Teacher
Secure	<ul style="list-style-type: none"> Generate creative design ideas Make links from research Cook or create samples of the idea 		
Confident	<ul style="list-style-type: none"> Generate detailed design sketches/recipes/drawings/ prototypes Use research to influence design ideas Share ideas with other students and give the constructive feedback 		
Outstanding	<ul style="list-style-type: none"> Explore different materials, components or ingredients and use technical information to decide if they are suitable for the final product Model ideas by cooking, 3d models or using ICT design software 		

— **FINAL TEMPLATES** — Please use this page to stick in final template layers that you have created in the classroom to trial your final design and get ready for its final machining.

FOLD AND STICK YOUR FINAL TEMPLATES HERE

Saving Your Work

Making

This work is
Below / On / Above / Well above
your minimum target path

Your CAD drawing must be saved in the correct place. This is on the Public Drive.

In the Public Drive search the student area for Design and Technology, then the folder for Year 8 Clocks, then your class group code. The filename should be your initials only. Please make sure you always save your Clock in the correct place. This will help us to help you get it machined out properly.



Year 8 = Make Time

10



DEVELOPING YOUR DESIGN USING ICT

Before Drawing up your components on the computers it is important that you understand some key terms and the important reasons for using ICT in modern manufacturing. Fill in the spaces next to the ACRONYMS.

C.A.D _____

C.A.M _____

C.N.C _____

What are the advantages of using computers and computer controlled machines when designing and making products?

Can you think of any disadvantages for using these technologies?

**FOLD AND STICK YOUR FINAL CAD DRAWINGS
HERE**

MAKING YOUR CLOCK

At this stage you will have fully designed and developed your chosen idea and its time to get making. Your design will probably use a mixture of materials including MDF and Acrylic and possibly others. All of these materials will need to be joined in some way and the most common method is using adhesive. Most adhesives are designed to stick specific materials together and it is important to use the right one for the job. Complete the table below which will act as an important guide for using adhesives.

TYPE OF ADHESIVE	SUITABLE FOR...	HEALTH AND SAFETY
 <p style="text-align: center;">PVA Adhesive</p>		
 <p style="text-align: center;">2 Part Epoxy Adhesive</p>		
 <p style="text-align: center;">Tensol 12 Solvent Adhesive</p>		
 <p style="text-align: center;">Hot Melt Adhesive</p>		

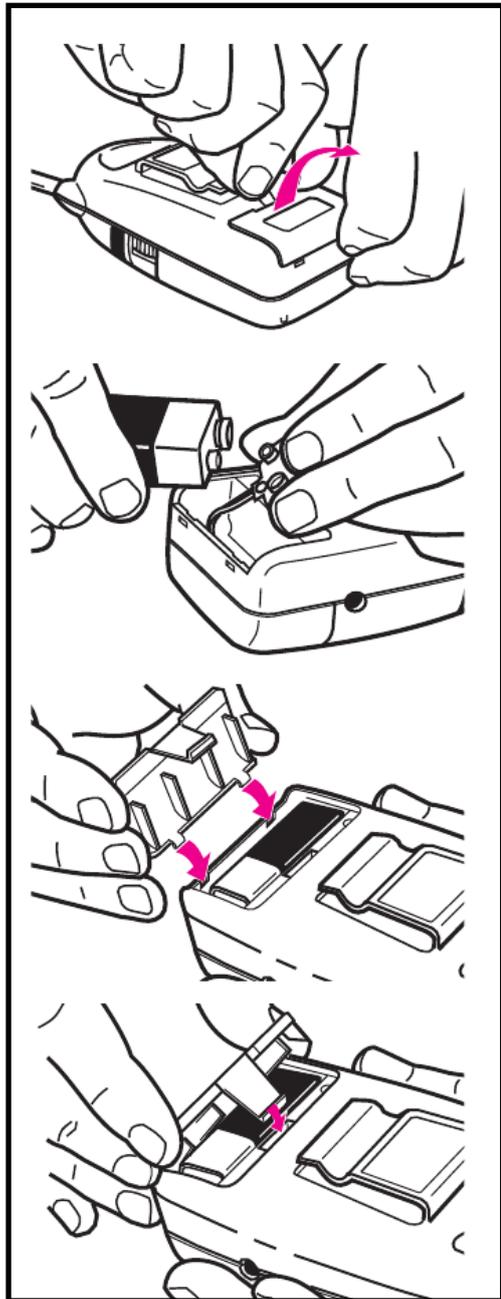
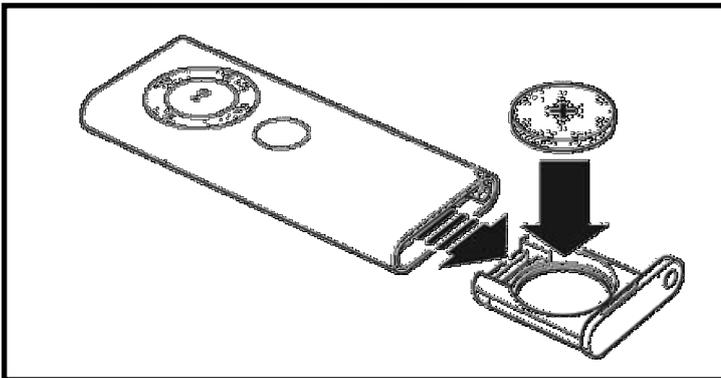
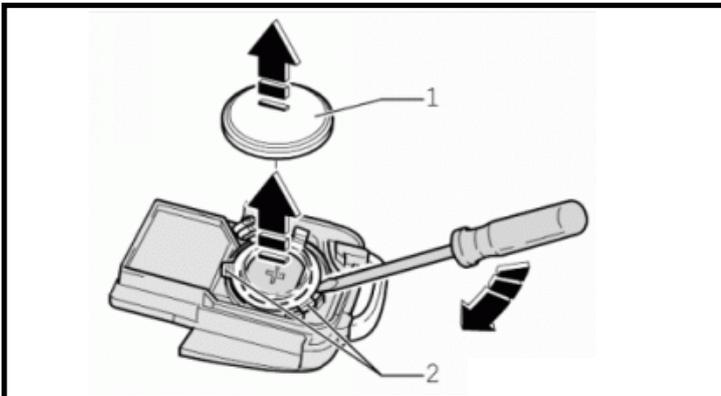
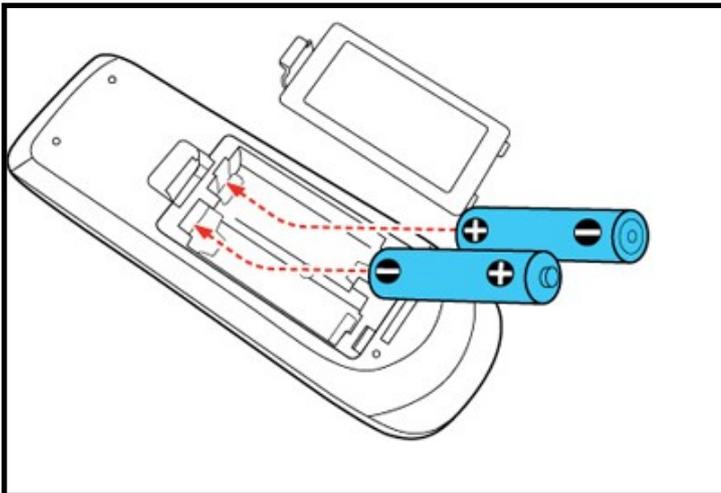
INSTRUCTIONS

All electronic products sold and produced in the UK must include relevant user information by law.

In order for a third party to be able to use your product you must provide a set of instructions showing how to change the battery and set the time.

On a separate sheet of A4 paper, design a set of instructions for your product. Use simple diagrams and as few words as possible to get the information across.

In the box below are some examples to help with your design.



**STICK YOUR FINAL
INSTRUCTIONS
HERE**

D&T : Marking Summary : Making

	Making	Tick Box	
		Student	Teacher
Secure	<ul style="list-style-type: none">Manage short tasks independently (without help from the teacher)Produce a good quality finished product		
Confident	<ul style="list-style-type: none">Select & use a range of tools and equipmentWork accuratelyPay attention to the quality of final productProduce a well-designed product.		
Outstanding	<ul style="list-style-type: none">Work from my own detailed plansUse a range tools and equipment with precisionCarry out a range of specialist techniques (with support)Produce a high quality, well considered final product		

Making

This work is
Below / On / Above / Well above
your minimum target path

Teacher Feedback:

— PICTURE TIME —

STICK PHOTOS OF
YOUR FINAL PRODUCT
HERE



— EVALUATION TIME —

Designers evaluate their finished products or prototypes in order to test whether they work well and if the design can be corrected or improved. Whatever you have designed it is important to evaluate your work constantly during the project.

Evaluation can take a variety of forms:

General discussion with other pupils, staff and others.

Questionnaires / surveys carried out at any time during the project.

Your personal views, what you think of existing designs.

Most important of all - what do you think of your designs, prototypes and finished products ?

CONSIDER THE FOLLOWING POINTS WHEN WRITING YOUR FINAL EVALUATION

1. What do you think of the overall design ? What changes would you make ?
2. Are you happy with the materials you chose ? Would you make adjustments next time ?
3. Is the colour scheme exactly what you expected ? What alterations would you make ?
4. Did the project take too long to make ? Would this alter the cost of manufacture ?
5. Would it be easy to set up a production line for the manufacture of your solution ?
6. Is your solution safe ? Could it be made safer ?
7. Are the techniques you used to make your solution adequate or would you use a different range of manufacturing techniques ?
8. Is the solution the right size/shape ?
9. What are the views of other people regarding your design ?
10. Does it work ? What changes are required ?

MY EVALUATION



Evaluating

This work is
Below / On / Above / Well above
your minimum target path

D&T : Marking Summary : Evaluation

	Evaluation	Tick Box	
		Student	Teacher
Secure	<ul style="list-style-type: none"> Identify what worked well and what could be improved Evaluate research 		
Confident	<ul style="list-style-type: none"> Compare design ideas/final product against the design brief criteria Suggest improvements for design ideas/product Gain technical information from examining, describing and evaluating similar products 		
Outstanding	<ul style="list-style-type: none"> Explain why materials, ingredients or components have been used Identify and justify any changes from the final design idea to the final product 		

rectangle

Area = base x height

a **triangle** is half the area of a rectangle

Area = $\frac{\text{base} \times \text{height}}{2}$

parallelogram

Area = base x height

AREA

Always use the **perpendicular height**

trapezium

Area = $\frac{(a + b) \times h}{2}$

circle

Area = πr^2

D&T Maths

Use your templates to help you. Break the templates up into the shapes shown to fill them as much as possible. Then use the calculations shown to try and work out the area of MDF used to make your clock. Use mm for all your measurements.

Use the page opposite to show all your calculations and answer the questions at the bottom of the page too.



Technical Knowledge

This work is

Below / On / Above / Well above

your minimum target path

Total amount of MDF I used is _____

Your original sheet of MDF given to you was 600mm x 300mm.

1. What is the area of your original sheet of MDF? _____
2. What percentage of your MDF have you used to make your clock?
(Your Clock mm² / original MDF mm²) x 100 = _____
3. If MDF costs 0.0002p per mm² and a clock mechanism costs £3.49, how much has it cost in materials to make your clock?

—RE-WRITE A SECTION PAGE—

Use this page to re-write a section of your work if necessary. (don't forget to indicate which section it is).

LITERACY-KEY WORDS

Below is a list of key words/terms and their correct spellings

Accuracy	CAM	Geometry	Rotation
Annotation	CNC	Pinion	Scale
Arc	Centre	Pivot	Segment
Axis	Circumference	Numeral	Specification
Adhesive	Detail	Quadrant	Stepper motor
Bearing	Diameter	Quarters	Tolerance
Bevel	Dimension	Radius /Radii	Vector
CAD	Finishing	Revolve	Vectorise

Teacher Assessment: