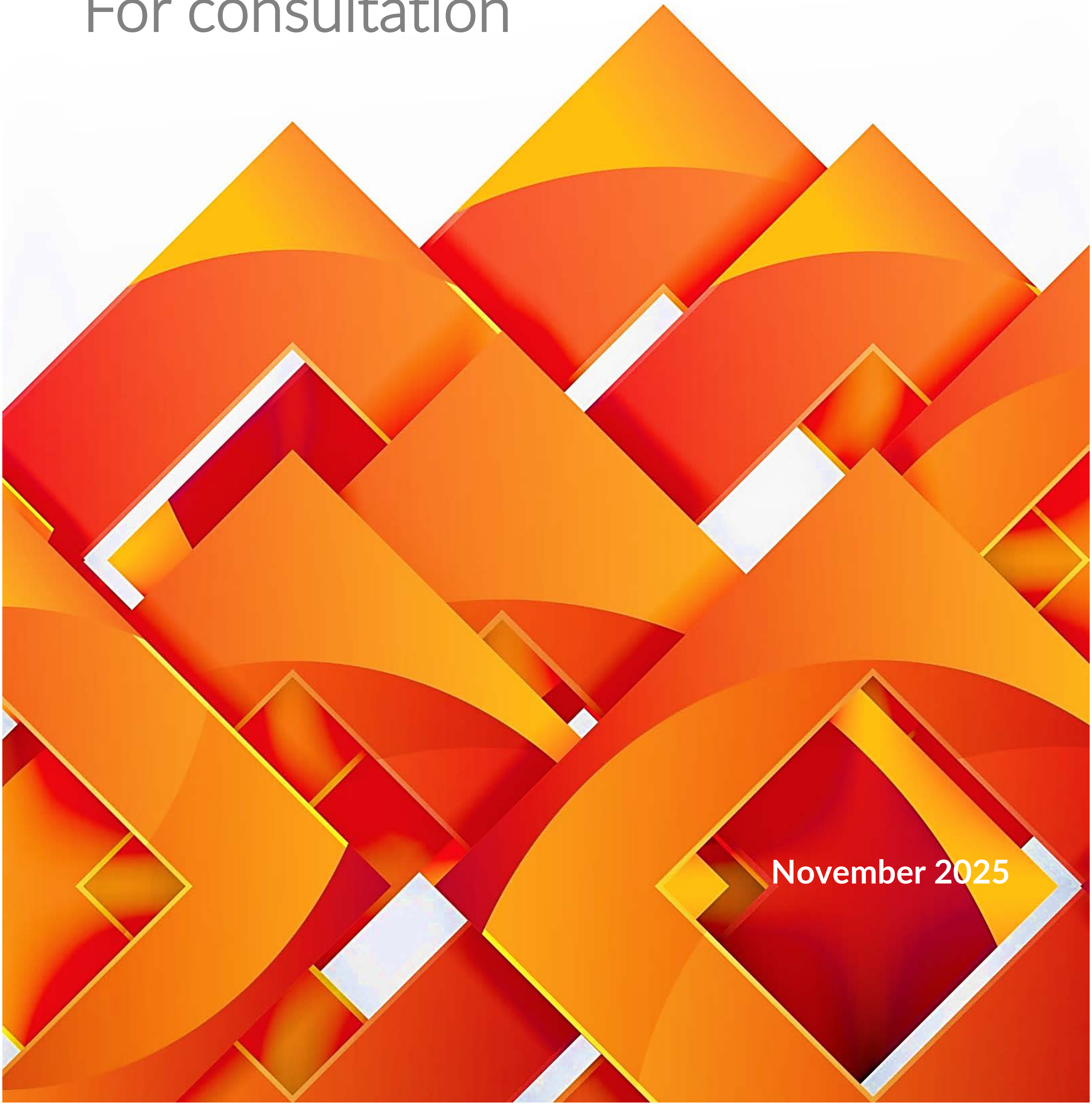
NCCA
An Chomhairle Náisiúnta Curaclaim agus Measúnachta
National Council for Curriculum and Assessment

Draft Specification for Leaving Certificate Design and Communication Graphics

For consultation



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Senior cycle

Senior cycle aims to educate the whole person and contribute to human flourishing. Students' experiences throughout senior cycle enrich their intellectual, social and personal development and their overall health and wellbeing. Senior cycle has 8 guiding principles.

Senior Cycle Guiding Principles	
Wellbeing and relationships	Choice and flexibility
Inclusive education and diversity	Continuity and transitions
Challenge, engagement and creativity	Participation and citizenship
Learning to learn, learning for life	Learning environments and partnerships

These principles are a touchstone for schools and other educational settings, as they design their senior cycle. Senior cycle consists of an optional Transition Year, followed by a two-year course of subjects and modules. Building on junior cycle, learning happens in schools, communities, educational settings, and other sites, where students' increasing independence is recognised. Relationships with teachers are established on a more mature footing and students take more responsibility for their learning.

Senior cycle provides a curriculum which challenges students to aim for the highest level of educational achievement, commensurate with their individual aptitudes and abilities. During senior cycle, students have opportunities to grapple with social, environmental, economic, and technological challenges and to deepen their understanding of human rights, social justice, equity, diversity and sustainability. Students are supported to make informed choices as they choose different pathways through senior cycle and every student has opportunities to experience the joy and satisfaction of reaching significant milestones in their education. Senior cycle should establish firm foundations for students to transition to further, adult and higher education, apprenticeships, traineeships and employment, and participate meaningfully in society, the economy and adult life.

The educational experience in senior cycle should be inclusive of every student, respond to their learning strengths and needs, and celebrate, value, and respect diversity. Students vary in their family and cultural backgrounds, languages, age, ethnic status, beliefs, gender, and sexual identity as well as their strengths, needs, interests, aptitudes and prior knowledge, skills, values and dispositions. Every student's identity should be celebrated, respected, and responded to throughout their time in senior cycle.

At a practical level, senior cycle is supported by enhanced professional development; the involvement of teachers, students, parents, school leaders and other stakeholders; resources;

research; clear communication; policy coherence; and a shared vision of what senior cycle seeks to achieve for our young people as they prepare to embark on their adult lives. It is brought to life in schools and other educational settings through:

- effective curriculum planning, development, organisation, reflection and evaluation
- teaching and learning approaches that motivate students and enable them to improve
- a school culture that respects students and promotes a love of learning.

Rationale

Design and Communication Graphics (DCG) offers students a unique blend of learning in graphic communication, spatial abilities, and design. Students develop essential practical and cognitive skills, including graphical communication, visualisation, reasoning, and creative problem-solving. The study of DCG equips students with the tools to model ideas in both physical and digital formats, enabling them to solve intricate design problems with confidence.

DCG focuses on the use of geometry in refining abstract concepts into detailed designs. Through a process of design, students apply spatial and geometric principles to identify and solve real-world problems graphically. They communicate learning clearly and effectively using techniques such as freehand sketching, technical drawing, parametric modelling, and computer-aided design (CAD). This approach strengthens spatial reasoning and critical thinking, providing students with competencies that are essential in fields such as STEM, the built environment, and digital design, where precision in visual representation and spatial analysis is important. Emerging technologies such as Artificial Intelligence (AI) and Virtual Reality (VR) are reshaping how complex design problems are visualised, simulated, and solved, highlighting the growing importance of spatial and geometric understanding in navigating both physical and virtual environments.

Building on this, an understanding of geometric principles and spatial relationships is fundamental to interpreting the world around us. Geometry has its origins in nature and understanding geometry allows us to create in harmony with nature. It influences our interaction with, and understanding of, both our physical and virtual environments. The application of geometric principles underpins design and functionality in areas such as the built environment, engineering, product design, marketing, gaming and many other creative industries. Through DCG, students explore and deconstruct geometric principles that shape both the physical and digital worlds. This exploration fosters a deeper appreciation for the role of geometry across various disciplines and enhances their understanding of design concepts through hands-on activities and collaborative problem-solving.

DCG fosters essential skills in design, communication, and problem-solving, helping students adapt and contribute meaningfully to a rapidly evolving technological landscape. DCG is not just about learning how to draw or use design software, it's about developing spatial abilities, critical thinking, creativity, and technical proficiency. The course promotes an iterative learning process that encourages students to continually refine their work, nurturing resilience and fostering a growth mindset. Students learn to manage tasks, meet deadlines, and refine their work based on feedback. Through project-based learning that connects theory to real-world applications, DCG empowers students to interpret and shape the world around them, equipping them with the skills and confidence to respond effectively to real-world challenges.

Through the study of design, students become more aware of how design impacts society. They explore the role of design in shaping spaces, products, and services. Understanding the cultural and ethical implications of design helps students become more thoughtful and responsible designers in the future. This awareness encourages students to approach design with greater sensitivity and responsibility, preparing them to contribute meaningfully to the world around them.

Aims

Leaving Certificate DCG encourages students to appreciate the role of geometry in both the physical and digital worlds. The subject supports the development of spatial reasoning, critical thinking, and communication skills, while also fostering the knowledge, skills, values, and dispositions that are essential for lifelong learning.

More specifically, Leaving Certificate DCG empowers students to:

- develop the ability to identify, understand, and apply geometric principles in both two-dimensional and three-dimensional contexts
- critically engage with and deconstruct geometry, enhancing spatial reasoning, problem-solving, and creative thinking skills
- cultivate an awareness of how geometric principles inform design, equipping students to address real-world challenges effectively
- enable students to integrate their learning, by encouraging collaborative enquiry, curiosity and reflective thinking as they develop sustainable solutions to technological problems
- communicate ideas clearly and precisely through various media, including freehand sketching, technical drawing, CAD software, and digital tools
- enhance students' research skills, independence, and capacity for self-directed learning
- foster resilience, adaptability, and effective collaboration to prepare for future challenges in diverse environments.

Continuity and progression

Leaving Certificate DCG provides continuity and progression, building on the knowledge, skills, values, and dispositions from students' early childhood education through to the junior cycle curriculum, and extends to wider experiences within the school and progresses beyond senior cycle.

Junior Cycle

The learning in each junior cycle technology subject focuses on the development of fundamental knowledge and skills that are transferable across the suite of technology subjects and areas of learning in other subjects. In junior cycle, students develop key skills such as Being Creative, Managing Information and Thinking, and Working with Others through innovation, collaboration, and exploration in an active learning environment. These activities engage students in a design journey, taking ideas from conception to realisation, ultimately fostering technological competence that is adaptable to senior cycle technology disciplines. Furthermore, they lay the foundation for the development of key competencies of senior cycle.

In Graphics, students explore the geometric world to gain an appreciation of the importance of graphics in the world around them. They develop cognitive and practical skills such as graphical communication, spatial visualisation, creative problem-solving, design capabilities and modelling, both physically and through the use of computer-aided design. Among the junior cycle technology subjects, Graphics plays a significant role in preparing students for further study in subjects like DCG.

Beyond senior cycle

DCG provides students with a strong foundation for future learning and career development. It fosters creative and critical thinking, spatial awareness, technical drawing skills, and digital fluency, all of which are increasingly valued in today's design-driven and technology-rich world.

Students who study DCG are well-positioned to progress into apprenticeships, traineeships, further and higher education, or directly into the workplace. The subject supports entry into fields such as architecture, engineering, product design, construction, animation, game development, marketing, and digital media. The study of DCG also provides a foundation for exploring innovative areas like user experience design, sustainable technologies, and creative computing.

More than preparing students for specific careers, DCG nurtures a mindset of curiosity, precision, and innovation. These qualities empower students to become confident problem-solvers and communicators, capable of applying their learning from DCG in diverse and evolving contexts beyond the classroom.

Student learning in senior cycle

Student learning in senior cycle consists of everything students learn **within** all of the subjects and modules they engage with **and** everything students learn which spans and overlaps **across** all of their senior cycle experiences. The overarching goal is for each student to emerge from senior cycle more enriched, more engaged and more competent as a human being than they were when they commenced senior cycle.

For clarity, the learning which spans **across** all of their senior cycle experiences is outlined under the heading 'key competencies'. The learning which occurs **within** a specific subject or module is outlined under the heading 'strands and learning outcomes'. However, it is vital to recognise that key competencies and subject or module learning are developed in an integrated way. By design, key competencies are integrated across the rationale, aims, learning outcomes and assessment sections of specifications. In practice, key competencies are developed by students in schools via the pedagogies teachers use and the environment they develop in their classrooms and within their school. Subjects can help students to develop their key competencies; and key competencies can enhance and enable deeper subject learning. When this integration occurs, students stand to benefit

- during and throughout their senior cycle
- as they transition to diverse futures in further, adult and higher education, apprenticeships, traineeships and employment, and
- in their adult lives as they establish and sustain relationships with a wide range of people in their lives and participate meaningfully in society.

When teachers and students make links between the teaching methods students are experiencing, the competencies they are developing and the ways in which these competencies can deepen their subject specific learning, students become more aware of the myriad ways in which their experiences across senior cycle are contributing towards their holistic development as human beings.

Key competencies

Key competencies is an umbrella term which refers to the knowledge, skills, values and dispositions students develop in an integrated way during senior cycle.

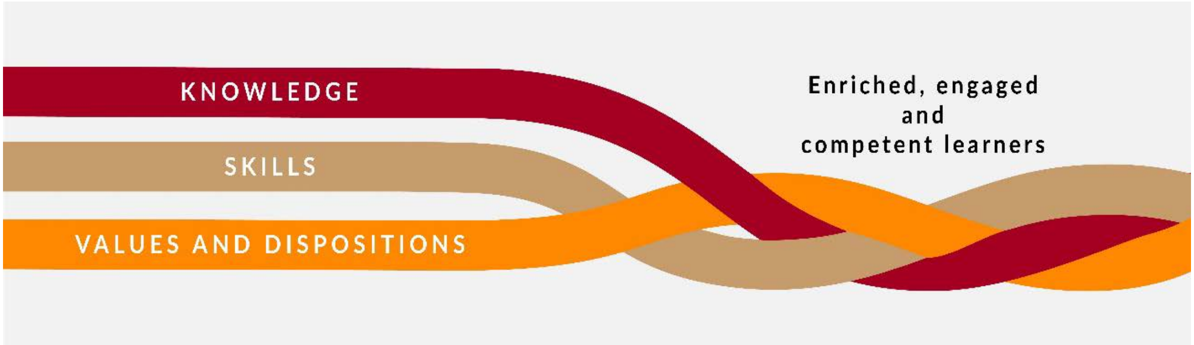

Figure 1 The components of key competencies and their desired impact

The knowledge which is specific to this subject is outlined below under 'strands of study and learning outcomes'. The epistemic knowledge which spans across subjects and modules is incorporated into the key competencies.

Figure 2 Key Competencies in Senior Cycle, supported by literacies and numeracy.

These competencies are linked and can be combined; can improve students' overall learning; can help students and teachers to make meaningful connections between and across different areas of learning; and are important across the curriculum.

The development of students' literacies and numeracy contributes to the development of competencies and vice-versa. Key competencies are supported when students' literacies and numeracy are well developed and they can make good use of various tools, including technologies, to support their learning.

The key competencies come to life through the learning experiences and pedagogies teachers choose and through students' responses to them. Students can and should be helped to develop their key competencies irrespective of their past or present background, circumstances or experiences and should have many opportunities to make their key competencies visible. Further detail in relation to key competencies is available at https://ncca.ie/en/senior-cycle/senior-cycle-redevelopment/student-key-competencies/

The key competencies can be developed in Leaving Certificate DCG in a range of ways.

Thinking and Solving Problems is developed as students identify and solve meaningful real-life problems through the application of visualisation skills, graphical principles, and modelling skills. By evaluating options and making informed decisions, students strengthen their critical thinking, problem-solving, and organisational skills, while taking responsibility for their own work.

Being Creative is developed through a process of exploration, where students think about new possibilities and imagine better futures by solving contemporary societal challenges. As they become more independent in their learning, students carry out research and design objects that reflect the evidence of their thinking, encouraging curiosity, speculation, and innovation. In doing so, they adapt and refine existing ideas, fostering creativity in both individual and collaborative contexts.

In DCG, the key competency of **Communicating** is developed through activities such as freehand sketching, technical drawing, using CAD and other digital tools, prototyping, and presenting work for feedback to document progress. These tasks strengthen students' visualisation and graphical literacy and improve their ability to interpret and communicate technical information across a range of media.

The key competency of **Working with Others** is strengthened when students work on tasks in pairs or small groups. Students cooperate to solve problems, critique each other's work, and present solutions to their peers and teachers. By giving and receiving constructive feedback, they develop open dialogue skills and learn to respect differing opinions.

Managing Learning and Self is developed as students plan their tasks, make informed decisions, set personal goals, and organise their work using portfolios and digital file management. By regularly reflecting on their progress and taking responsibility for meeting deadlines, students build confidence, develop internal standards, and learn to adapt to different challenges. This process supports independent learning and encourages personal growth.

In turn, this commitment to managing their learning contributes to **Cultivating Wellbeing**. As students engage meaningfully with tasks, they build resilience, confidence, and a strong sense of purpose. By exploring geometric principles and design challenges through class discussions, they develop supportive relationships and contribute to an inclusive classroom environment. These experiences not only enhance their cognitive skills but also nurture the emotional and social abilities essential for lifelong wellbeing.

The key competency of **Participating in Society** is developed as students explore how design influences the world around them. They are encouraged to think critically about sustainability, ethics, and the role of geometry in shaping the spaces and products we use every day. Through real-life design challenges, students reflect on their responsibilities as designers and the potential of design to address social and environmental issues. This process supports their growth as thoughtful, engaged citizens who contribute positively to their communities and society.

In DCG, students develop their **literacies and numeracy** by expanding their technical vocabulary and applying it to solve problems through graphical methods. They improve their numeracy skills by applying measurements accurately and developing a deeper understanding of proportion and scale. Their visual literacy is strengthened as they interpret 2D and 3D drawings, recognise spatial relationships, and analyse shapes and forms.

Strands of study and learning outcomes

This Leaving Certificate DCG specification is designed for a minimum of 180 hours of class contact time.

The Leaving Certificate DCG specification sets out the knowledge, skills, values and dispositions for students in three strands:

- Geometry in Context
- Projection Systems
- Plane and Descriptive Geometry.

These strands are supported by the four integrating themes of Geometric Principles, Problem-Solving, Design, and Visualisation.

These themes promote an integrated approach to teaching and learning. They guide students in exploring and applying geometric concepts to solve real-world problems and communicate their ideas using appropriate graphical methods.

A brief overview of the themes is provided below.

Geometric Principles:
Students develop a deep understanding of geometric concepts and relationships, enabling them to apply geometry as a tool for analysis, construction, and design across a range of contexts.

Problem-Solving:
Students engage with open-ended and structured challenges that require critical thinking, spatial reasoning, and the application of geometric knowledge to find effective solutions.

Design:
Students explore the design process through ideation, iteration, and refinement, using graphical communication to express and develop creative and functional solutions.

Visualisation:
Students develop the ability to clearly and accurately represent objects and systems in two and three dimensions. Using techniques such as sketching, physical modelling, and CAD, they learn to communicate design ideas and solutions with precision and creativity.

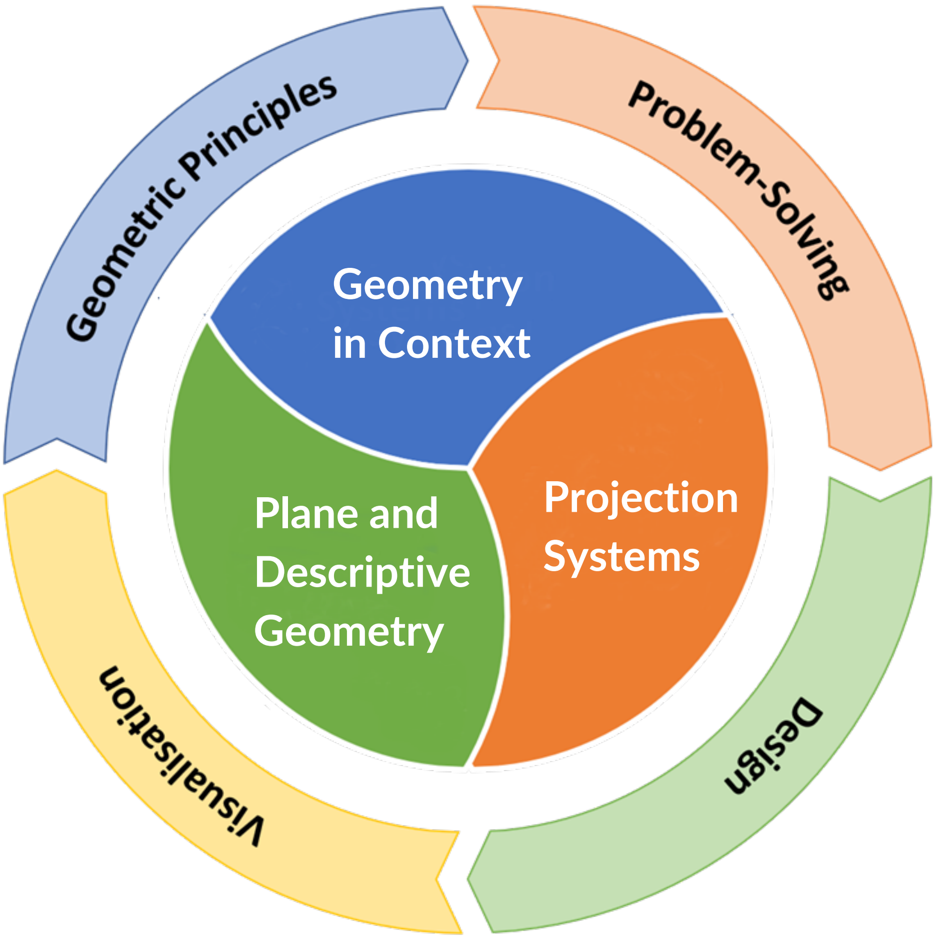

Figure 3 Overview of strands

The specification emphasises a non-linear, integrated approach to learning across the strands. The learning outcomes in the strands Geometry in Context, Projection Systems, Plane and Descriptive Geometry describe the core concepts, principles, and theories that students learn about and experience in DCG.

Learning outcomes should be achievable relative to students' individual aptitudes and abilities. Learning outcomes promote teaching and learning processes that develop students' knowledge, skills, values and dispositions incrementally, enabling them to apply their key competencies to different situations as they progress.

The learning experience at both Ordinary and Higher levels will be tailored to support students in developing their learning at an appropriate depth and complexity. At both levels, students will build essential competencies, with Higher level placing a stronger focus on applying learning in complex local and global contexts.

Students studying at Ordinary level will engage with structured and guided tasks, allowing them to apply knowledge and skills in familiar situations with clear support. Students studying at Higher level will be encouraged to think more independently, developing the ability to identify and apply appropriate knowledge and skills in both familiar and unfamiliar contexts. This approach fosters deeper critical thinking, problem-solving, and adaptability in real-world scenarios.

Ordinary level	Higher level
Students engage with a broad body of knowledge developing understanding of core concepts and principles. Students will demonstrate the capacity to apply this knowledge in familiar contexts.	Students actively engage with a broad body of knowledge and show a high level of skill in analysing and synthesising key concepts and principles. They can apply and adapt this knowledge independently, demonstrating proficiency in both familiar and new contexts.
Students develop competency in a range of skills, demonstrating ability to source and use information, follow established procedures and techniques and produce accurate work. Students will apply their skills effectively in the design and realisation of solutions to relevant tasks in familiar contexts.	Students demonstrate and apply a broad range of specialised skills to evaluate and use information, to plan and develop investigative strategies, and to determine solutions to varied and unfamiliar problems. They will select and apply relevant skills in the design and realisation of solutions to a high level of precision in a wide variety of both familiar and new contexts.
Students develop numeracy and literacies to interpret information and data. These skills will be applied to demonstrate understanding, communicate findings and make informed decisions as part of their learning.	Students demonstrate high level competence in numeracy and literacies, using them to interpret complex information and data. They apply these skills to demonstrate their understanding, communicate findings with clarity, and make well-informed decisions throughout their learning process.

Table 1: Design of learning outcomes for ordinary and higher level

An overview of each strand is provided below, followed by a table. The right-hand column contains learning outcomes which describe the knowledge, skills, values and dispositions students should be able to demonstrate after a period of learning. The left-hand column outlines specific areas that students learn about. Taken together, these provide clarity and coherence with the other sections of the specification.

Strand 1: Geometry in Context

In this strand, students engage with real-world challenges through the integration of geometry, design and communication. They apply geometric understanding and design principles to develop meaningful solutions, communicating their ideas effectively through a range of graphical methods. Students discover how geometry is not only a tool for representation but also a means to explore, shape, and resolve design challenges while addressing sustainability and environmental impact.

Students develop fluency in both traditional and digital methods of graphical communication. By engaging in freehand sketching, technical drawing, and parametric CAD modelling, they build confidence in expressing and refining design ideas. These tools support not only accurate representation, but also iterative exploration, creative problem-solving, and innovation.

As they grow in their ability to communicate design thinking, students learn the value of clarity, precision, and visual literacy. They become familiar with drawing conventions, symbols, and standards that ensure their geometric representations are understood in real-world contexts. They recognise that effective communication underpins successful design-connecting the conceptual with the technical, and the imaginative with the practical.

By integrating creative and critical thinking, students iteratively develop, test, and refine their design concepts. They use sketches, models, and digital tools to visualise and improve their ideas, deepening their understanding of how form and function interact. They also learn to organise their work, manage information, and reflect on their learning progress.

Strand 1 Learning outcomes

Students learn about	Students should be able to
Design • design factors o end user needs o environmental impact o sustainability o functionality o ergonomics o aesthetics o materials	1.1. analyse and interpret factors that influence design decisions in real-world contexts. 1.2. identify and analyse key insights and characteristics of effective and efficient design. 1.3. apply synthesis and ideation techniques to generate, develop and communicate design ideas or concepts.

o safety • design process(es) o concept exploration and research o design thinking strategies o ideation o design actions & decisions o low fidelity modelling and prototyping o evaluation of design	1.4. evaluate design solutions considering design requirements and constraints.
Sketching • observation techniques • conceptual techniques • sketching techniques • proportion, volume and form • selection of sketching materials • line and tone • rendering techniques o texture o light and shade o colour	1.5. use sketching as a problem-solving tool. 1.6. demonstrate proficiency in freehand sketching techniques, to present and communicate geometry, ideas, and solutions effectively. 1.7. use appropriate medium, rendering, colouring, and light techniques to enhance the presentation of sketches and drawings.
Parametric CAD • parametric CAD software tools • CAD sketching principles: o selection of appropriate sketches and profiles o use of relations o sketches fully defined • parametric modelling of parts and assemblies: o selection of appropriate features	1.8. demonstrate an understanding of parametric CAD modelling principles by creating sketches, parts, assemblies, and drawings. 1.9. explore geometric principles and concepts in the construction and deconstruction of CAD design models. 1.10. construct CAD solutions in response to design problems and tasks.

o use of end conditions o renaming features o application of appearance/material • generation of drawings from part and assembly models: o orthographic views o dimensioning o detailed view o section view o broken section view • generation pictorial views from CAD model: o pictorial view o exploded view o photorealistic view o animated sequences • use of templates and libraries • data exchange between applications	1.11. produce presentation drawings, views, and images of CAD design solutions. 1.12. demonstrate design intent effectively in CAD modelling.
Communication of design • drawing conventions, symbols and standards • presentation and layout methods • orthographic working drawing • pictorial drawing • assembly drawing presentation o sectional view(s) o detailed view(s) • exploded pictorial view(s) o balloon referencing • dimensioning and notation • CAM	1.13. create drawings and layouts that effectively communicate and illustrate design ideas and solutions. 1.14. use a variety of presentation techniques and technologies to communicate ideas, thinking, and technical information to complete tasks. 1.15. communicate design thinking and ideas, and technical information in order to complete tasks. 1.16. present their work in a clear, organised, and aesthetically engaging manner.

Personal and task management • evidence of decision making • files and folder management – physical and digital • digital portfolio • personal reflection	1.17. devise a plan of actions and personal goals necessary in the completion of tasks. 1.18. manage information and creative thinking when engaging with tasks. 1.19. evaluate their own learning to inform future decisions and choices.

Strand 2: Projection Systems

Through the study of Projection Systems, students develop spatial awareness and graphical communication skills that are fundamental to interpreting, visualising and representing everyday objects in two dimensions (2D) and three dimensions (3D). They learn to apply geometric and projection principles to create accurate technical drawings, supporting both the development and clear communication of design intent.

As students explore projection systems such as orthographic, auxiliary, axonometric, and perspective projection, they deepen their understanding of how to represent complex objects and solve spatial problems through graphical techniques. They come to appreciate the importance of precision, proportion, and recognised drawing conventions in communicating technical and design information effectively.

Students enhance their analytical and problem-solving skills by interpreting and producing multi-view drawings, recognising the relationships between planes, solids, and surfaces. They learn to identify hidden detail, true lengths, true shapes, and points of contact between interacting forms. Through this strand, they develop critical thinking and visualisation skills and become adept at selecting the most suitable projection method to convey form, structure, and design solutions in a visual format.

By developing their competency in projection systems, students gain confidence in expressing and refining their ideas, bridging the gap between abstract ideas and realised outcomes and applying their learning across a broad range of real-world applications.

Strand 2 Learning outcomes

Students learn about	Students should be able to
Orthographic projection • definition of a plane • planes of reference • 1st angle projection • projection of right and oblique solids • sectional views	2.1. demonstrate an understanding of the planes of reference. 2.2. identify orthographic projection principles to create technical drawings of real-world objects. 2.3. represent 3D objects in logically arranged 2D views through drawing, sketching, and modelling.

• use of horizontal and vertical section planes to solve problems	2.4. solve problems using orthographic projection. 2.5. construct orthographic drawings to communicate design ideas and manufacturing requirements. 2.6. recognise hidden detail, dimensions, annotations, and drawing conventions in orthographic drawings.
Plane figures • triangles • regular and irregular polygons • circle	2.7. recognise the use of plane figures in real-world objects and applications. 2.8. construct plane figures using their properties and geometric constructions. 2.9. apply the principles and properties of plane figures to solve geometric and real-life problems or challenges.
Auxiliary projection • projection of an auxiliary view of an object • projection of second and subsequent auxiliary views to solve problems • true shapes of surfaces • true lengths of lines and edges	2.10. apply understanding of reference planes and auxiliary projection planes to solve problems using a first auxiliary view. 2.11. Construct views of right solids in various spatial orientations 2.12. solve graphical problems related to inclined surfaces and features using auxiliary views.
Solids in contact • projection of regular solids in contact, including spheres, cylinders, and cones • point of contact between solids in mutual contact	2.13. apply the geometric relationships between solids in mutual contact. 2.14. recognise the principles of tangency and its application in determining points and lines of contact between solids.

• construct views of solids in contact given the point of contact	

Axonometric projection
• axonometric plane and axes
• principles of orthogonal axonometric projection
• projection methods:
  o Isometric
  o Dimetric
  o Trimetric
	2.15. describe the principles of axonometric projection, including the concept of projection planes and axes.
	2.16. explain the underlying geometric principles that underpin axonometric projections and its relationship with orthographic views.
	2.17. construct axonometric drawings of objects and solids, including the sphere, using the axes method.

Perspective projection • principles of pictorial perspective drawing • spectator point • picture plane • ground line • horizon lines • vanishing points • vanishing points for inclined lines (auxiliary vanishing points)	2.18. demonstrate an understanding of the principles of perspective projection in representing an object. 2.19. use the concepts of vanishing points and height lines in perspective drawings. 2.20. construct perspective drawings of real-world objects.

Strand 3: Plane and Descriptive Geometry

Through the study of Plane and Descriptive Geometry, students engage with, understand, and apply the fundamental concepts and principles underpinning geometric reasoning in both two dimensions (2D) and three dimensions (3D). They develop a deep spatial awareness and the ability to visualise, construct, and represent lines, planes, and solids in space using precise graphical methods.

Students come to appreciate geometry as both a creative and practical discipline, recognising its critical role in design, engineering, and the built environment. By exploring elements such as conic sections, inclined planes, surface developments, and loci, they apply analytical and graphical techniques to interpret and communicate solutions to real-world problems with clarity, logic, and precision.

The strand supports fluency in the language and logic of geometry, supporting students in constructing and interpreting technical diagrams that communicate form, motion, and transformation effectively. By solving problems involving intersections and surface developments and envelopments, students develop a deeper understanding of geometric theory and its real-life applications in areas such as construction, manufacturing, and environmental design.

Strand 3 Learning outcomes

Students learn about	Students should be able to
Geometry of lines and planes • true length of a line • true angle of a line to a plane • properties of parallel and skew lines • shortest distance between skew lines • shortest horizontal distance between skew lines • laminar surfaces defined by spatial co-ordinates • line of intersection between two laminar surfaces	3.1. demonstrate an understanding of the spatial relationships between lines and planes. 3.2. demonstrate an understanding of skew lines and their use in solving practical problems. 3.3. demonstrate an understanding of the properties of a laminar planar surface. 3.4. solve problems involving the positioning, inclination, intersection, and dihedral angle between planar surfaces.

• dihedral angle between surfaces	
Oblique Plane • definition of planes; simply inclined and oblique • determination of the traces of a plane • true shape of an oblique plane • inclinations of oblique planes to the principle planes of reference • intersection of oblique planes, lines and dihedral angle • sectioning of right solids by oblique planes	3.5. distinguish between simply inclined and obliquely inclined plane surfaces. 3.6. demonstrate an understanding of the properties of simply inclined and oblique planes. 3.7. construct simple and oblique planes based on given angles and reference geometry. 3.8. apply the concepts of oblique planes to solve real-world problems.

Conic sections
 	
• conic constructions:
  o ellipse
  o parabola
  o hyperbola (including double hyperbola)
• terminology for conics:
  o vertex/vertices
  o focal point(s)
  o directrix/directrices
  o eccentricity
  o latus rectum
  o focal sphere
• conics as sections of a right cone
• tangent and normal to conics
	3.9. define conic sections and their significance in geometry and real-world applications
	3.10. identify conic shapes and their applications in the real and natural world.
	3.11. construct ellipses, parabolas, and hyperbolas as true sections of a solid cone, in a rectangle and as plane loci.
	3.12. construct tangents to the conic sections from points located on or outside the curve.
	3.13. recognise the geometric properties common to the conic curves.
	3.14. solve problems using the parameters and properties of conic sections.

Development and envelopment of surfaces • development and envelopment of right prisms, oblique prisms, pyramids, and cones • development of composite and intersecting surfaces • presentation of fold lines • projection of true distance lines between specified points on the surfaces of solids	3.15. recognise the relationship between 3D objects and their 2D developed shapes. 3.16. construct a surface development and envelopment of geometric and composite solids. 3.17. interpret the concepts of true length, true shape, and fold lines in surface developments and envelopments.
Intersection of surfaces • line of intersection between surfaces and solids • intersection of surfaces: o right and oblique prisms o pyramids o cones o spheres o composite solids	3.18. determine the line of intersection between surfaces and solids using graphical methods. 3.19. identify methods for determining the line of intersection between surfaces, and apply the most effective approach to solve real-world problems.
Loci • common loci, helices, conical spirals and Archimedean spirals • loci defined by the movement of circles relative to lines and circles • determination of loci from linkage mechanisms • cam profile and displacement diagram which will depict: o uniform velocity	3.20. use the principle of loci as a problem-solving tool. 3.21. investigate the use of loci, helices and spirals in everyday applications. 3.22. identify how linkage mechanisms convert motion and force, and relate them to broader mechanical systems. 3.23. interpret the locus of a point in linkage mechanisms. 3.24. construct cam profiles and displacement diagrams based on given motion and follower profiles.

- simple harmonic motion - uniform acceleration and retardation - in-line knife edge and roller followers	

Teaching for student learning

Teaching for student learning in DCG involves creating rich, student-centred experiences that integrate creativity, problem-solving, and technical proficiency in ways that resonate with students and prepare them for future pathways. Effective DCG encourages active participation through practical tasks like freehand sketching, orthographic and pictorial drawing, parametric CAD modelling, and real-world design challenges. These activities build technical competence and stimulate engagement and curiosity.

High-quality student learning in DCG starts by developing a strong understanding of geometric principles, which are applied as problem-solving tools in more complex situations. Students' spatial reasoning and geometric understanding is supported by the teacher through carefully sequenced, concept-driven learning experiences. It is important that the principles of geometry are established and interrogated before students embark on the more detailed treatment of areas of learning such as oblique planes and linkage mechanisms.

Geometry is taught through active engagement and visual representation, using hands-on equipment like compasses and set squares in the early stages, while simultaneously integrating CAD software to demonstrate how geometric rules translate into digital environments. It is crucial that students understand the 'why' behind constructions and projections rather than just memorising steps. For example, exploring how elliptical shapes emerge from cones, or why auxiliary views are necessary in complex surface development.

Where possible, these concepts should be taught through real-life design examples. This allows students to apply geometry to meaningful problems, such as developing the net of a packaging design, calculating true shapes in engineering components, or analysing the movement of mechanisms using dynamic geometry. Taught as a language of design, geometry enables students to move seamlessly between 2D and 3D representations and use it as a tool for creativity and precision.

The learning outlined in the strands of study is designed to be taught in an integrated fashion, rather than being treated in isolation. This approach is supported by the four integrating themes of Geometric Principles, Problem-Solving, Design, and Visualisation, which actively guide teaching and learning. Where possible, teaching and learning should be guided by the integrating themes to support a cohesive and meaningful understanding of the subject.

The development of sketching skills is essential. Sketching is used not just for visual representation but also to illustrate student thinking and enhance problem-solving skills. As students learn, they should be encouraged to use sketching as a design and communication tool that supports ideation and iteration.

In a rapidly changing technological society, it is important that students' use of CAD and digital tools is embedded early and consistently throughout their course of study. Students should gain fluency in an industry-standard parametric CAD software, using it to explore design principles dynamically through simulations, animations, and modelling. Technology can also support students in developing digital portfolios that showcase their progress, reflect on their learning, and present their designs effectively.

Visual literacy and communication are fundamental, as students learn to interpret complex drawings and create their own technical representations with clarity and precision using manual and digital methods. Embedding real-world applications into lessons-such as product redesign tasks, prototyping, or solving design problems with constraints helps contextualise theory and highlights the real-life relevance of the subject. These experiences are enriched through links with industry professionals, field trips, and exposure to design practices emphasising ethics, sustainability, and user-centred design.

Feedback plays an important role in supporting students as they learn. Formative feedback, constructive peer review, and reflective self-evaluation help students refine their thinking and improve their design solutions over time. Emphasising iteration encourages a mindset where mistakes are viewed as part of the creative process, fostering resilience and growth. Collaboration is also essential, as working in pairs or small teams mirrors professional design environments where communication, delegation, and group problem-solving are essential for effective design development and innovation.

Assessment

Assessment in senior cycle involves gathering, interpreting, using and reporting information about the processes and outcomes of learning. It takes different forms and is used for a variety of purposes. It is used to determine the appropriate route for students through a differentiated curriculum, to identify specific areas of strength or difficulty for a given student and to test and certify achievement. Assessment supports and improves learning by helping students and teachers to identify next steps in the teaching and learning process.

As well as varied teaching strategies, varied assessment strategies will support student learning and provide information to teachers and students that can be used as feedback so that teaching and learning activities can be modified in ways that best suit individual learners. By setting appropriate and engaging tasks, asking questions and giving feedback that promotes learner autonomy, assessment will support learning and promote progression, support the development of student key competencies and summarise achievement.

Assessment for certification

Assessment for certification is based on the rationale, aims and learning outcomes of this specification. There are two assessment components: a written examination and an additional assessment component comprising of a Student Design Project. The written examination will be at higher and ordinary level. The Student Design Project will be based on a common brief. Each component will be set and examined by the State Examinations Commission (SEC).

In the written examination, Leaving Certificate DCG will be assessed at two levels, Higher and Ordinary (Table 2). Examination questions will require students to demonstrate learning appropriate to each level. Differentiation at the point of assessment will also be achieved through the stimulus material used, and the extent of the structured support provided for examination students at different levels.

Table 2: Overview of assessment for certification

Assessment component	Weighting	Level
Student Design Project	40%	Common Brief
Written examination	60%	Higher and Ordinary Levels

Additional assessment component: Student Design Project

The Student Design Project provides an opportunity for students to apply evidence of their learning across all strands of the specification. The senior cycle key competencies of thinking and solving problems, being creative, communicating, working with others, and managing learning and self, developed through working with learning outcomes across the specification, will be applied through the student's engagement with the project.

Students will complete their Student Design project component in response to the common brief issued annually by the SEC which will set out the requirements. Students will investigate, design and create a design solution in response to a brief relating to a real-world problem. Students should be able to distinguish between the stages and functions of design, and use appropriate graphical skills and techniques, knowledge, and design strategies to develop their preferred solution.

The project will involve the following:

- investigate the brief and context through research to understand key aspects
- design a creative solution that aligns with the brief and demonstrates innovative design thinking
- create a parametric model and present their solution, demonstrating clear design intent and proficiency
- evaluate their design solution and reflect on their learning.

This Student Design Project should be integrated into the ongoing teaching and learning of the subject, exploiting its potential to motivate and engage students while emphasising the importance of geometry and design in their everyday lives. Engagement with this component will allow students a high degree of autonomy in the planning, development, and presentation of a design solution, using the sketching and digital skills developed from their engagement with the specification. The underlying geometry will be explicit in the student's design solution.

Upon completion of the Student Design Project, students will submit their individual design folio and digital files in a format specified by the SEC in the brief. The Student Design Project will be marked by the SEC. It is envisaged that it will take up to 25 hours to complete. A separate document, *Guidelines to support the Student Design Project component* gives guidance on a range of matters related to the organisation, implementation, and oversight of the Student Design Project.

Descriptors of quality for additional assessment component

The descriptors below relate to the learning achieved by students in the Student Design Project. In particular, the Student Design Project requires students to

- Investigate and communicate
- Design
- Create
- Evaluate and reflect.

Table 3: Descriptors of quality - Student Design Project

	Students demonstrating a high level of achievement	Students demonstrating a moderate level of achievement	Students demonstrating a low level of achievement
Investigate and communicate	Communicate a comprehensive investigation of the design brief, with detailed research and deep exploration and understanding of key aspects of geometry in context.	Communicate a reasonable investigation of the design brief with some research and with some exploration and understanding of key aspects geometry in context.	Communicate a limited investigation of the design brief with minimal exploration and understanding of key aspects geometry in context.
Design	Develop a creative design solution that clearly communicates their ideas and concepts that satisfies all aspects of the brief. Communicate a high level of design thinking and decision making throughout the development for their design solution.	Develop a design solution that communicates their ideas and concepts that satisfies aspects of the brief. Communicate a moderate level of design thinking and decision making throughout the development for their design solution.	Develop a basic design solution that communicates their ideas and concepts with little consideration of the brief. Communicate a limited level of design thinking and decision making throughout the development for their design solution.
Create	Create a parametric model and drawing outputs that exhibits a high level of design intent. Demonstrate proficiency in	Create a parametric model and drawing outputs that exhibits a moderate level of design intent. Demonstrate competence in	Create a parametric model and drawing outputs that exhibits a limited level of design intent. Demonstrate basic parametric modelling

	parametric modelling and effective presentation skills in the design solution.	parametric modelling and moderate presentation skills in the design solution.	and some presentation skills in the design solution.
Evaluate and reflect	present a detailed, critical evaluation of their design solution. Demonstrate thoughtful reflection on their design journey, offering relevant insights and clear suggestions for potential improvement.	provide some critical evaluation of their design solution. Demonstrate moderate reflection on their design journey, offering some insights and suggestions for potential improvement.	provide minimal evaluation of the design solution Demonstrate little reflection on their design journey and limited recommendations for potential improvement.

Written examination

The written examination will consist of a range of question types. The senior cycle key competencies (figure 2) are embedded in the learning outcomes and will be assessed in the context of the learning outcomes. The written examination paper will include a selection of questions that will assess, appropriate to each level:

- The learning described in the three strands
- The application of student learning to real-world problems and applications relating to DCG.

Reasonable accommodations

This Leaving Certificate DCG specification requires that students engage with the nature of the subject on an ongoing basis throughout the course. The assessment for certification in Leaving Certificate DCG involves a written examination worth 60% of the available marks and an additional component worth 40%. In this context, the scheme of Reasonable Accommodations, operated by the State Examinations Commission (SEC), is designed to assist students who would have difficulty in accessing the examination or communicating what they know to an examiner because of a physical, visual, sensory, hearing, or learning difficulty. The scheme assists such students to demonstrate what they know and can do, without compromising the integrity of the assessment. The focus of the scheme is on removing barriers to access, while retaining the need to assess the same underlying knowledge, skills, values, and dispositions as are assessed for all other students and to apply the same standards of achievement as apply to all other students. The Commission makes every effort when implementing this scheme to accommodate individual assessment needs through these accommodations.

There are circumstances in which the requirement to demonstrate certain areas of learning when students are being assessed for certification can be waived or exempted, provided that this does not compromise the overall integrity of the assessment. However, some of the areas of learning in a subject specification cannot be waived because they are core to the subject specification. In Leaving Certificate DCG, these areas include the physical engagement with manual hand drawn pencil geometric constructions, freehand sketching, and parametric CAD, to show the practical, concrete application of the student's technical skills and understanding. This is because the skills developed in these areas are fundamental and integral to DCG.

More detailed information about the scheme of Reasonable Accommodations in the Certificate Examinations, including the accommodations available and the circumstances in which they may apply, is available from the State Examinations Commission's Reasonable Accommodations Section.

Before deciding to study Leaving Certificate DCG, students, in consultation with their school and parents/guardians should review the learning outcomes of this specification and the details of the assessment arrangements. They should carefully consider whether or not they can achieve the learning outcomes, or whether they may have a special educational need that may prevent them from demonstrating their achievement of the outcomes, even after reasonable accommodations have been applied. It is essential that if a school believes that a student may not be in a position to engage fully with the assessment for certification arrangements, they contact the State Examinations Commission.

Leaving Certificate Grading

Leaving Certificate DCG will be graded using an 8-point grading scale. The highest grade is a Grade 1; the lowest grade is a Grade 8. The highest seven grades (1-7) divide the marks range 100% to 30% into seven equal grade bands 10% wide, with a grade 8 being awarded for percentage marks of less than 30%. The grades at Higher level and Ordinary level are distinguished by prefixing the grade with H or O respectively, giving H1-H8 at Higher level, and O1-O8 at Ordinary level.

Table 4: Leaving Certificate Grading

Grade	% marks
H1/O1	90 - 100
H2/O2	80 < 90
H3/O3	70 < 80
H4/O4	60 < 70
H5/O5	50 < 60
H6/O6	40 < 50
H7/O7	30 < 40
H8/O8	< 30

Appendix 1: Glossary of action verbs

Action verb	Students should be able to
Analyse	study or examine something in detail, break down in order to bring out the essential elements or structure; identify parts and relationships, and to interpret information to reach conclusions
Apply	select and use information and/or knowledge and understanding to explain a given situation or real circumstances
Assess	judge, evaluate or estimate the nature, ability, quality or value of something
Calculate	obtain a numerical answer showing the relevant stages in the working
Collaborate	work jointly with another or others on an activity or project
Communicate	present using appropriate language in a suitable format
Create	bring something into existence; to cause something to happen as a result of one's actions
Demonstrate	prove or make clear by reasoning or evidence, illustrating with examples or practical application
Describe	give a detailed account of the main points of the topic, using words, diagrams, sketches, and/or images
Design	conceive, create and execute according to plan
Develop	advance a piece of work or an idea from an initial state to a more advanced state
Devise	plan, develop or create something by careful thought
Discuss	offer a considered, balanced review that includes a range of arguments, perspectives, factors or hypotheses, grounded in appropriate evidence
Evaluate (data/information)	collect and examine data to make judgments and appraisals; describe how evidence supports or does not support a conclusion in an inquiry or investigation; identify the limitations of data in conclusions; make judgments about the ideas, solutions or methods
Evaluate (ethical judgement)	collect and examine evidence to make judgments and appraisals; describe how evidence supports or does not support a judgement; identify the limitations of evidence in conclusions; make judgments about the ideas, solutions or methods

Examine	look closely at arguments, data, information and/or stories in order to uncover origins, assumptions, perspectives, trends and/or relationships
Execute	to carry out fully, to put completely into effect
Explain	give a detailed account supported by reasons or causes
Identify	recognise patterns, facts, or details; provide an answer from a number of possibilities; recognise and state briefly a distinguishing fact or feature
Illustrate	use drawings or examples to describe something
Interpret (data)	use knowledge and understanding to recognise trends and draw conclusions from given information
Interpret (non-data)	express ideas about the intended meaning of
Investigate	observe, study or examine in detail in order to establish facts, and reach new insights and/or conclusions
Justify	give valid reasons or evidence to support an answer or conclusion
Manage	to work upon or try to alter for a purpose
Present	Make objects perceivable to others
Produce	make or manufacture from components or raw materials
Recognise (data/information)	identify facts, characteristics or concepts that are critical (relevant/appropriate) to the understanding of a situation, event, process or phenomenon
Use	apply knowledge or rules to put theory into practice

Appendix 2: Geometric principles

No.	Meaning
1.	A line projects as a true length when a view is taken looking perpendicular to the line • A line parallel to the VP will appear as a true length in elevation • A line parallel to the HP will appear as a true length in plan
2.	Parallel lines appear parallel in every orthographic view
3.	If a line is parallel to any line on a plane, it is parallel to the plane
4.	A line projects as a point when we look along its true length
5.	A plane projects as an edge when any line on the plane projects as a point
6.	The true shape of a plane is seen on a projection plane which is parallel to the plane
7.	Two planes intersect in a line
8.	The dihedral angle between two planes is seen in a view showing the planes as edges
9.	The true angle between a line and a plane is seen in a view showing the line as a true length and the plane as an edge
10.	All horizontal sections of an upright or inverted right cone are circles
11.	A sphere appears as a circle in every view
12.	A sphere and cone in contact will have a common tangent plane
13.	When two spheres touch one another: • the point of contact lies on the line joining the two centres • the distance between their centres is equal to the sum of the radii • the point of contact can be located in any view, by dividing the line in the ratio of the radii
14.	The vertical trace of a plane is the line in which the plane meets the vertical plane (V.P.)
15.	The horizontal trace of a plane is the line in which the plane meets the horizontal plane (H.P.)