

## Summer Transition Project

VESPA  
Mindset

### Mechanical Engineering & Welding Studies



**You will be required to share your project with your Personal Tutor and class on day one**

**The Mechanical Engineering & Welding Studies course at Highlands College includes the following topics –**

- Engineering bench skills,
- Engineering and Technical Drawing, (including measuring and calculations).
- Engineering machining (centre lathe and milling)
- Engineering Health and Safety,
- Engineering Operations,
- Engineering Toolmaking,
- Engineering and Welding Inspection,
- Heavy Plate & Sheet Metal Fabrication,

**For this project, you will:**

Answer a series of questions relating to research, measuring lengths and volumes and applying it to measuring **surface area** and **capacity/volume**.

You will also be looking at estimating costs, researching health and safety processes and answering questions relating to text

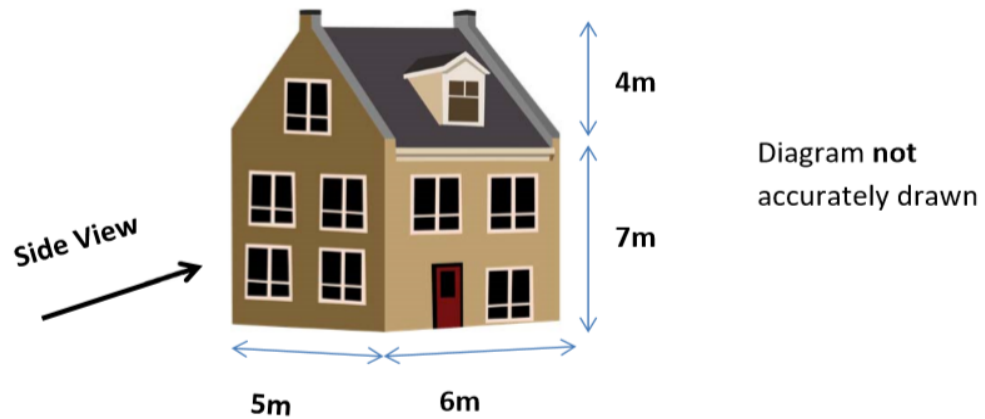
**Please write your answers on a separate sheet. The task titles are highlighted in yellow**

**Your project could be presented as a mix of the following:**

- ✓ A PowerPoint presentation
- ✓ Written answers
- ✓ Sketches

## Scale Drawing

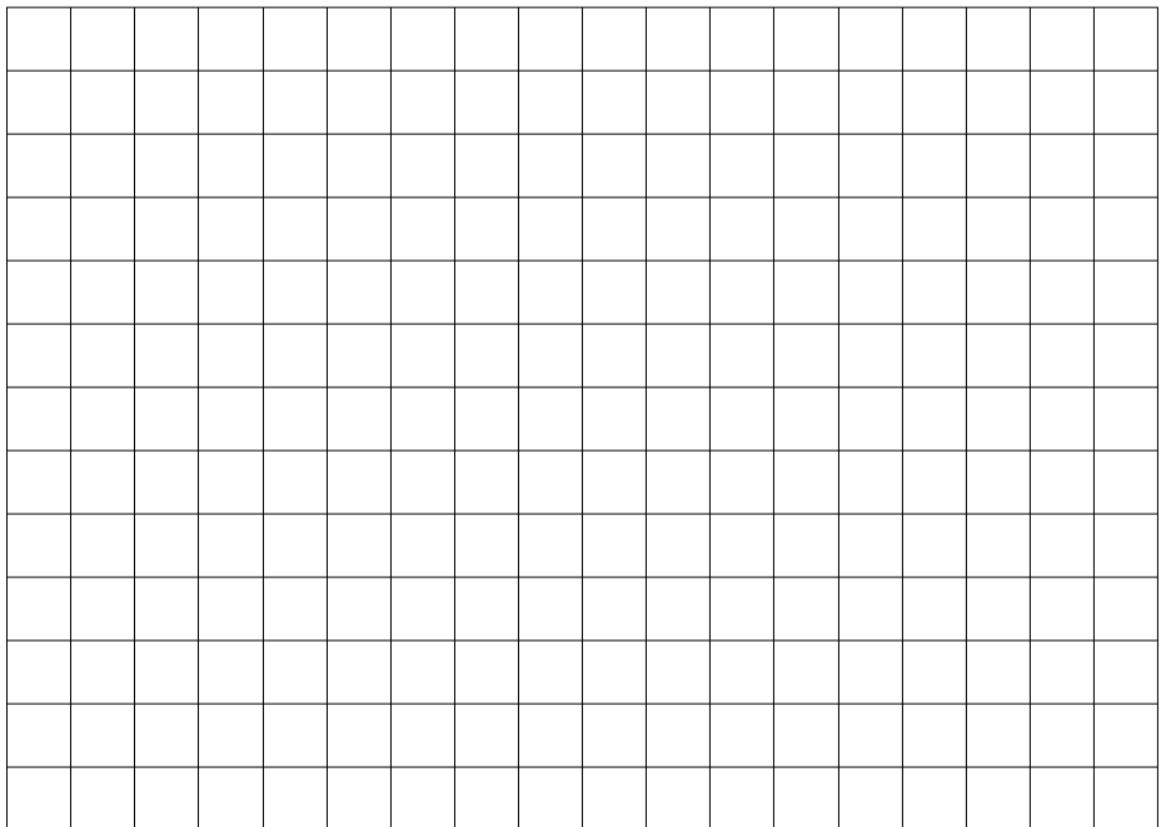
1. Yvonne wants to buy a newly built house.  
She finds this picture of the house she wants online.



Yvonne wants a scale drawing of the side view of the house.

She uses a scale of 1:100

Draw the side view of the house on the grid. Remember to use the scale.



(Each square on this grid measures 1cm x 1cm)

## Tools Task

For this task you may need to research the tools

### Match the name of the tool to the picture

Carpenters pencil    Mitre block    Pliers    Wooden mallet    Bradawl  
 Claw hammer    Tenon saw    T-square    Wood chisel    Combination square  
 Hand countersink    Oil stone block    Hardwood bevel    Roofing square    Chisel  
 Mortice gauge    Block plane    Hand plane    Marking gauge    Carpenters square


1 	2 	3 	4 	5 
6 	7 	8 	9 	10 
11 	12 	13 	14 	15 
16 	17 	18 	19 	20 

## Materials Task

For this task you may need to research the materials

**Match the name of the material to the picture**

Breeze block    Marble    Slate    Glass    Plastic    Brick    Stone    Cement block  
 Steel    Copper    Metal    Wood    Ceramic tile    Plasterboard    Roof felt    PVC  
 Plaster    Tarmac    Roofing tile    Corrugated sheeting

1 	2 	3 	4 	5 
6 	7 	8 	9 	10 
11 	12 	13 	14 	15 
16 	17 	18 	19 	20 

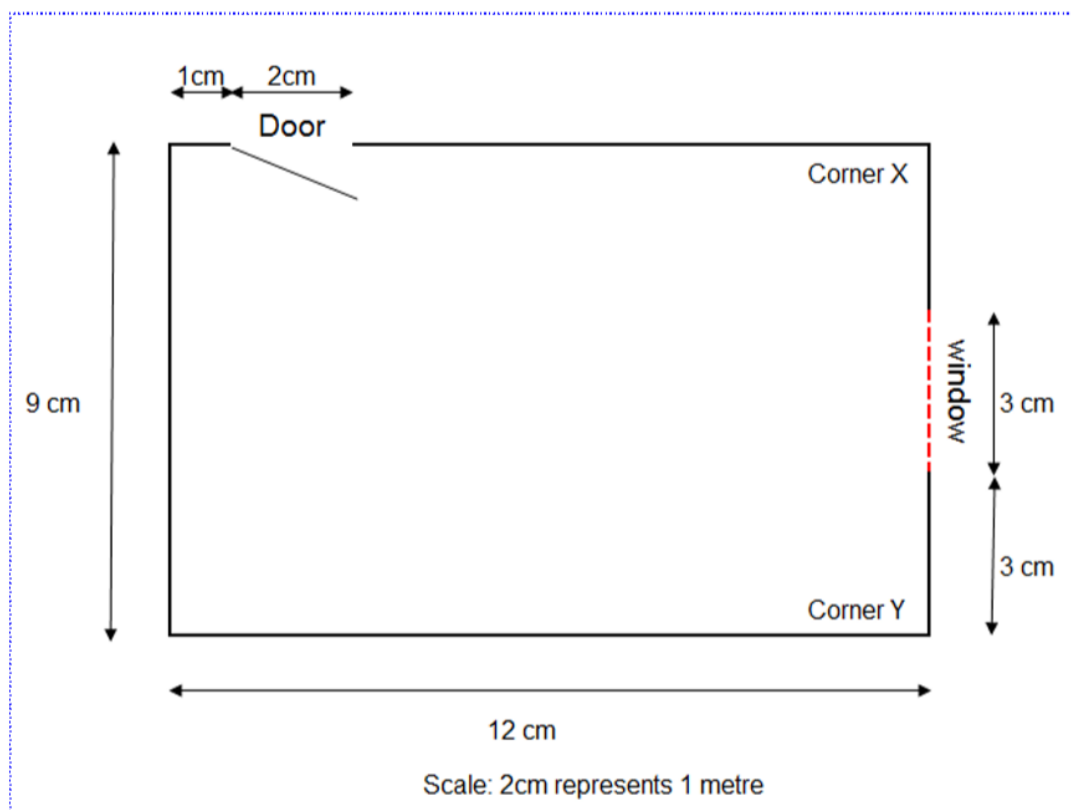
## Measuring Task

### Fitting a Bathroom

The bathroom below needs to be fitted



Find below the drawing of the bathroom (not drawn to scale)



Use the information on the diagram to answer the questions below:

## Task 1

1. What is the actual length and width of the bathroom?
2. The wash hand basin unit (vanity unit) is to be fitted between the door and the corner marked X. How long is this length in the drawing?
3. If the bath tub is 1.7m long and 700mm wide, calculate the area of the bath tub.
4. How much water will you require to fill the bath tub if it is 80cm deep?

## Costing Task

### Fitting a Bathroom

You must show all your working out and evidence that you have checked your work.

#### Task 2

Your customer requested a new bathroom suite with the following specifications:

- Bath that is at least 1700mm x 700mm
- Full height pedestal with basin: 800mm high or more
- Lever or Dual flush WC: 650mm x 380mm x 795mm

a) Find the **cheapest** deal for your client from the deals below.

**Explain the reasons for your answers**

Model	Price	Special offer	Dimensions (mm)
<b>Falmouth</b> 	 £412.22	<b>£130 off</b> when paid for with cash	Bath: 1800 x 700 Basin: 500 (L), 805 (h) Dual flush WC
<b>Vicky</b> 	 £620	<b>50% off</b> all Vicky bath suites	Bath: 1700 x 700 Basin: 500 (L), 815 (h) Dual flush WC
<b>Quickline</b> 	 £578 only	<b>1 off 5</b> all bath suites	Bath: 1700 x 700 Basin: 500 (L), 795 (h) Dual flush WC
<b>Price Busters</b> 	 £225 only	<b>Unbeatable prices</b>	Bath: 1700 x 700 Basin: 500 (L), 695 (h) Dual flush WC
<b>Vantage</b> 	 £550 only	<b>15% off</b> on all purchases	Bath: 1650 x 700 Basin: 500 (L), 695 (h) Lever Cistern flush WC

b) Calculate the average price and the range of prices for the listed bathroom suites.



## Britain's brickies build a fortune

By Lucy Jones BBC News Online Thursday, 22 April, 2004, 07:20 GMT 08:20 UK  
<http://news.bbc.co.uk/1/hi/business/3643673.stm>

**At the age of 17, Jonathan Hill from Middlesex is eyeing a salary of at least £55,000 a year.**

He is not a stock broker, brain surgeon or lawyer. But he is **learning** a skill which is just as **lucrative** in today's market - bricklaying.

Qualified construction workers are in huge demand in Britain. In the south-east, where the building of Terminal 5 at Heathrow airport is **attracting** builders from across the world, they are almost impossible to find for a reasonable price.



Jonathan Hill hopes to get work at Terminal 5

As with computer programmers amid the millennium bug worries in the run up to 31 December 2000, the most highly-skilled builders are demanding bumper salaries.

"With the building of Terminal 5, the **prospects** are really good," Mr Hill admits. "I've always had an interest in the construction industry. My dad earns a fair bit from it."

### Job creation

Terminal 5 - to cost \$6bn - is one of the biggest construction projects in Europe. It will boast 110 aircraft stands, 40,000 car parking spaces, 18 conveyor belts, the tallest control tower in the country and hundreds of shops by the time it is completed in 2011.

New roads and rail links will serve the terminal which is set to house British Airways' **entire** Heathrow operation.

In the process, more than 50,000 people will have been provided with well-paid jobs for the best part of a **decade**. But at present there is an **expertise** shortage.



Construction at the terminal is well underway

This has led BAA, the company that operates Heathrow, to join the Learning and Skills Council (LSC) - a government body - to set up the Heathrow Construction Centre to train young people carpentry, joinery and bricklaying.

### Onsite training

The centre, which officially opens on Thursday, has would-be recruits knocking on the doors: more than 250 people applied for 50 places last year

There are now 80 16-to-18-year-olds training at the centre, which plans to expand. Young people see there is good money, if they've got the right skills," says David Boyer from the LSC. "Many 16-year-olds look around and don't see anything they want to do and so are falling out of education.



## Britain's brickies build a fortune

"The key is finding something that young people want to do but that employees will pay for." Construction fits the bill perfectly, he says.

Although students do have to attend lectures, most of their learning takes place in a workshop. "It's not like being in school... there's a level of **maturity**," says Mr Hill.



The apprentices like being outside the classroom

### Caravan sites

The Terminal 5 project has its **critics**. Local people fear extra noise and pollution from the aeroplanes flying overhead, although the jobs the project is **generating** locally is widely seen as a pay-off.

But news of the riches to be made at Terminal 5 is spreading quickly. Caravan sites housing the builders who have come from as far away as Russia and Finland have sprung up near the terminal site.

The conditions are basic and cold in winter: the toilets and showers are located in cabins outside. But the Mercedes and BMW cars parked outside the caravans are evidence of why people are coming.



Workers from far away live in caravans

"It's definitely worth it - even unskilled workers are getting between £700 and £1,000 a week," said one resident of the Wiggin's site who left behind her house and children in Essex to join her husband, a builder on Terminal 5.

"The aeroplanes **interfere** with the television and a few people have had their caravans nicked but I'm happy."

The airport authorities are taking steps ensure Terminal 5 employs locals. Many students at the Heathrow Construction Centre live nearby.

“ I've talked to a lot of the kids here... they all have a game plan. They want to set up their own businesses with the money they earn from working on Terminal 5 ”

Mick Temple, Heathrow Airport

"Clearly the more Terminal 5 benefits the local community, the better," says Mick Temple, managing director of Heathrow Airport. "They don't want to see that there are benefits but they are going to someone else."

There is hope the project could benefit the area for many years to come. "I've talked to a lot of the kids here... they all have a game plan. They want to set up their own businesses with the money they earn from working on Terminal 5."

That may mean more builders in future but in the short-term bricklayers are going to be increasingly hard to come by.

**Read the article on pages 1 and 2**

**Now answer the following questions**

1. What type of text is this?
2. How much is Terminal 5 set to cost?
3. List six things that Terminal 5 will have?
4. How many people would have been provided with well-paid jobs in Terminal 5?
5. Which two companies are setting up a training centre at Heathrow; and what type of training do they intend to provide?
6. What phrase tells us what Jonathan Hill thinks about the training centre?
7. What do the local people think about Terminal 5?
8. What are the caravan sites used for and where do the people come from?
9. What is the average salary for unskilled workers?
10. The airport authorities are working with the locals to provide what? Which phrase tells us this?

## Health and Safety

You may need to research the signs



Do you know what the signs  
below mean?  
Write the meaning of each sign  
in the space next to it.

**Prohibitory signs** - a sign prohibiting behaviour likely to increase or cause danger (e.g. smoking)

- round shape
- black pictogram on white background, red edging and diagonal line (the red part to take up at least 35% of the area of the sign)



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## Warning signs

Warning sign - a sign giving warning of a hazard or danger (eg danger: electricity)

- triangular shape
- black picture with at least 50% yellow background



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## Mandatory signs

Mandatory sign - a sign prescribing specific behaviour (e.g. eye protection must be worn)

- round shape
- white pictogram on a blue background (the blue part to take up at least 50% of the area of the sign)



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## Extension Task 1

Diana has a loft in her house that she wants to convert into a bedroom. She finds out all the costs.

Building work	£13500
Fitted wardrobe	£475
Bedroom Furniture	£600
Decoration	£250

1. Calculate the total cost.

2. Diana wants to pay less for the building work.

The builder offers her 10% discount on the £13500 cost. **How much is the discount?**

3. Diana has a plan of the floor in the new bedroom.

She shades the space where she cannot put more furniture.

Diana wants to put a rug, a fitted wardrobe and a TV cabinet into the new bedroom.

The wardrobe needs:

- to be fitted against a wall.
- a rectangular floor space of 100cm by 250cm (depth x width).
- to be at least 50cm from the bed.

The TV cabinet:

- needs a rectangular floor space of 100cm by 50cm.
- must not be against a wall or any furniture.

**Draw a fitted wardrobe and TV cabinet on the plan on page 2.**

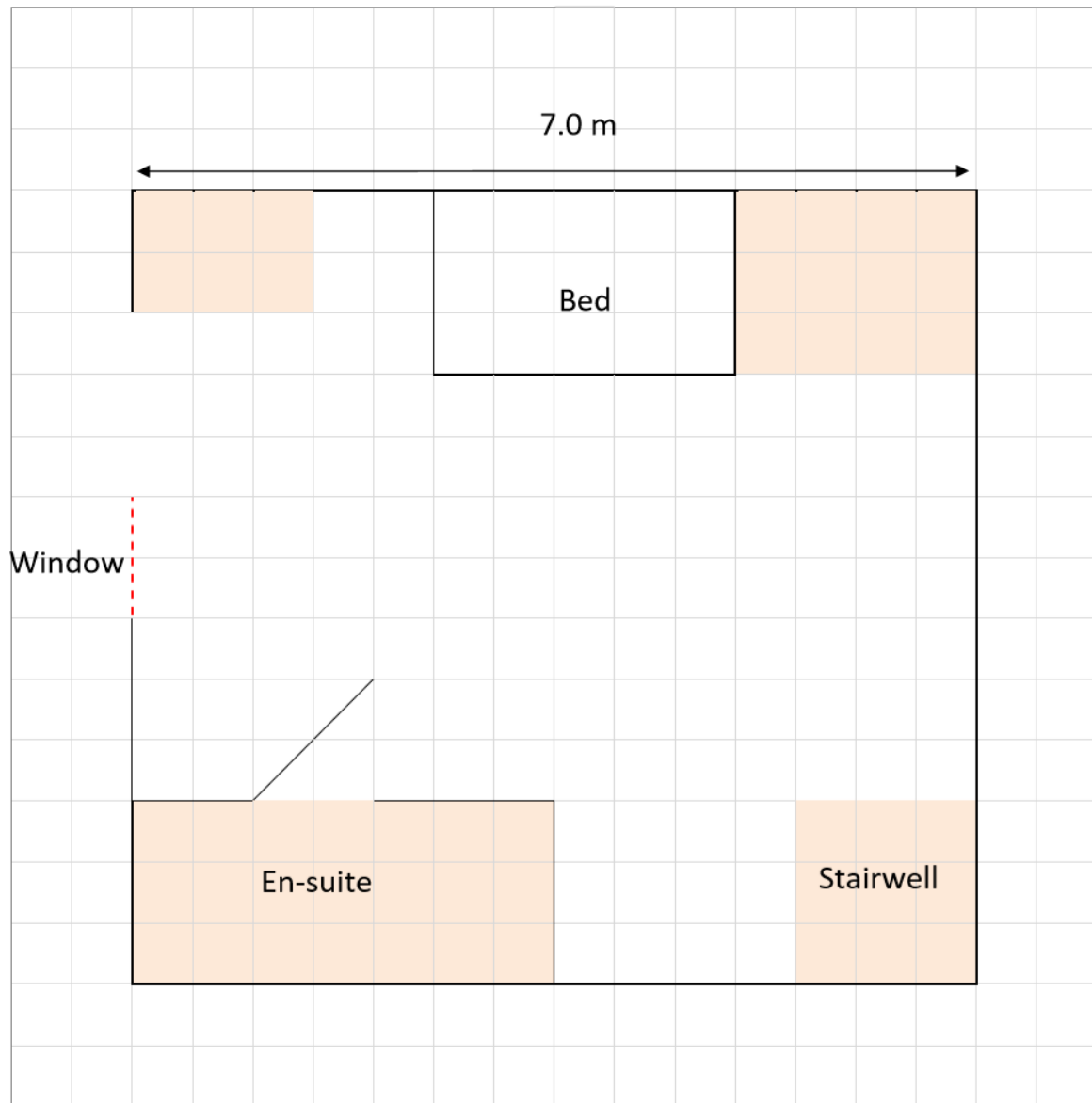
4. Diana wants to put a rug on the floor in the new bedroom. She wants a rectangular rug with a maximum size of 2m by 1m. She finds these rugs.

a. List the rugs she could buy.

Rug	Width	Length
Rose	75cm	150cm
Pansy	120cm	180cm
Mint	150cm	150cm
Dill	140cm	200cm
Ivy	80cm	120cm

b. From your list, choose the rug with the largest area. Draw it on the plan making sure it is at least 50cm from any wall or furniture. Label it clearly with the correct name.

## Plan of Loft



4c. Complete this information about the scale plan.

- One square on the plan represents an actual space of \_\_\_\_ cm x \_\_\_\_ cm.
- The en-suite bathroom will be \_\_\_\_ m long and \_\_\_\_ m wide.
- The total area of the rectangular loft space is: \_\_\_\_ m<sup>2</sup>.



## Extension Task 2

# Building a wall

Bricks per  $\text{m}^2 = 60$

Your task is to work out the cost of bricks for building a brick wall.

First decide on the length and the height of your wall.

Then work out the area of the wall.

Remember  $\text{AREA} = \text{BASE} \times \text{HEIGHT}$

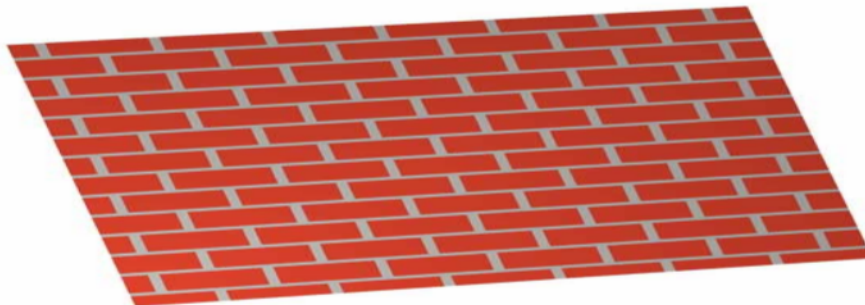
Then calculate how many bricks you will need.

It is good practice to add on an extra amount to allow for wastage. The usual allowance is 5%.

Next, search the internet for your materials. Print off details.

Work out the cost of the bricks for building your wall.

Finally, draw a scale diagram of your wall.



### Extension Task 3

# Repainting a ceiling

**Your task is to work out the cost of repainting a ceiling.**  
Choose one of the training rooms (or your classroom).

**First you will need to work out the area of the ceiling in question.**

You need to allow for 2 coats of paint.

**Next, find a website quoting the price for a tin of emulsion paint.**  
Print off details.

A litre of paint will allow for approximately 12m of coverage.  
You will need to work out the cost of painting just  $1\text{m}^2$ .

Remember to show a way of checking your answer.

**Finally, draw a scale diagram of the chosen room.**

