Computer Aided Design

Computer Aided Design (CAD)
Computer aided design uses computers to design products.

CAD allows designers to draw objects accurately. The accuracy of CAD drawings is made possible by coordinates which are used to locate and define points. CAD drawings can be two-dimensional (2D) or three-dimensional (3D).

2D CAD programs
In 2D CAD drawings, coordinates are represented as (x,y) coordinates.

Examples of 2D CAD software programs include: 2D Design, AutoCAD LT, Illustrator, Paint and many more.

3D CAD programs
In 3D CAD drawings coordinates are represented by (x, y and z) coordinates.

Examples of 3D CAD software programs include: TINKERCAD, Google SketchUp, Fusion 360, Onshape, Solidworks, Creo, Solid Edge and CATIA. Many of these titles can be obtained free for staff and student use.
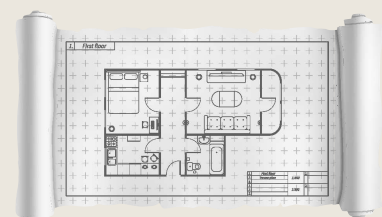
Cloud Based CAD and Collaboration
The advent of Cloud based CAD has enabled enhanced collaboration as teams can work on projects remotely with access to the latest version of the software from a multitude of devices. This is possible in a school environment with titles such as TINKERCAD and Fusion360.
Cloud based CAD has led to improved productivity, COLLABORATION and a more flexible work environment.

TINKERCAD
TINKERCAD is a free online 3D design app from Autodesk geared towards complete beginners.
It is used all over the world to help people think, create and make. TINKERCAD is used extensively by students in middle school years. The software features an intuitive block-building concept, allowing designers to develop models from a set of basic shapes. TINKERCAD allows users to place, adjust and combine shapes to create custom and intricate solutions.

TINKERCAD has a wide range of free online tutorials to guide users through the skills required to 'Tinker'. TINKERCAD also has a facility called TINKERCAD Classrooms. TINKERCAD Classrooms is a tool teachers can use to quickly get students up and running with TINKERCAD. Once students sign on with a class code the teacher provides, the teacher can view and manage student progress in TINKERCAD from a convenient dashboard.

Link to TINKERCAD classrooms: https://blog.tinkercad.com/official-guide-to-tinkercad-classrooms
Link to TINKERCAD projects (there is a build your own space station): https://www.tinkercad.com/learn/project-gallery;collectionId=OY5L5E8IRXTI47Z

Collaboration in TINKERCAD

TINKERCAD allows you to actually have multiple people working on the design at the same time.

Computer Aided Design

SketchUp Pro 2021
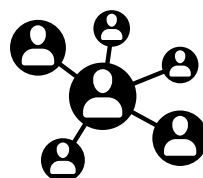
SketchUp is easy to use and can be learned fairly quickly, especially in comparison with other 3D CAD programs. The program comes in several variants. SketchUp for Schools is browser-based for Primary and Secondary schools signed up with G Suite for Education or Microsoft Education. SketchUp Pro is a full featured 3D modelling tool. All SketchUp variants allow the designer to 3D model and iterate in 3D space.

FUSION 360:

Fusion 360 is a cloud-based 3D CAD program. It's unique in the sense that it uses the power of the could to bring together design teams to collaborate on complex projects. An advantage of the Fusion 360° platform is it stores the entire history of the model including all the changes. It contains numerous design options, including freeform, solid and mesh modelling. It runs on multiple platforms and allows users to access their information wherever they want.

Activity:

Using a CAD package of your choice, produce a simple 3D design. This could be a moon digging robot, habitat dome, experimental apparatus, space station or just part of your project. Print it out and stick it in the space below.
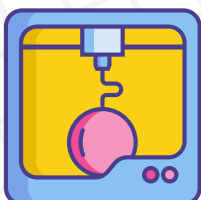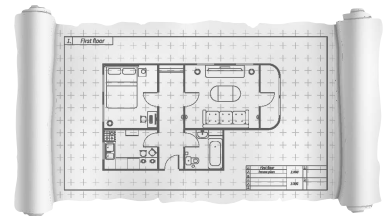
Computer Aided Manufacturing (CAM)

Once an object is designed in a 3D CAD program it can then be saved/exported in a file format suitable (eg: .STL) for Computer Aided Manufacture (CAM). CAM includes 3D printers, CNC Mills and Laser Engravers.