An Roinn Oideachais
agus Óige
Department of Education
and Youth

Curriculum Specification for Leaving Certificate Applied Graphics and Design

For introduction to schools in September 2027.

Prepared by the National Council for Curriculum and Assessment (NCCA)

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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
Inclusive education and diversity
Challenge, engagement and creativity
Learning to learn, learning for life
Choice and flexibility
Continuity and transitions
Participation and citizenship
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

Leaving Certificate Applied Graphics and Design offer students a 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 Applied Graphics and Design equips students with the tools to model ideas in both physical and digital forms, enabling them to solve intricate design problems with confidence.

Applied Graphics and Design 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 Applied Graphics and Design, 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.

Applied Graphics and Design fosters essential skills in design, communication, and problem-solving, helping students adapt and contribute meaningfully to a rapidly evolving technological landscape. Applied Graphics and Design 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, Applied Graphics and Design empowers students to interpret and shape the world around them, equipping them with the skills and confidence to respond effectively to real-world technological and design challenges.

Through the study of design, students become more aware of how design impacts society and people. They explore how design shapes spaces, products, and services, gaining insight into its cultural and ethical implications. This helps them develop as thoughtful and responsible designers. Students are encouraged to approach design with sensitivity and responsibility, preparing them to contribute meaningfully to the world around them.

Applied Graphics and Design also supports students in recognising how designed spaces, systems, and objects shape community life, culture, wellbeing, and everyday experience.

Aims

Leaving Certificate Applied Graphics and Design 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 Applied Graphics and Design 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 to strengthen 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
- support students in integrating their learning through collaborative enquiry, curiosity, and reflective thinking, while fostering a sustainable and ethical approach to solving technological challenges
- 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

Continuity and progression

Leaving Certificate Applied Graphics and Design 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 Junior Cycle 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 this subject.

Beyond senior cycle

Applied Graphics and Design 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 Applied Graphics and Design 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 Applied Graphics and Design also provides a foundation for exploring innovative areas like user experience design, sustainable technologies, and creative computing.

More than preparing students for specific careers, Applied Graphics and Design 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 Applied Graphics and Design 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.

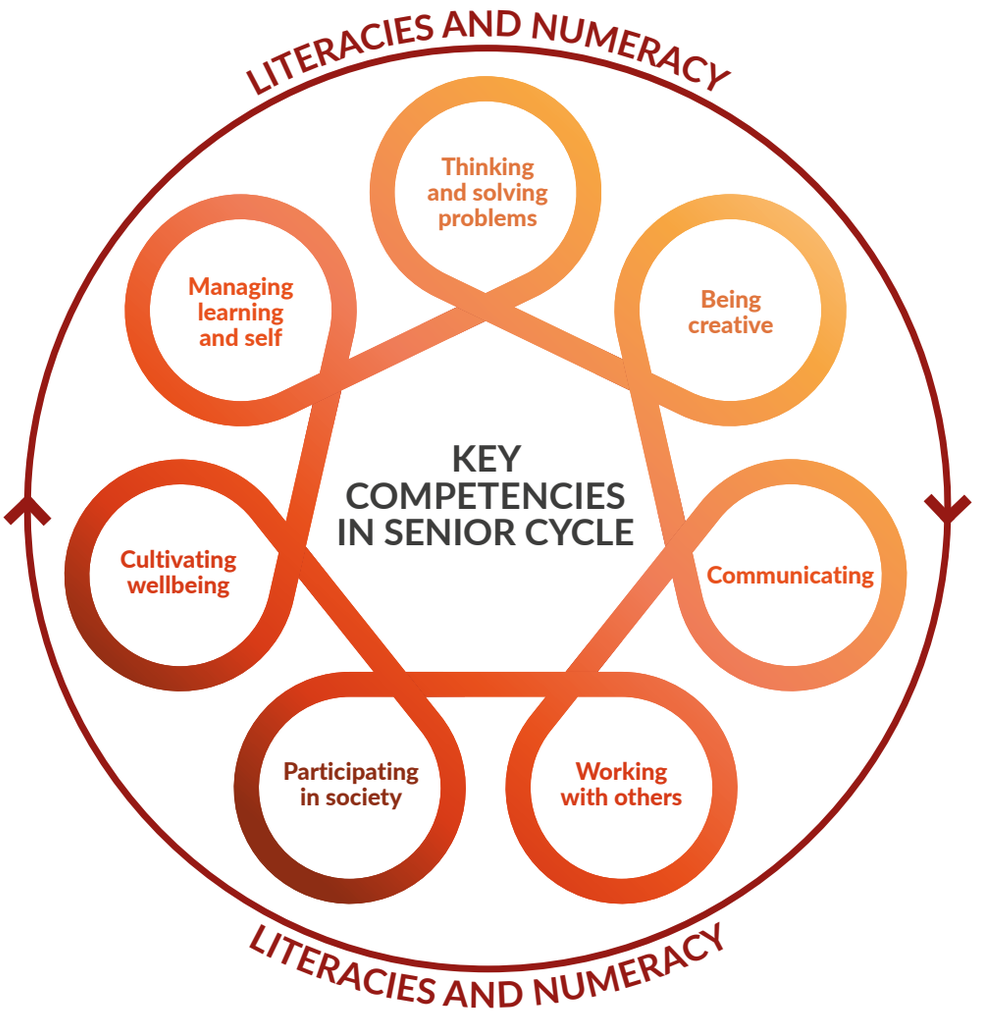


Figure 2: Key Competencies in Senior Cycle, supported by literacies and numeracy

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 Applied Graphics and Design 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 solutions 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 Applied Graphics and Design, 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 in accessible ways 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, universal design, 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 Applied Graphics and Design, 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 Applied Graphics and Design specification is designed for a minimum of 180 hours of class contact time.

The Leaving Certificate Applied Graphics and Design 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.

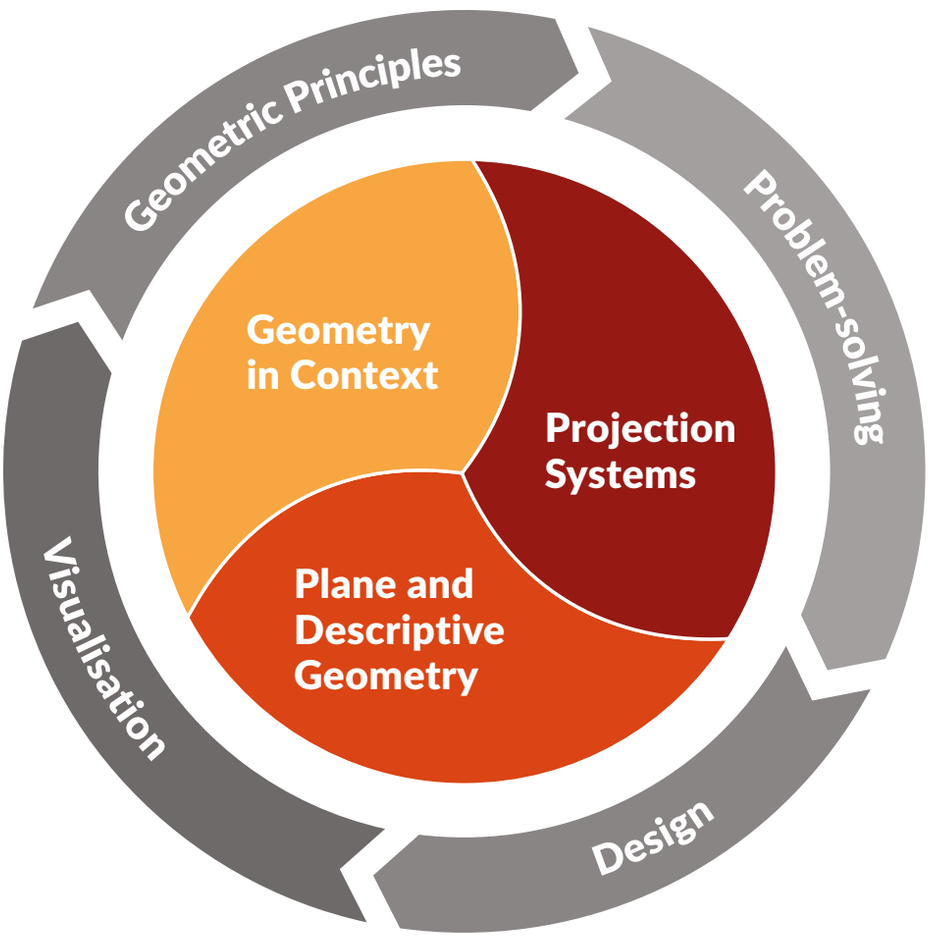


Figure 3: Overview of strands

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 Applied Graphics and Design.

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 actively 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 can 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 interpret information and data, 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 the exploration of ideas, creative problem-solving, and innovation.

As they grow in their ability to communicate design thinking, students learn the value of clarity and precision and develop their 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 considerations
  ◦ end user needs
  ◦ environmental impact
  ◦ sustainability
  ◦ functionality
  ◦ human-centred
  ◦ ergonomics
  ◦ aesthetics
  ◦ materials
  ◦ safety
  ◦ inclusion
• design process(es)
  ◦ concept exploration and research
  ◦ collaborative enquiry
  ◦ design thinking strategies
  ◦ ideation
  ◦ design actions & decisions
  ◦ low fidelity modelling and iterative prototyping
  ◦ evaluation of a design output
	1.1. discuss and analyse considerations that influence design decisions in real-world contexts.
	1.2. recognise and apply 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.
	1.4. design appropriate solutions that meet design considerations, requirements and constraints using design process(es).
	1.5. evaluate design solutions against relevant requirements, key factors, and impact to humans and the environment.

Students learn about	Students should be able to

Sketching
• observation techniques
• conceptual techniques
• sketching techniques
• proportion, volume and form
• selection of sketching materials
• line and tone
• rendering techniques
  • texture
  • light and shade
  • colour
	1.6. use sketching as a problem-solving tool.
	1.7. demonstrate proficiency in freehand sketching techniques, to present and communicate geometry, ideas, and solutions effectively.
	1.8. 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:
  • selection of appropriate sketches and profiles
  • use of relations
  • sketches fully defined
• parametric modelling of parts and assemblies:
  • selection of appropriate features
  • use of end conditions
  • renaming features
  • application of appearance/material
• generated drawings from part and assembly models:
  • orthographic views
  • dimensioning
  • detailed view
  • section view
  • broken section view
• generated views from CAD model:
  • pictorial
  • exploded
  • photorealistic
• use of templates and libraries
• data exchange between applications
	1.9. demonstrate an understanding of parametric CAD modelling principles by creating sketches, parts, assemblies, and drawings.
	1.10. investigate geometric principles and concepts in the construction and deconstruction of CAD design models.
	1.11. construct CAD solutions in response to design problems and tasks.
	1.12. produce presentation drawings, views, and images of CAD design solutions.
	1.13. demonstrate design intent effectively in CAD modelling.

Students learn about	Students should be able to

Communication of design
• current drawing conventions, symbols and standards
• presentation and layout methods
• orthographic working drawing
• pictorial drawing
• assembly drawing presentation
  ◦ sectional view(s)
  ◦ detailed view(s)
• exploded pictorial view(s)
  ◦ balloon referencing
• dimensioning and notation
	1.14. create drawings and layouts in 1st angle that effectively communicate and illustrate design ideas and solutions.
	1.15. use a variety of presentation techniques and technologies to communicate ideas, thinking, and technical information to complete tasks.

Personal and task management • evidence of decision making • files and folder management – physical and digital • digital portfolio • personal reflection	**1.16.** devise a plan of actions and personal goals necessary in the completion of tasks. **1.17.** manage information and creative thinking when engaging with tasks. **1.18.** evaluate and reflect on 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 proficiencies 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 • use of horizontal and vertical section planes to solve problems	**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 sketching and drawing. **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 • tangents to circles	**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.

Students learn about	Students should be able to
Auxiliary projection • projection of an auxiliary view of an object • projection of second and subsequent auxiliary views to solve problems • true shapes of surfaces	**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 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 • construct views of solids in contact given the point of 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.
Axonometric projection • axonometric plane and axes • common principles of orthogonal axonometric projection as they relate to Isometric, Dimetric, and Trimetric projection.	**2.15.** describe the principles of axonometric projection, including the concept of projection planes and axes. **2.16.** demonstrate the 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 • dihedral angle between 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 real-world 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.
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.

Students learn about	Students should be able to

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

Development and envelopment of surfaces
• development and envelopment of:
  ◦ right and oblique prisms
  ◦ cylinders
  ◦ pyramids
  ◦ cones
• development of planar composite surfaces
• presentation of fold lines
• projection of true distance lines between specified points on the surfaces of solids
	3.14. recognise the relationship between 3D objects and their 2D developed shapes.
	3.15. construct a surface development and envelopment of geometric and composite solids.
	3.16. 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 planar surfaces:
  ◦ right and oblique prisms
  ◦ pyramids
  ◦ composite solids
	3.17. determine the line of intersection between surfaces and solids using graphical methods.
	3.18. 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
  ◦ Archimedean spirals
• determination of loci from linkage mechanisms
	3.19. use the principle of loci as a problem- solving tool.
	3.20. investigate the use of loci, helices and spirals in everyday applications.
	3.21. identify how linkage mechanisms convert motion and force and relate them to broader mechanical systems.
	3.22. interpret the locus of a point in linkage mechanisms.

Teaching for student learning

Teaching for student learning in Applied Graphics and Design 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. The subject 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 Applied Graphics and Design begins with 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 that deepen throughout 5th and 6th year. It is important that the principles of geometry are established and interrogated before students embark on the more advanced treatment of areas of learning such as oblique planes and conic sections.

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 modelling the development of a packaging design, determining 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 incrementally develop proficiency in an industry-standard parametric CAD software, using it to explore design principles dynamically through simulations 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 through oral presentations and discussions, and reflecting on their own progress 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 Applied Graphics and Design 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.

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

Table 2: Overview of assessment for certification

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. They will complete their Student Design Project component in response to the common brief issued annually by the SEC which will set out the requirements. The brief will be issued in term one of year two.

Students will investigate, design and create a design solution in response to the 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, 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.
- communicate their design project with clarity.

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.

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
- Design
- Create
- Evaluate and reflect
- Communicate.

	Students demonstrating a high level of achievement	Students demonstrating a moderate level of achievement	Students demonstrating a low level of achievement
Investigate	Conduct a comprehensive investigation of the design brief, with detailed research, deep exploration and understanding of key aspects and requirements.	Engage in a reasonable investigation of the design brief with research, exploration and understanding of key aspects and requirements.	Participate in a limited investigation of the design brief with some understanding of key aspects and requirements.
Design	Generate an original and well-considered design solution that fully addresses the brief, showing clear intent and strong design rationale throughout.	Produce a functional design solution that addresses key aspects of the brief, with evidence of design thinking and decision-making.	Present a basic design solution with minimal alignment to the brief and limited evidence of design thinking.
Create	Create a parametric model and drawing outputs that exhibit a high level of design intent and technical accuracy. Demonstrate proficiency in parametric modelling and effective presentation skills in the design solution.	Build a parametric model and drawing outputs that exhibit a moderate level of design intent and technical accuracy. Demonstrate competence in parametric modelling and moderate presentation skills in the design solution.	Produce a parametric model and drawing outputs that exhibit a limited level of design intent and basic technical execution. Demonstrate basic parametric modelling and some presentation skills in the design solution.
Evaluate and reflect	Present a thoughtful and critical evaluation of the design solution, offering well-justified suggestions for improvement. Provide a thoughtful and critical reflection of their learning experience over the project.	Provide some critical evaluation of the design solution and identify areas for improvement. Offer a considered reflection with some criticality of their learning experience over the project.	Provide brief evaluation of the design solution. Give a brief reflection of their learning experience.
Communicate	Communicate a high level of design thinking and decision making throughout the development and presentation. Present effective coherence and clarity throughout their design journey presentation.	Communicate a moderate level of design thinking and decision making throughout the development and presentation. Present some coherence and clarity in their design journey presentation.	Communicate a limited level of design thinking and decision making in the presentation. Present a limited level of coherence in their design journey presentation.

Table 3: Descriptors of quality – Student Design Project

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 Applied Graphics and Design.

Reasonable accommodations

This Leaving Certificate Applied Graphics and Design 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 Applied Graphics and Design 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 Applied Graphics and Design, 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 Applied Graphics and Design.

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 Applied Graphics and Design, 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 Applied Graphics and Design 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.

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

Table 4: Leaving Certificate Grading

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
Communicate	present and convey technical, design, or spatial information through graphical methods, such as sketches, drawings, models, or CAD outputs.
Create	bring something into existence; to cause something to happen as a result of one's actions
Discuss	offer a considered, balanced review that includes a range of arguments, perspectives, factors or hypotheses, grounded in appropriate evidence.
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
Devise	plan, develop or create something by careful thought
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
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
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
Reflect	give thoughtful consideration to actions, experiences, values and learning in order to gain new insights and make meaning
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.)

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