About this Revision Guide & Workbook

Revise

These pages provide a recap of everything you need to know for each topic.

You should read through all the information before taking the Quick Test at the end. This will test whether you can recall the key facts.

Quick Test

1. What factors should be considered when exploring design contexts?
2. Why should designers meet with the end user and wider stakeholders?
3. What is a design brief and specification?

Practise

These topic-based questions appear shortly after the revision pages for each topic and will test whether you have understood the topic. If you get any of the questions wrong, make sure you read the correct answer carefully.

Review

These topic-based questions appear later in the book, allowing you to revisit the topic and test how well you have remembered the information. If you get any of the questions wrong, make sure you read the correct answer carefully.

Mix it Up

These pages feature a mix of exam-style questions for the different topics within a chapter. They will make sure you can recall the relevant information to answer a question without being told which topic it relates to.

Test Yourself on the Go

Visit our website at www.collins.co.uk/collinsGCSErevision and print off a set of flashcards. These pocket-sized cards feature questions and answers so that you can test yourself on all the key facts anytime and anywhere. You will also find lots more information about the advantages of spaced practice and how to plan for it.

Workbook

This section features even more topic-based questions as well as a practice exam paper, providing further practice opportunities for each topic to guarantee the best results.

ebook

To access the ebook revision guide visit

www.collins.co.uk/ebooks

and follow the step-by-step instructions.

Contents

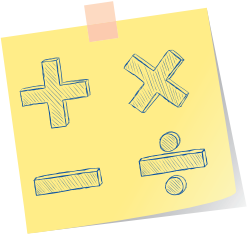
Contents

Maths Skills in the Exam

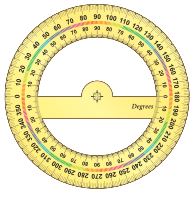
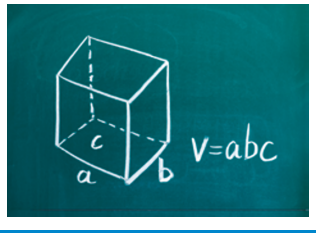
You must be able to:

- Use maths skills to answer questions related to Design & Technology.

Some of the exam questions for GCSE Design & Technology will use skills and knowledge that have been learned in maths. The following table summarises the maths skills that might be needed. It also gives some examples of how these might be used in questions in the exam. There are lots of practice questions that include maths skills in the relevant sections of this book. Look for the maths skills logo:



Type of Maths	Skill or Knowledge	How this Might be Used
Arithmetic and Numerical Computation (M1)	Use expressions in decimal and standard form.	• Use decimal and standard form appropriately when using metric units and units of mass, length, time, money and other measures (for example 9.6×10^3 m). (Be aware that some measurements still commonly use imperial units.) • Use and apply standard form when calculating quantities of materials, cost and sizes.
	Use ratios, fractions and percentages.	• Understand and use ratios in the scaling of drawings. • Apply fractions and percentages when analysing provided tables and charts of data, survey responses and user questionnaires. • Calculate percentages such as profit or waste savings; use percentages to compare measurements.
	Calculate surface areas and volumes (where dimensions are given).	• Calculate the surface area to determine quantities of materials. • Calculate the volume of cuboids, and simple and composite shapes.
	Apply tolerances.	• Calculate the maximum and minimum value of a quantity or size with a tolerance.
Handling Data (M2)	Diagrams, bar charts and histograms.	• Construct frequency tables, pie charts and bar charts using provided data. • Interpret the meaning of data presented in frequency tables, pie charts and bar charts. • Present data to accurately show performance over time.

Graphs (M3)	Draw and interpret graphs.	• Analyse graphs to extract information and interpret what this information shows. • Plot or draw graphs from provided data (such as performance data or responses to surveys).  
	Translate information shown in graphs into numbers.	• Extract information from provided technical specifications or graphs to understand instructions or needs.
Geometry and Trigonometry (M4)	Using angular measurements in degrees: • know the basic properties of isosceles, equilateral and right-angled triangles • understand the basic rules of angular calculations and trigonometry.	• Calculate angles and dimensions in components to support marking out. • Calculate angles in structures reinforced by triangulation. 
	Understand symmetry to create tessellated patterns.	• Create tessellated patterns that minimise waste of material.
	Visualise and represent 2D and 3D forms, including 2D representations of 3D objects.	• Communicate intentions to others using graphical presentation of designs. • Create accurate 2D representations from 3D objects with stated dimensions. • Interpret information to accurately present isometric drawings.
	Calculate areas of triangles and rectangles. (Note: some dimensions may not be given or need to be calculated.)	• Calculate the area to determine quantities of materials needed. • Calculate the area to determine area scale factor application.
	Calculate the surface area and volumes of cubes. (Note: some dimensions may not be given or need to be calculated.)	• Calculate the overall surface area of cuboids to determine the quantities of material needed. • Calculate the volume of cuboids to determine if an object can fit into the space. • Calculate the volume of cuboids to determine volume scale factor application.  

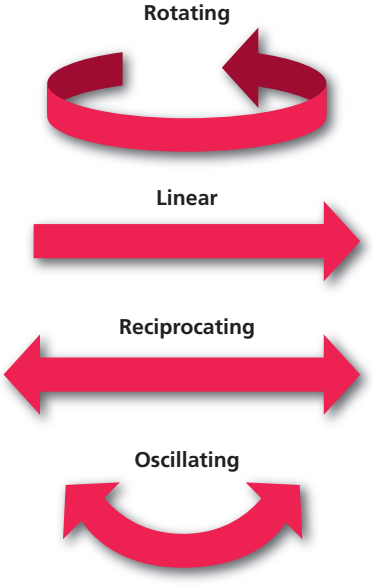
Motion and Levers

You must be able to:

- Describe the four types of motion
- Describe the basic principles of a lever
- Explain the different classes of lever.

Types of Motion

- Most products and systems involve some form of motion.
- There are four types of motion:
  - **Rotating** motion means movement in a circle.
  - **Linear** motion goes straight in one direction.
  - **Reciprocating** motion means moving backwards and forwards.
  - **Oscillating** motion means swinging backwards and forwards, like a pendulum.



Types of motion

Principles of Levers

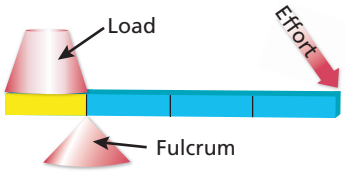
- **Levers** are a simple form of machine. They change the amount of **effort** or force needed to move a load.
- They consist of a rigid bar or beam that pivots around a fixed point called a **fulcrum**.
- A load is applied at one position on the lever.
- Effort is applied at another position on the lever. Sufficient effort results in movement of the lever about the fulcrum.
- Changing the distances between the fulcrum and either the load or the effort changes the amount of effort needed to move the load.
- There are three classes (or types) of lever: first, second and third class.

Key Point

There are four types of motion: rotating, linear, reciprocating and oscillating.

First-Class Lever

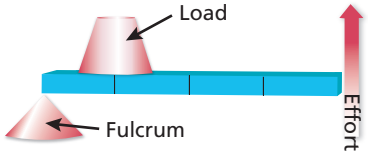
- In a first-class lever, the fulcrum is between the load and the effort.
- If the effort is further from the fulcrum than the load is, this results in a mechanical advantage. This means that the effort needed to move the lever is less than the load.
- The amount of mechanical advantage is proportional to the distance of the effort from the fulcrum and the distance of the load from the fulcrum.
- The distance that the effort and the load move is also proportional to the mechanical advantage.
- For example: if the effort is two times the distance from the fulcrum that the load is, the effort needed to move the load will be half of the value of the load. The distance that the effort will move will be double the distance that the load will move.
- Seesaws and scissors are examples of class 1 levers.



A first-class lever

Second-Class Lever

- In a second-class lever, the load is applied between the effort and the fulcrum.
- There is a mechanical advantage because the load is nearer the fulcrum than the effort.
- Nutcrackers and wheelbarrows are examples of second-class levers.



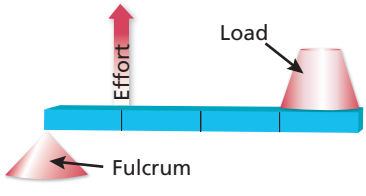
A second-class lever

Key Point

First-class and second-class levers can give a mechanical advantage, making it easier to move a load.

Third-Class Lever

- In a third-class lever, the effort is applied between the load and the fulcrum.
- The effort needed for movement is greater than the load, because the effort is nearer the fulcrum than the load. However, the amount of movement of the load is multiplied.
- Lifting a dumbbell is an example of a third-class lever: the load is the dumbbell, the fulcrum is the elbow and the effort is provided by the biceps muscle that attaches to the forearm between them.



A third-class lever

Quick Test

1. What is the difference between reciprocating and oscillating motion?
2. What are the four common features of all levers?
3. Which type of lever does not give a mechanical advantage to the effort?

Key Words

rotating
linear
reciprocating
oscillating
lever
effort
fulcrum