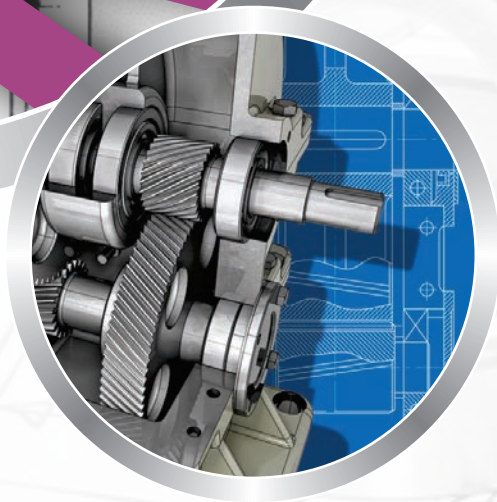
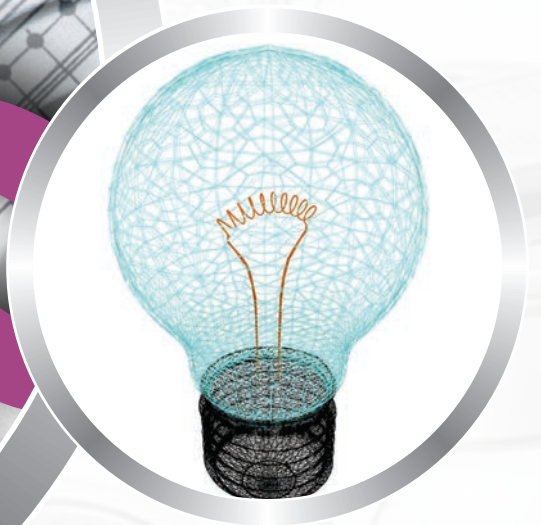


N5

Technical Illustration

Gateways to Engineering Studies



Gateways to Engineering Studies

Technical
Illustration

N5

Chris Brink & Phillip Barber

Published by
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Icons used in this book

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Icon	Description	Icon	Description
	Assessment / Activity		Multimedia
	Checklist		Practical
	Demonstration/ observation		Presentation/Lecture
	Did you know?		Read
	Example		Safety
	Experiment		Site visit
	Group work/ discussions, role-play, etc.		Take note of
	In the workplace		Theoretical – questions, reports, case studies, etc.
	Keywords		Think about it

Module 1

Introduction to Technical Illustration

Learning Outcomes

On the completion of this module the student must be able to:

- Answer questions relating to the Introduction to Technical Illustration.
- Identify and use the following equipment and materials correctly:
 - A4 Tracing paper (90 gsm).
 - A3 Drawing paper.
 - Drawing equipment as used in General and Mechanical Draughting.
 - 2 mm clutch pencil with 2H and 4H lead (optional).
 - 0,3 mm and 0,5 mm clutch pencil with F or H lead.
 - Prepared three-point perspective grid.
 - Calculator with trigonometric functions.

1.1 Introduction - Welcome to the world of Technical Illustration



This learner's book will provide an introduction into the importance of Technical Illustration in the Engineering Industry as a means of pictorial communication, enabling the learner to communicate complex information in a simplistic manner to assist the end user in the completion of their tasks.

In this module we will investigate the Nature, Purpose and Value of Technical Illustration and in terms of its impact on the disciplines of mechanical, electrical, architectural engineering and many more industries.

Technical Illustration is the use of illustration to visually communicate information of a technical nature. Technical illustrations can be components of technical drawings or diagrams. The Technical illustration in general, aims to generate expressive images that effectively convey certain information via the visual channel to the human spectator.

Technical illustrations generally have to describe and explain the subjects to a non-technical audience. Therefore the visual image should be accurate in terms

of dimensions and proportions, and should provide an overall impression of what an object is or does, to enhance the viewer's interest and understanding.

High-quality Technical Illustration successfully combines technical information, imagination and artistic ability to produce accurate three-dimensional drawings that depict either the whole or part of a mechanism, often still in the design stage, with the maximum consideration for economy in execution and reproduction.

The illustrator's responsibility covers the whole process, from conception to completion of the final, fully-annotated line or tone drawing, with provision for the addition of colour, and with all the necessary instructions for the type of duplication.

1.2 The Nature, Purpose and Value of Technical Illustration

Technical Illustration is the technique of translating pure engineering drawings into realistic, accurate, easily recognisable illustrations by a process of three-point perspective projection. It is the graphic interpretation of the designer's conception. It communicates mechanical and design information in a manner comprehensible to the layman who cannot readily visualise a complicated mechanism or project from a large number of plans, elevations and sections.

Engineering drawings communicate information in a formal, technical language seldom fully understood by any but professional engineers. The gap in understanding between the qualified engineer and the uninitiated operative is completely bridged by the Technical Illustrator.

Important and often complicated information which cannot be shared by any other means is clearly and quickly communicated by the Technical Illustrator. It may be said, without minimising the importance of supplementary text, that the old proverb, "**A picture is worth a thousand words**", is certainly true of the communication of technical information.

There is no better way to communicate technical information than in graphic form: a good illustration explains itself and overcomes all language difficulties and barriers.

The uses of Technical Illustrations are many and its value is recognised in a variety of applications; brochures, leaflets, wall charts, spare parts catalogues, operator's handbooks, operator's and maintenance manuals, prestige advertising, exhibition and display, schematic drawings for institutional purposes, workshop and repair manuals, pictorial instruction manuals, computer and mobile applications and many more.

1.3 The Technical Illustrator

Although Technical Illustration is simple to understand, it is not simple to execute. First and foremost, the illustrator must be a combination of artistic and technical, fully conversant with all the principles and practices that govern the realistic representation of solid objects in relation to their environments. In addition, the



student must have acquired the fundamental skills and must have a facility for absorbing technical information.

In short, they must combine artistic ability with mechanical understanding and be an expert in precision drawing.

Who are the famous Technical Illustrators?

The first among others, **Leonardo di ser Piero da Vinci** April 15, 1452 – May 2, 1519, was an Italian Renaissance polymath: painter, sculptor, architect, musician, scientist, mathematician, engineer, inventor, anatomist, geologist, cartographer, botanist, and writer whose genius, perhaps more than that of any other figure, epitomised the

Renaissance humanist ideal. Leonardo has often been described as the prime example of the Renaissance Man.

A man of "unquenchable curiosity" and "feverishly inventive imagination".

Leonardo is revered for his technological ingenuity. He conceptualised a helicopter, a tank, concentrated solar power, a calculator, and the double hull, and he outlined a rudimentary theory of plate tectonics.

For more information visit [http://en.wikipedia.org/wiki/Leonardo da Vinci](http://en.wikipedia.org/wiki/Leonardo_da_Vinci)

Figure 1.1 Self portrait and detail drawing of leg and foot by Leonardo da Vinci.



Ralph Angus McQuarrie (June 13, 1929 – March 3, 2012) was an American



conceptual designer and Technical illustrator who designed the original **Star Wars** trilogy, the original **Battlestar Galactica** TV series, **E.T. the Extra-Terrestrial** and **Cocoon**, for which he won an Academy Award.

Initially he worked for a dentistry firm, drawing teeth and equipment, before working as a technical illustrator for Boeing, as well as designing film posters and animating **CBS News's** coverage of the **Apollo space program** at the three-man company Reel Three. While there, McQuarrie was asked to produce some illustrations for a certain film project that was starting. Impressed with his work, director **George Lucas** met with him to discuss his plans for a space-fantasy film.

Several years later, in 1975, Lucas commissioned McQuarrie to illustrate several scenes from the script of the film, **Star Wars**. McQuarrie designed many of the film's characters, including **Darth Vader**, **Chewbacca**, **R2-D2** and **C-3PO** and drew many concepts for the film's **Star Wars** sets. For more information: http://en.wikipedia.org/wiki/Ralph_McQuarrie

The formula 1 web site (2012) has a technical section which features articles like: **Red Bull RB8-exhaust changes** or **McLaren MP4-27-front wing comparison** which utilises full colour technical illustrations to explain a specific change or comparison. For more information: <http://www.formula1.com/news/technical/>

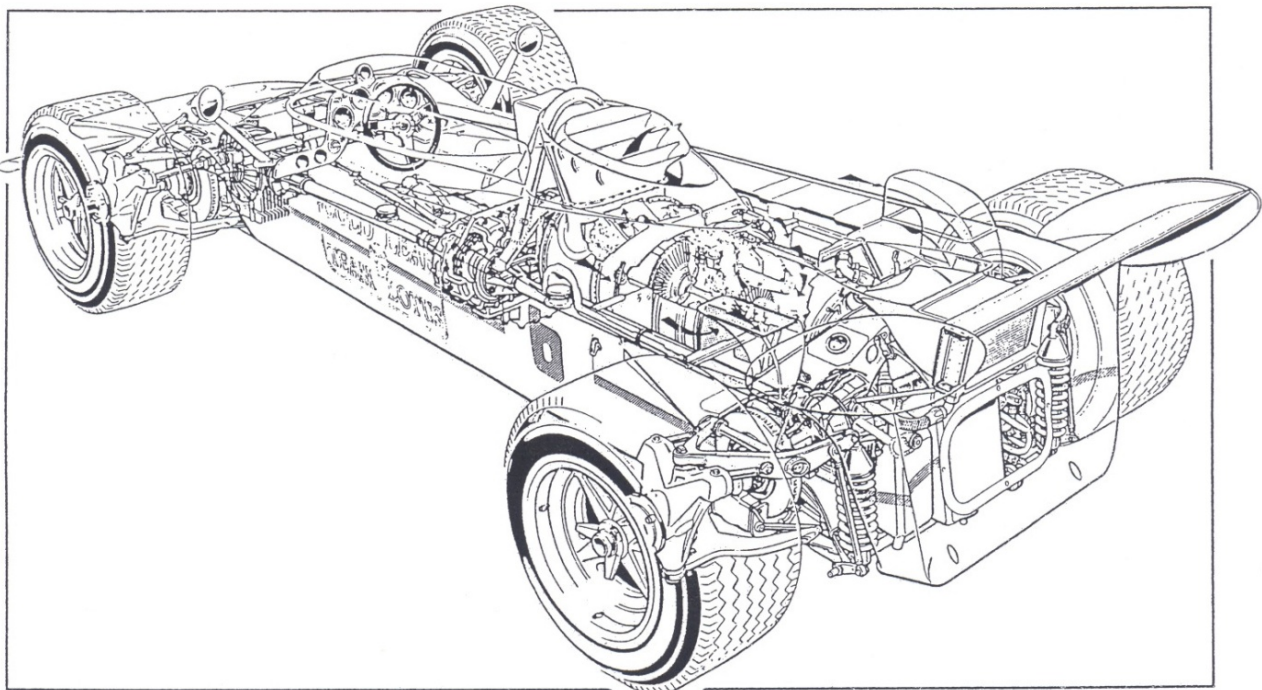


Figure 1.2 Lotus 56B Pratt & Whitney cutaway drawing 1971 by the Author

A full knowledge of formal perspective is needed to produce drawings that are not distorted or ambiguous. The illustrator must understand the theory of the Picture Plane, the Ground Plane, the Eye level/Horizon Line, Centre of Vision, the three Vanishing Points, the Cone of Vision, the spectator viewpoint, interpenetration of surfaces etc.

The student must have a thorough understanding of the principles of plane and solid geometry, (almost every aspect of every mechanical design is an example of applied geometry), and must understand the formal language of orthographic projection as well as the design draughtsman.

Obviously, it is impossible to interpret and communicate accurately what has not been fully understood. To communicate this subject faithfully in various types of media, the illustrator must master the techniques employed to represent the appearances of the wide variety of materials used in the disciplines of mechanical, electrical, architectural engineering and many more.

Types of communication

As technical illustration is a pictorial form of communication it can be categorised into three main categories, based on the type of communication required:

- **Communication with the general public**

Technical illustration informs the general public, as for example the illustrated instructions found in the manuals for automobiles and consumer electronics. This type of technical illustration contains simple terminology and symbols that can be understood by the lay person and is sometimes called creative technical illustration or technical graphics.

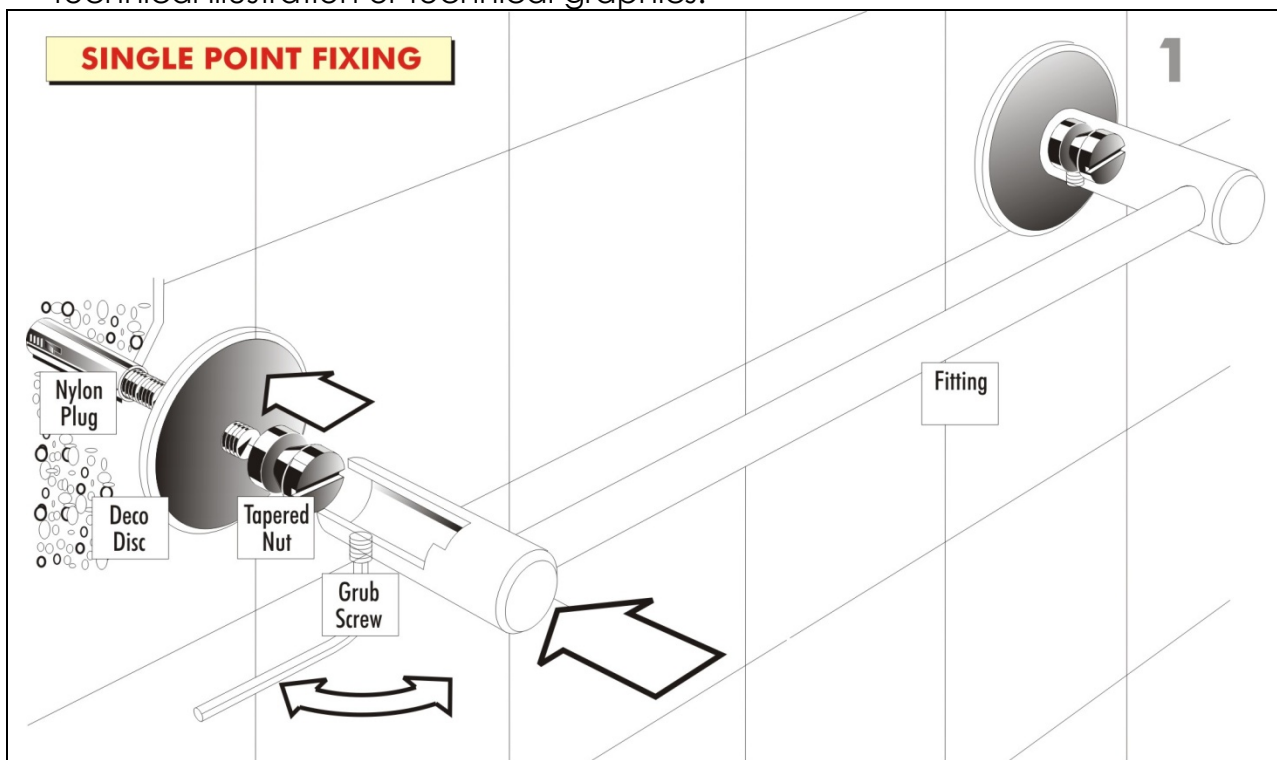


Figure 1.3 Single Point Fixing Instructions by the Author

- **Specialised engineering or scientific communication**

Technical illustration is used by engineers and scientists to communicate with their peers and in specifications. This use of technical illustration has its own complex terminology and specialised symbols. Good examples of this are in the fields of atomic energy, aerospace and military/defense. These areas can be further categorised into disciplines of mechanical, electrical, architectural engineering and many more.

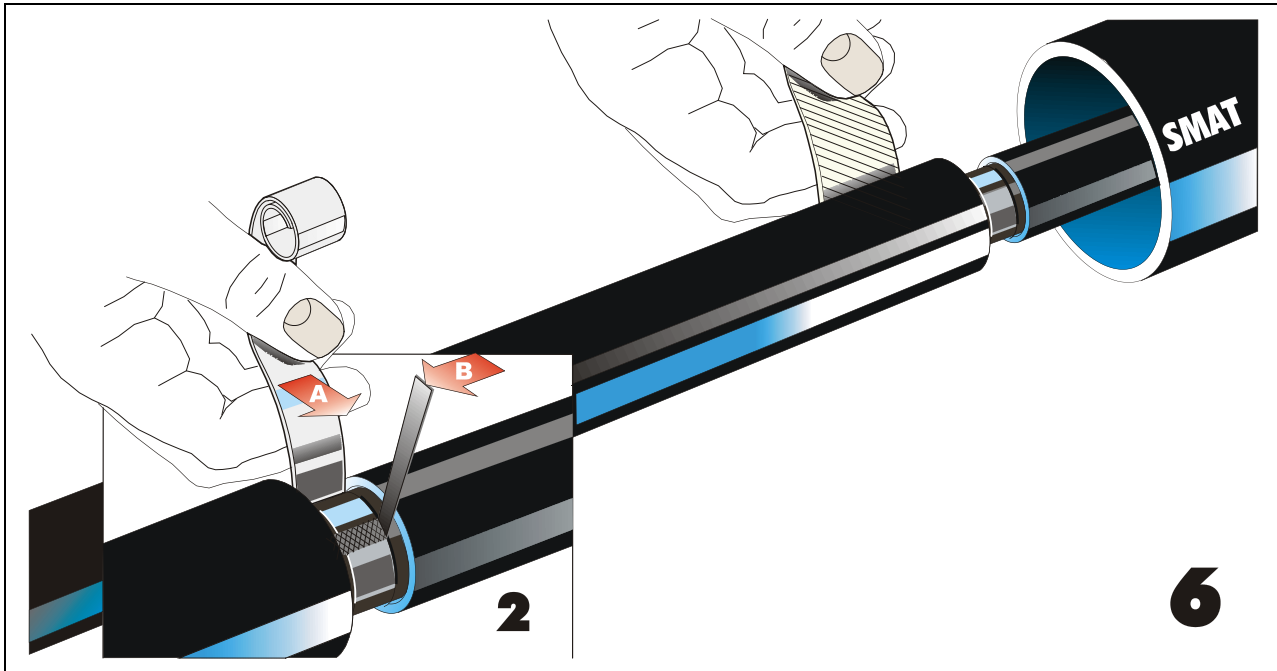


Figure 1.4 Cable Installation Instructions by the Author

This installation illustration, one of eight of a set of procedures shown above, was created by the author to train technicians in the art of cable termination. The clear concise style and technique was created specifically for the client on a specially created **3-point perspective grid** in CorelDraw.

- **Communication between highly skilled experts**

Technical illustration is used by engineers to communicate with people who are highly skilled in a field, but who are not engineers. Good examples of this type of technical illustration are illustrations found in user/operator documentation. These illustrations can be very complex and have jargon and symbols not understood by the general public, and are composed of illustrations that are part of instructional documentation for operating certain types of complex machinery.

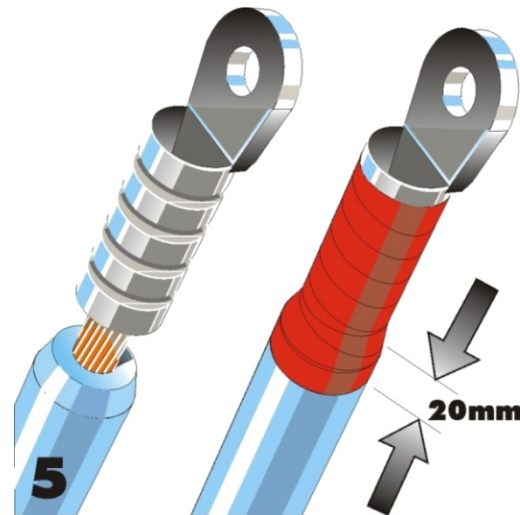


Figure 1.5 Cable Termination Installation Instructions by the Author

Types of illustrations

Main types of illustrations in technical communication are:

- conventional line illustrations,
- exploded view illustrations,
- cutaway illustrations,
- and clip art images

Presentation Drawings

The purpose of presentation drawings is to present the proposed building or facility in an attractive setting at the proposed site for promotional purposes.

They usually consist of perspective views complete with colours and shading, although they may also contain nicely drawn elevation views with shadows and landscaping.

Presentation drawings are therefore essentially selling tools, a means to sell the building or project before it reaches the working-drawing stage, and are used in brochures and other outlets.

This phase is also where the schematic design is developed, finalised, and approved by the client.



Figure 1.6 Show Stand

This is another example of the use of a full colour presentation drawing (exploded view) used to pictorially explain a complex geometric shape.

In geometry, the **rhombicuboctahedron**, or **small rhombicuboctahedron**, is an Archimedean solid with eight triangular and eighteen square faces. There are 24 identical vertices, with one triangle and three squares meeting at each. (Note that six of the squares only share vertices with the triangles while the other twelve share an edge.)

Rhombicuboctahedron dissected into two square cupolae and a central octagonal prism. A rotation of one cupola creates the *pseudorhombicuboctahedron*. Both of these polyhedra have the same vertex.

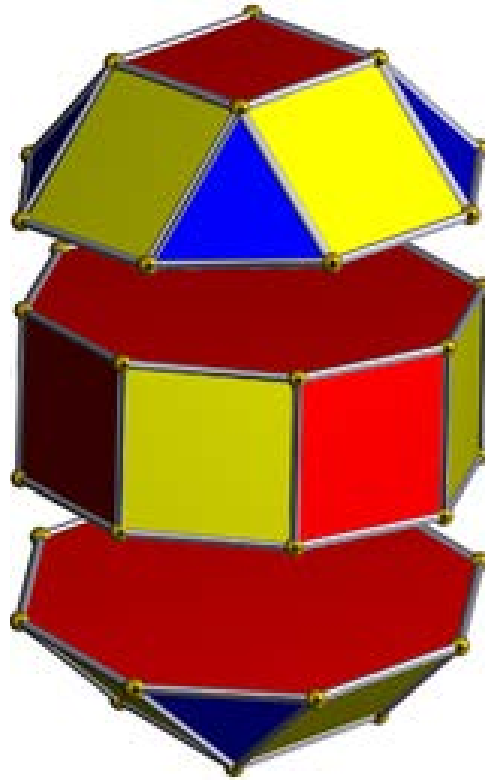



Figure 1.7 A Drawing of a Rhombicuboctahedron

 Self-Check		
I am able to:	Yes	No
1 INTRODUCTION TO TECHNICAL ILLUSTRATION		
○ Answer questions relating to the Introduction to Technical Illustration.		
○ Explain the Nature, Purpose and Value of Technical Illustration;		
○ Explain the role of the Technical Illustrator;		
○ List who are the famous Technical Illustrators;		
○ Explain the three main categories of technical communication;		
○ List the main types of illustrations in technical communication;		
● Identify and explain the purpose of the equipment and materials used in Technical Illustration.		
If you have answered 'no' to any of the outcomes listed above, then speak to your facilitator for guidance and further development.		

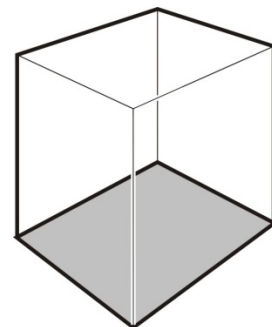
Module 2

One-Point Perspective Drawings

Learning Outcomes

On completion of this module the student must be able to:

- Identify and describe each of the following points and distances:
 - Picture plane.
 - Left vanishing point.
 - Right vanishing point.
 - Horizon line.
 - Centre of vision.
 - Ground line.
 - Ground plane
 - Station point (eye).
 - Height of eye above the ground line.
 - Distance of eye in front of picture plane.
 - New centre of vision.
 - New horizon lines.
 - Measuring point for the centre of vision.
 - Raised ground line.
 - New measuring point up/down.
 - New vanishing point up/down.
- Draw various one-point perspective views of single components or items as presented in Step by Step lessons and Activities.



**IMPORTANT NOTE:**

Accuracy, observation and attention to detail are most important to observe in this subject. The abilities to work smartly and take the initiative are other important attributes to develop.

2.1 Introduction



In this module you will learn how to draw in perspective various common shapes as used in professional life, building and manufacturing.

Principals of perspective

Perspective systems are graphic methods of creating an illusion of spatial depth corresponding to the way in which we perceive three-dimensional forms in space. The principles of perspective assist the artist in translating three-dimensional views accurately into two dimensions; they offer a means of understanding spatial relationships in terms of lines on a flat surface.

The conventions of perspective drawing are geared to architectural scale and embrace a range of views usually outside the requirements of technical illustration.

A dramatically foreshortened image, or a bird's eye or worm's eye view of the subject tends to draw out a subjective, even emotional response from the viewer which is inappropriate to the main requirements of technical illustration – to describe actual form or instruct the viewer on the mode of operation of a technological object.

The subjects in this field of illustration also frequently limit the degree of perspective construction, since the optical illusions which such systems represent increase with distance.

There is very little perspective effect in a straightforward view of an everyday domestic object, and it is not much increased in something the size of a large haulage truck. Exaggerated perspectives simply appear incorrect at this scale.

However, certain visual impressions do occur which, properly reproduced, can authenticate the rendering of three-dimensional forms in drawing, and to this extent a working knowledge of perspective theory is indispensable.

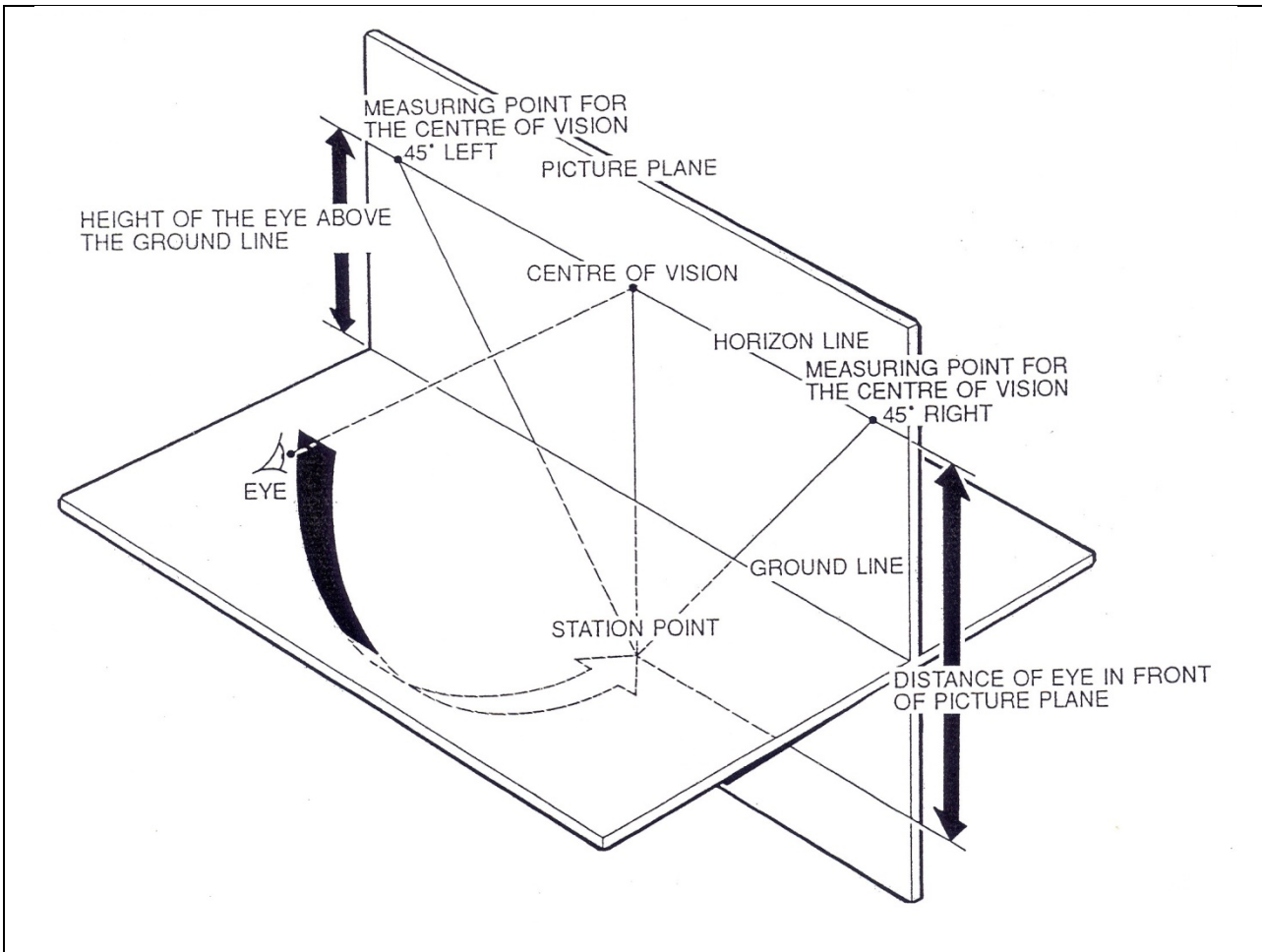


Figure 2.1 Principles of measuring point perspective drawing



IMPORTANT NOTE:

To judge a perspective view, the artist imagines a picture plane (like a sheet of glass) in front of the object on which the image is cast. The sight line from the artist's eye meets the picture plane at right angles and establishes the level of the horizon line. The object should be within 60° cone of vision to avoid distortion. It is located on the ground plane in relation to the fixed station point (the viewer).

2.2 The vocabulary of perspective

Perspective is a visual device and must be assimilated in practical terms by studying examples of perspective construction. The diagrams and constructions in the following pages explain the visual effects of the different systems of linear perspective and the stages by which they are achieved.

2.3 Convergence

This is the basic principle of perspective which states that parallel lines receding from the viewer appear to converge. Objects positioned along these lines diminish in size with their distance from the viewer. Perspective drawing involves

plotting the degrees of convergence and diminishment in relation to the viewer's locations, the positioning of objects viewed, and the farthest point of sight, the point of convergence.

2.4 Terms used in measuring point perspective

Certain terms are used consistently to identify different elements in the construction, as defined in the table 2.1 below.

Terminology	Description
Convergence	This is the basic principle of perspective which states that parallel lines receding from the viewer appear to converge. Objects positioned along these lines diminish in size with their distance from the viewer. Perspective drawing involves plotting the degrees of convergence and diminishment in relation to the viewer's locations, the positioning of objects viewed, and the farthest point of sight, the point of convergence.
Station Point or Eye (SP)	This is the fixed point from which an object is viewed, essentially the eye of the spectator. Also called the viewing point or eye position, the station point is one of the basic fixed reference points from which the perspective construction is calculated. It may be fixed at any distance from the object, and may provide a level, high or low viewpoint on the object.
Centre of Vision (CV)	The direct line of sight from the station point to the central focus of interest on the object viewed is known as the centre of vision.
Cone of vision (CON)	Normal sight includes a range of 180° or more, but some of the information within this range is taken in peripherally. In perspective drawing, a cone of vision is established with a range of 60° or less, since this is the maximum range which can be seen in focus from a fixed viewpoint. The cone represents lines of sight radiating from the eye: its apex is at the station point. The centre of vision is the central axis of the cone of vision. In establishing the station point for a particular perspective view, the cone of vision should encompass the outer boundaries of the object viewed. Any part which falls outside the 60° cone of vision becomes distorted in the drawing.
Ground Plane (GP)	This is a horizontal plane on which the viewer or object is standing. The viewer's eye level, or the station point,

	has a fixed relationship to the ground plane.
Picture Plane (PP)	This is an imaginary plane on which the image of the object is projected. It is commonly compared to a sheet of glass placed somewhere between the viewer and the object. In ordinary perspectives it is a vertical plane, but it can also be behind the object or tilted obliquely away from or towards the viewer, creating different types of perspective view. The closer to the station point the picture plane is located, the larger the image of the object.
Ground Line (GL)	Assuming that the ground plane is horizontal and the picture plane vertical, there is inevitably a line of intersection where they meet and this is called the ground line.
Horizon Line (HL)	The line on which the points of convergence occur corresponds to the eye level of the viewer and is known as the horizon line. It lies on the picture plane parallel to the ground line. The position of the horizon line is selected by the artist according to the viewpoint required. When a low horizon line (close to the ground line) is established, the perspective drawing creates an illusion of looking up at the object from a low level. If the horizon line is high, the view is downward-looking and more of the area of the ground plane is seen.
Vanishing Point (VP)	The point of convergence of two receding horizontal lines occurs on the horizon line, and this is called the vanishing point. Commonly used perspective systems work around one or two vanishing points. Three-point perspective introduces an additional vanishing point which lies above or below the horizon line, producing a more complex overall view. Separate sets of vanishing points may be located within a single image to accommodate grouped elements seen at varying angles.
Visual Rays	The lines of vision that we call visual rays extend from the Eye (SP) to corners, edges or points on the object. A perspective image is formed where each of the visual rays penetrate through the Picture Plane (PP).
Height of the Eye in front of the Picture Plane	This is the distance between the Ground Line (GL) and the Horizon Line (HL).
Distance of the eye in front of the Picture	This is the distance between the Station Point (SP) and the Picture Plane (PP).

Plane	
Measuring Points for the Centre of Vision	Measuring Points for the Centre of Vision (MPCV) are the points where the visual rays or lines of sight intersect with the Picture Plane (PP).
Measuring Point	By transferring the distance from the Vanishing Point to the Station Point, casting an arc up to the Horizon Line, will pinpoint the Measuring Points for each Vanishing Point (VP 1 will work in conjunction with MP 1 and vice versa). These points are used only for measuring purposes. True measurements are made along the Ground Line and are projected to the Measuring Point, where they intersect their specific Vanishing Point, they form the perspective foreshortened length of the original true measurement.
Foreshortening	<p>A horizontal plane seen in plan view, that is, from directly above or below, appears in its true dimensions. When a viewpoint is taken looking across the plane from a position closer to its own level, the apparent depth of the receding plane is progressively less than its actual measurement. The same is true of a vertical plane angled away from the viewer. This effect is known as foreshortening and is the reason why, in a perspective drawing, unlike an isometric or axonometric view, a scale of true measurement cannot be directly applied other than to lines parallel to the picture plane.</p> <p>The various perspective elements are co-ordinated to produce a logically developed view from a given point and in a given relation to the object viewed. Basic decisions must be made by the artist which subsequently dictate the logic of the constructed image: for example, the position of the station point establishes the size of the depicted object and the angle from which it is viewed; the location of the picture plane in relation to the station point separately affects the size of the image, the level of the horizon line establishes the apparent angle of view in relation to a vertical plane.</p>
New Centre of Vision	The New Centre of Vision is established when the object to be constructed has raised or lowered vanishing points.
Raised Ground Line	This is the raised distance between the existing Ground Line (GL) and the top of an object. It is established for convenience to enable more accurate measuring.

New Horizon Line	The Horizon Line (NHL) is established when the object to be constructed has raised or lowered vanishing points.
New Measuring Point Up/Down	The New Measuring Point (NMP) is established when the object to be constructed has raised or lowered vanishing points.
New Vanishing Point Up/Down	The New Vanishing Point (NVP) is established when the object to be constructed has raised or lowered vanishing points.

Table 2.1 The vocabulary of perspective

2.5 Abbreviations or acronyms of the vocabulary terms

Certain abbreviations or acronyms of terms are used consistently to identify different elements in the construction, as defined in the table 2.2 below.

Abbreviations or acronyms	Description
CV	Centre of Vision
HL	Horizon Line
GL	Ground Line
GP	Ground Plane
PP	Picture Plane
VP	Vanishing Point
VPLT	Vanishing Point to the left-hand side
VPRT	Vanishing Point to the right-hand side
MPCV	Measuring Point for the Centre of Vision
MPLT	Measuring Point to the left-hand side
MPRT	Measuring Point to the right-hand side
SP	Station Point
NCV	New Centre of Vision
RGL	Raised Ground Line
NHL	New Horizon Line
NMPUP/DN	New Measuring Point Up/Down
NVPUP/DN	New Vanishing Point Up/Down

Table 2.2 The abbreviations or acronyms used in perspective

2.6 Perspective Constructions

The effect of a perspective construction depends upon the number of vanishing points employed. To simplify the basic definitions, they are represented here in terms of describing a simple box-like form. Again, it is by following the diagrams, the step by step procedures and the exercises in the following modules of this book, that you can understand the actual result of a particular perspective view.

2.7 One-Point Perspective

A full knowledge of formal perspective is needed to produce drawings that are not distorted or ambiguous.

The illustrator must understand the theory of the Picture Plane, the Ground Plane, the Eye Level/Horizon Line, Centre Of Vision, the three Vanishing Points, the cone of vision, the spectator viewpoint, interpenetration of surfaces etc.

The student must have a thorough understanding of the principles of plane and solid geometry, (almost every aspect of every mechanical design is an example of applied geometry), and must understand the formal language of orthographic projection as well as the design draughtsman. Obviously, it is impossible to interpret and communicate accurately what has not been fully understood.

In this system only one vanishing point is fixed on the horizon line. The centre of vision is at right angles to one side of the object; this side is parallel to the picture plane.

Where other plane surfaces of the box are visible at the same time (from left, right, above or below), these planes are receding from the viewer and the lines describing them must converge at the vanishing point already fixed, whatever the angle at which the box is seen.

In one-point perspective, lines seen as vertical by the viewer are represented as vertical in the drawing, since they fall parallel to the picture plane.

One-point perspective tends to produce a simplified graphic interpretation of form. It is usefully employed for diagrammatic schemes which include multiples of the same form, since this is easier on the eye than a more complex perspective rendering.

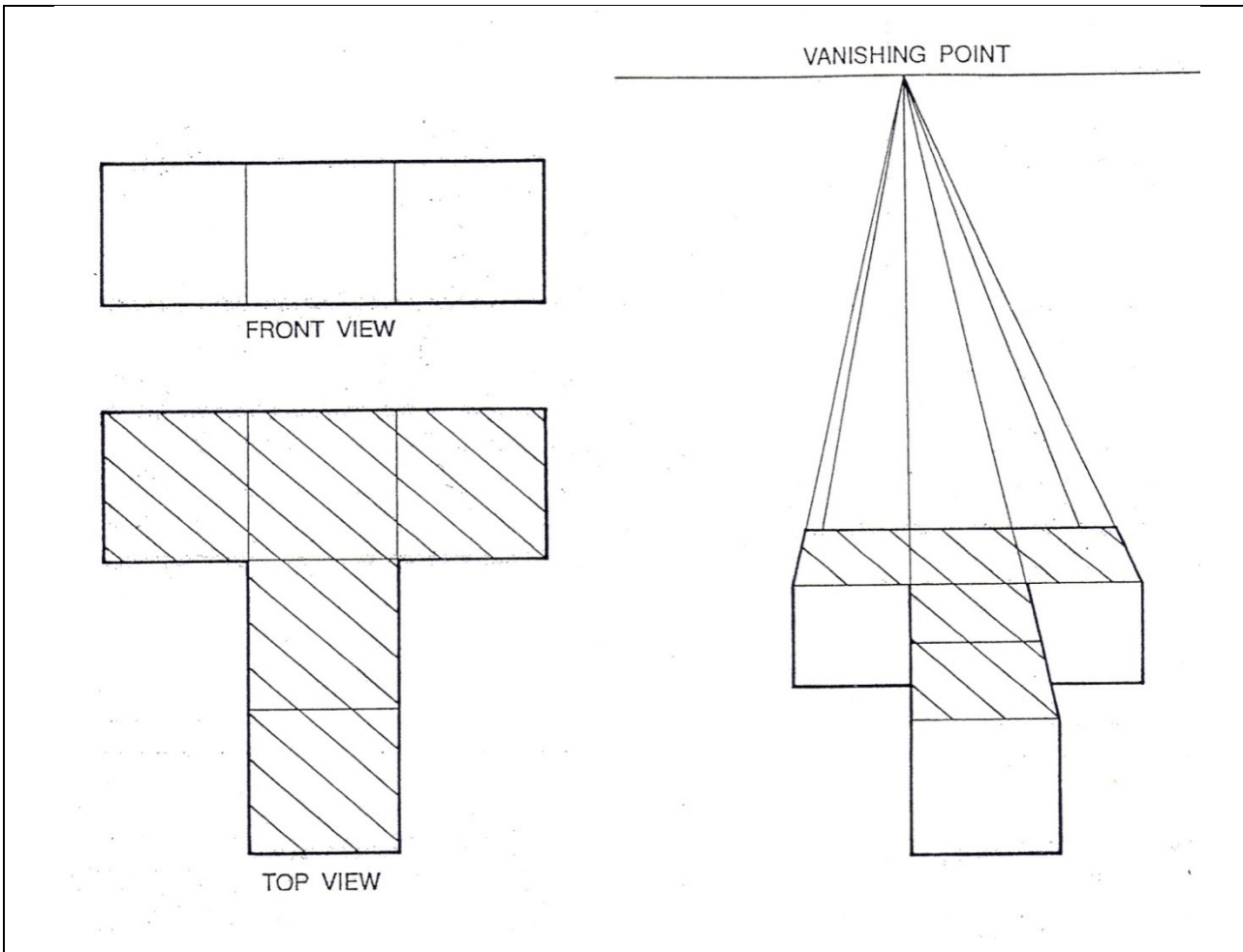


Figure 2.2 One-point perspective



IMPORTANT NOTE:

In one-perspective, the convergence of lines travelling away from the viewer occurs at a single point on the horizon line. The checkerboard on the left represents a ground plan of cubic blocks on a grid and this is shown three dimensionally on the right in the corresponding one-point perspective view.

2.8 Two-Point Perspective

Using again the example of a solid box, in two-point perspective it can be represented with three visible planes, all angles away from the viewer. Two vanishing points are needed to accommodate the convergence of lines from the three planes. Vertical elements remain vertical, as in one-point perspective.

Two-point perspective is perhaps the most commonly used system since it provides a clear view of solid objects and interior structures in an easily absorbable form.

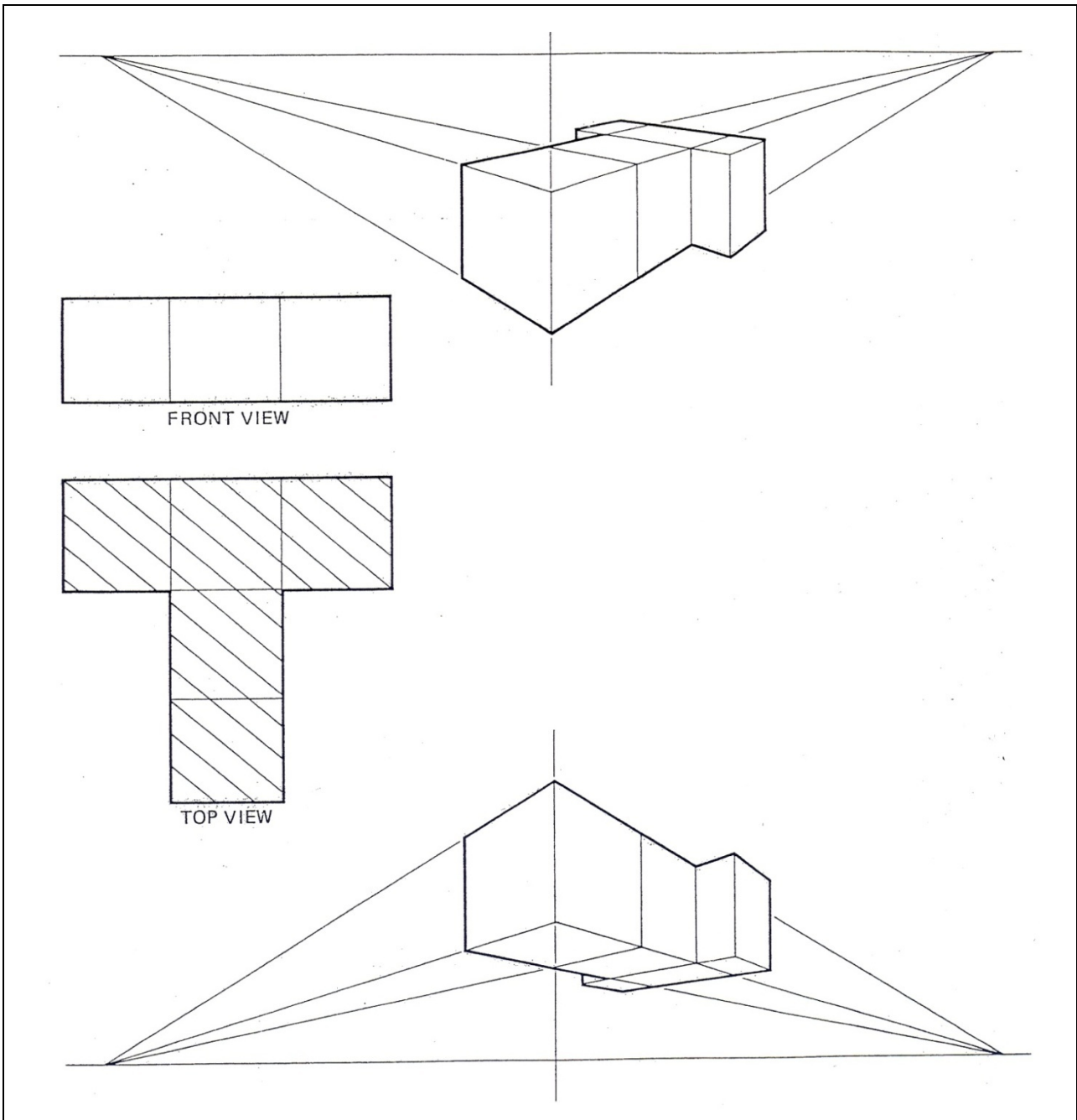


Figure 2.3 Two-point perspective



IMPORTANT NOTE:

In two-point perspective, two vanishing points are used to, in effect; govern opposite sides of the object. The location of the object in relation to the horizon line in a perspective view indicates the viewpoint-level, low or high angle. This can be seen from these two examples of the basic cube, one seen from above where receding lines travel up to the horizon, one from below with the lines converging downwards.

2.9 Three-Point Perspective

In this system, two vanishing points are located on the horizon, governing horizontal convergence, but a third is established above or below the horizon line to allow convergence of normally vertical planes, giving an inclined view of the object. No lines fall parallel to the picture plane.

Using the example of the basic box, the impression is of looking up or down the vertical faces, depending on whether the third vanishing point is above or below the horizon. The planes seem to slope away, a perspective device often employed to render views of tall buildings. With a controlled degree of recession in the third direction, it also creates a convincing impression of a simple, large-scale object, but the more exaggerated forms of three-point perspective inevitably suggest architectural scale and have a dramatic effect.

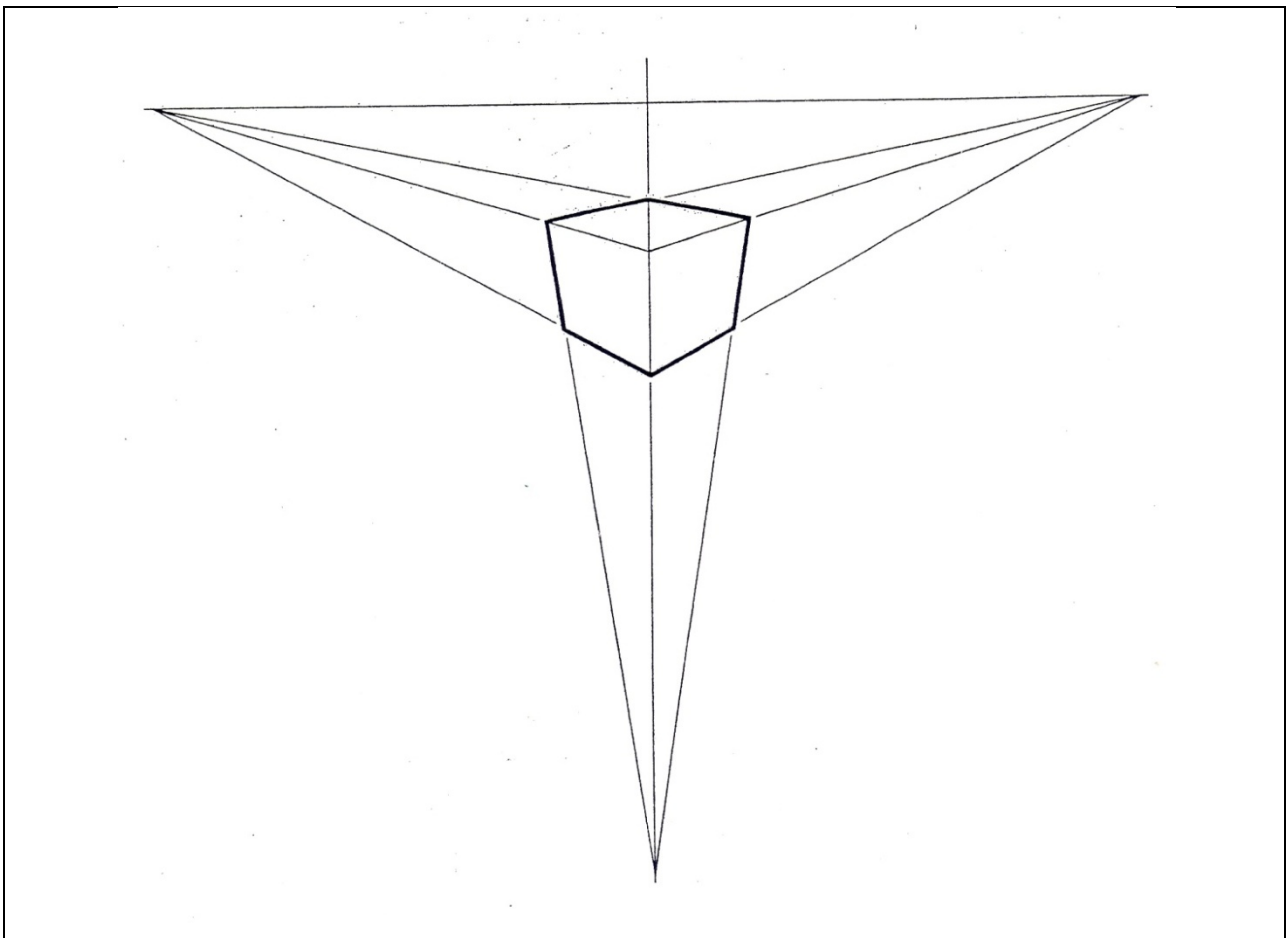


Figure 2.4 Three-point perspective



IMPORTANT NOTE:

In three-point perspective each of the visible planes of the basic cube forms an eventual convergence, necessitating a third vanishing point which relates to lines describing vertical planes. This corresponds closely to the viewer's optical experience.

2.10 One-point perspective – Measuring-point method



Worked example 1

The following steps show you how to construct the layout and the drawing in one-point perspective. Use A3 paper size (297 x 420 mm).

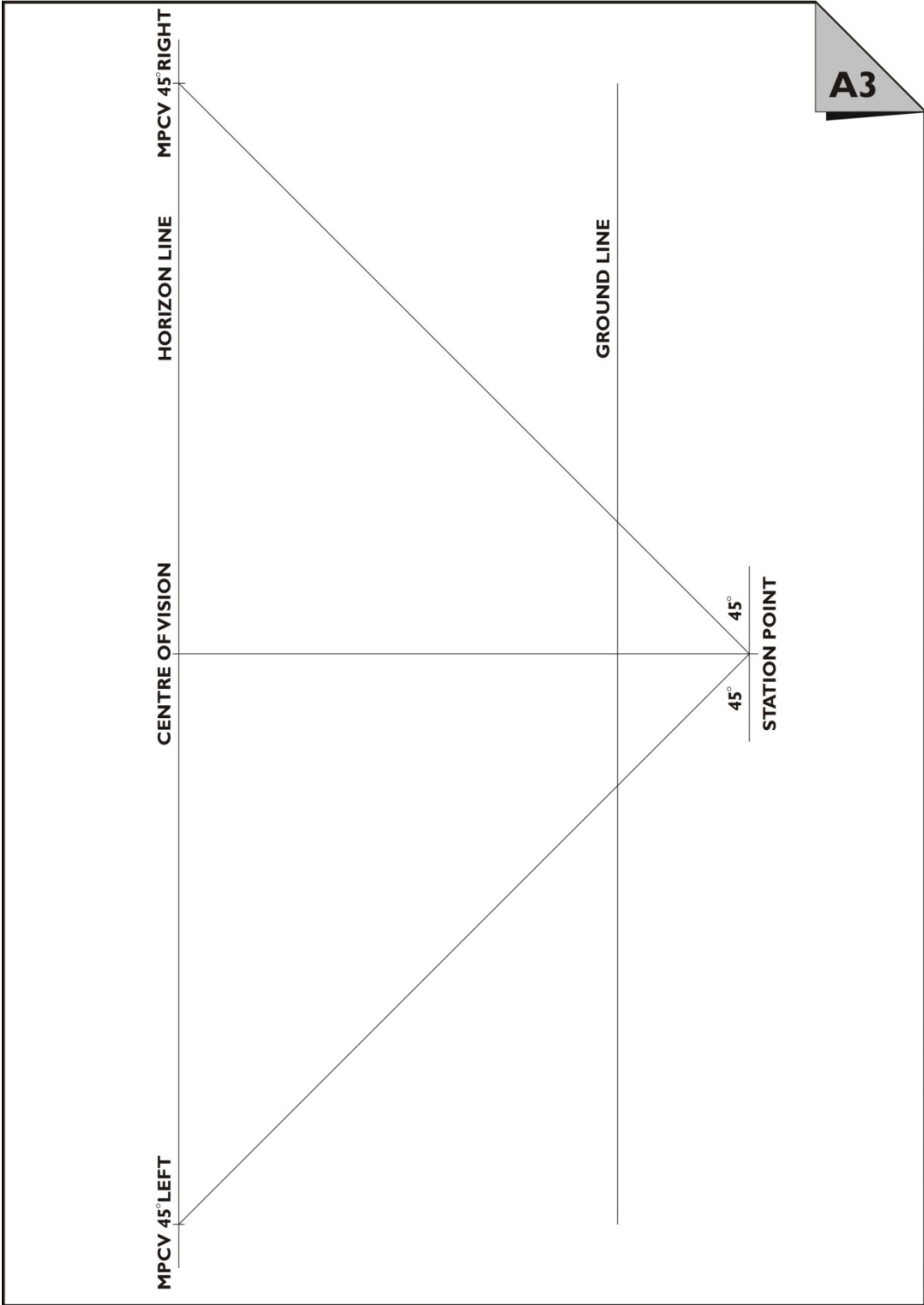


Figure 2.5 One-point perspective measuring-point layout guide

Step 1 Perspective of a square on the ground line

1. All measurements in millimetres.
2. Position the station point, the ground line and the horizon line as in the layout guide. Refer to Figure 2.5.
3. The distance of the eye in front of the picture plane is 130 mm.
4. The height of the eye above the ground line is 100 mm.
5. Use an A3 sheet of drawing paper.

**IMPORTANT NOTE:**

It is important to follow the layout guide at the beginning of each module. Ensure that the layout for the drawing is central both horizontally and vertically to the dimensions of the paper to be used. (in this case A3 size) Attention to detail is most important in this subject.

Step 2

1. Centralise Measuring Point plan over given paper area. Refer to Figure 2.5 of the layout guide.
2. Establish the Horizon Line, and from its centre, draw a vertical line (Centre of Vision).
3. Measure vertically down 130 mm from the Horizon Line and establish the Station Point.

Step 3

1. Locate the vanishing point at the intersection of the horizon line and the centre of vision.

Step 4

1. Locate the measuring points.
2. As the vanishing point is on the centre of vision, you need to work with measuring points for the centre of vision.
3. From the station point, draw two construction lines: one at a 45° angle to the left and one at a 45° angle to the right.
4. Where the two construction lines intersect the horizon line, mark these points MPCVLT and MPCVRT.

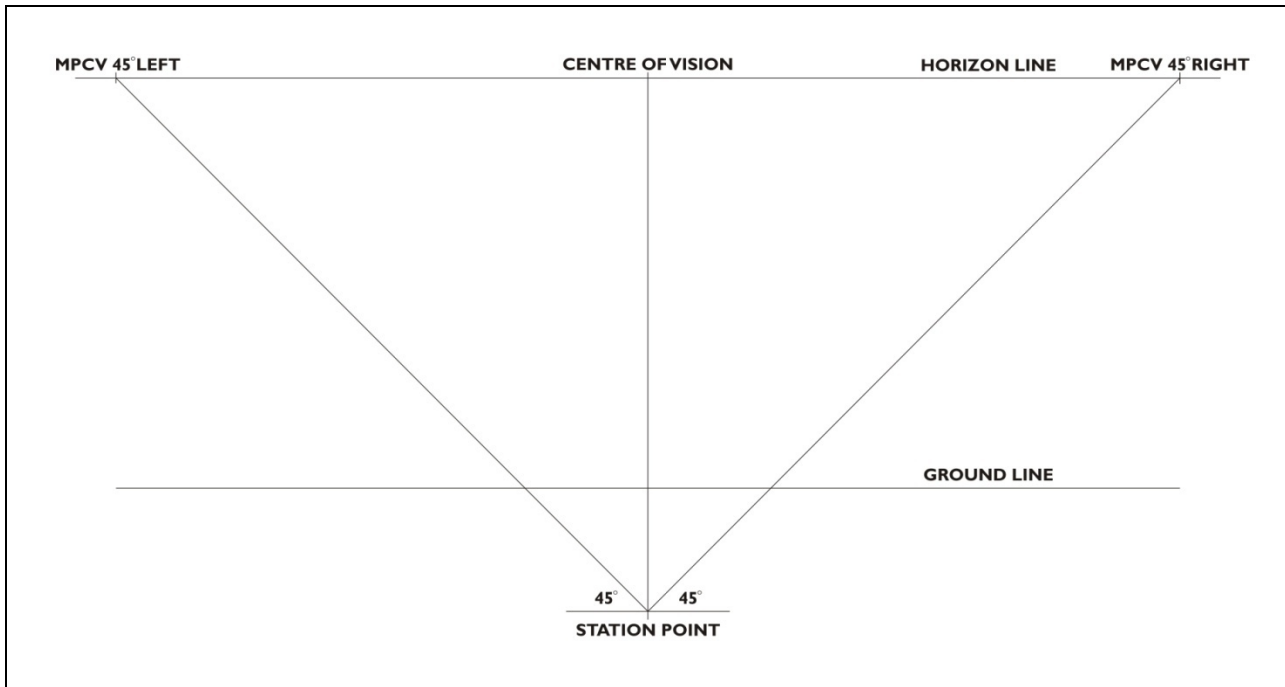


Figure 2.6 One-point perspective measuring-point plan

Step 5

1. Measure the length of the square (40 mm) from point A and establish point B on the Ground Line. Refer to Figure 2.7.
2. If we consider this to represent one side of a square, then by completing a diagonal from point B to MPCV RT will produce side C-D which is equal in perspective foreshortened length.

Step 6

1. Measure off the width of the block along the ground line to the right of the centre of vision and ground line intersection at A.
2. Mark this point B.

Step 7

1. Measure off the length of the block along the ground line to the left of the centre of vision and the ground line intersection at A.
2. Mark this point B.

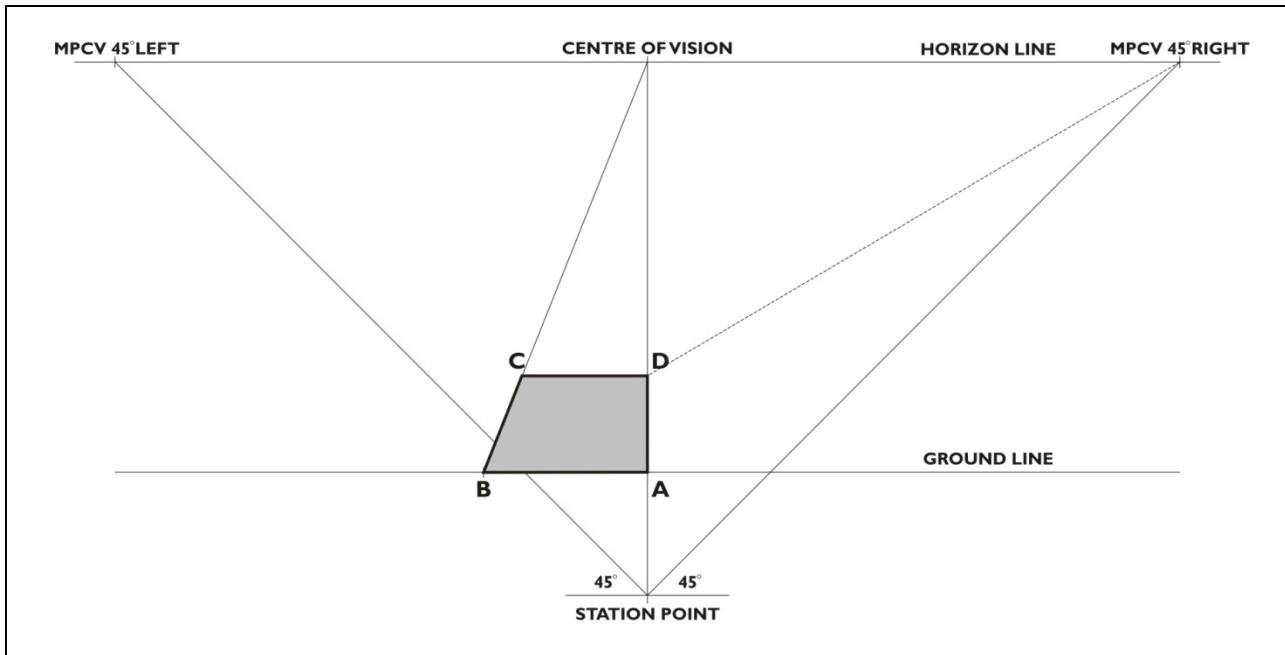


Figure 2.7 One-point perspective drawing of a square

2.11 One-point perspective – Square behind the Picture Plane



Worked example 2

The following steps show you how to construct the layout and the drawing in one-point perspective. Use A3 paper size (297 x 420 mm).

Step 1 Perspective of a square behind the Picture Plane

1. All measurements in millimetres.
2. Position the station point, the ground line and the horizon line as in the layout guide Figure 2.5.
3. The distance of the eye in front of the picture plane is 130 mm.
4. The height of the eye above the ground line is 100 mm.
5. The square is positioned 40mm behind the Picture Plane.
6. Use an A3 sheet of drawing paper.

Step 2

1. Centralise Measuring Point plan over paper area. Refer to Figure 2.5 layout guide.
2. Establish the Horizon Line, and from its centre, draw a vertical line (Centre of Vision).
3. Measure vertically down 130 mm from the Horizon Line and establish the Station Point.

Step 3

1. Locate the vanishing point at the intersection of the horizon line and the centre of vision.

Step 4

5. Locate the measuring points.
6. As the vanishing point is on the centre of vision, you need to work with measuring points for the centre of vision.
7. From the station point, draw two construction lines: one at a 45° angle to the left and one at a 45° angle to the right.
8. Where the two construction lines intersect the horizon line, mark these points MPCVLT and MPCVRT.

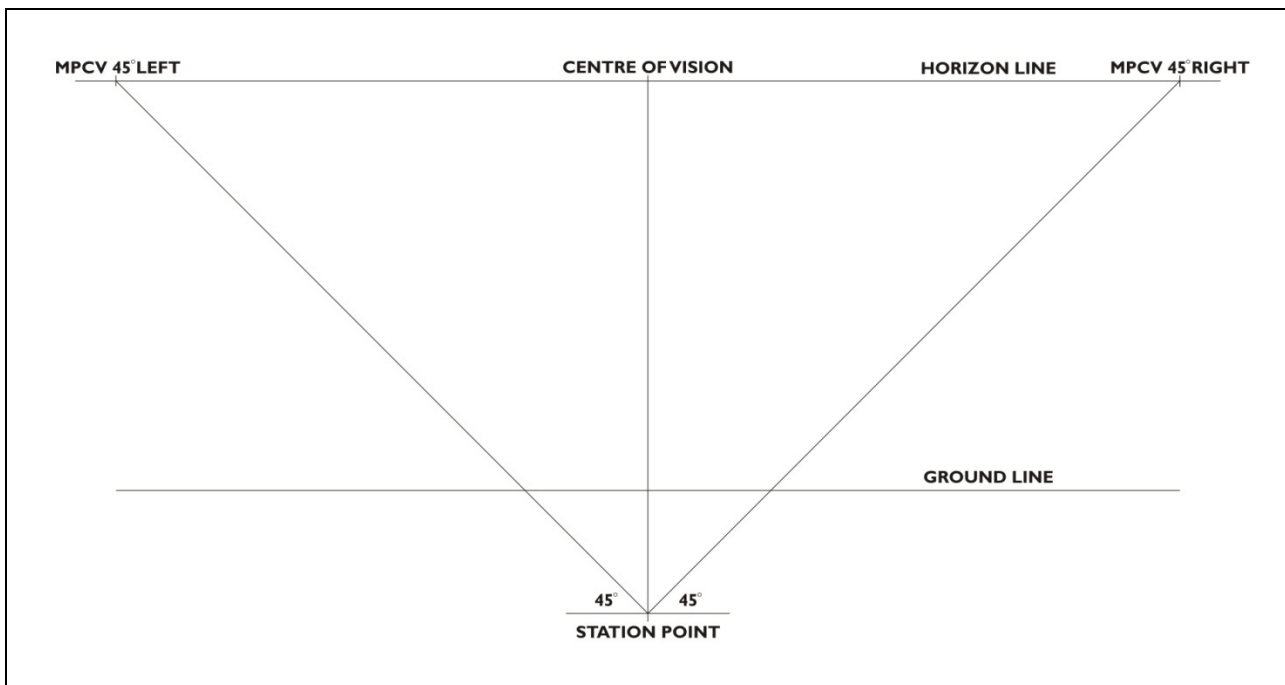


Figure 2.8 One-point perspective measuring-point plan

Step 5

1. Measure from point 1 40 mm to establish the square behind the Picture Plane. From point 2 measure a further 40mm to establish the width of the square, point 3. Refer to Figure 2.9.
2. Draw a line from point 2 and 3 to the CV.
3. Complete a diagonal from point 1 to MPCV LT which will produce point A and complete a diagonal from point 2 to MPCV LT which will produce point B.

Step 6

1. Where the lines of point 1 intersect point 2 establish point A. Where the

lines of point 2 point 3 intersect point 3 establish point B.

2. Complete the sides of the square by drawing horizontal lines from point A to B and from point D to C.

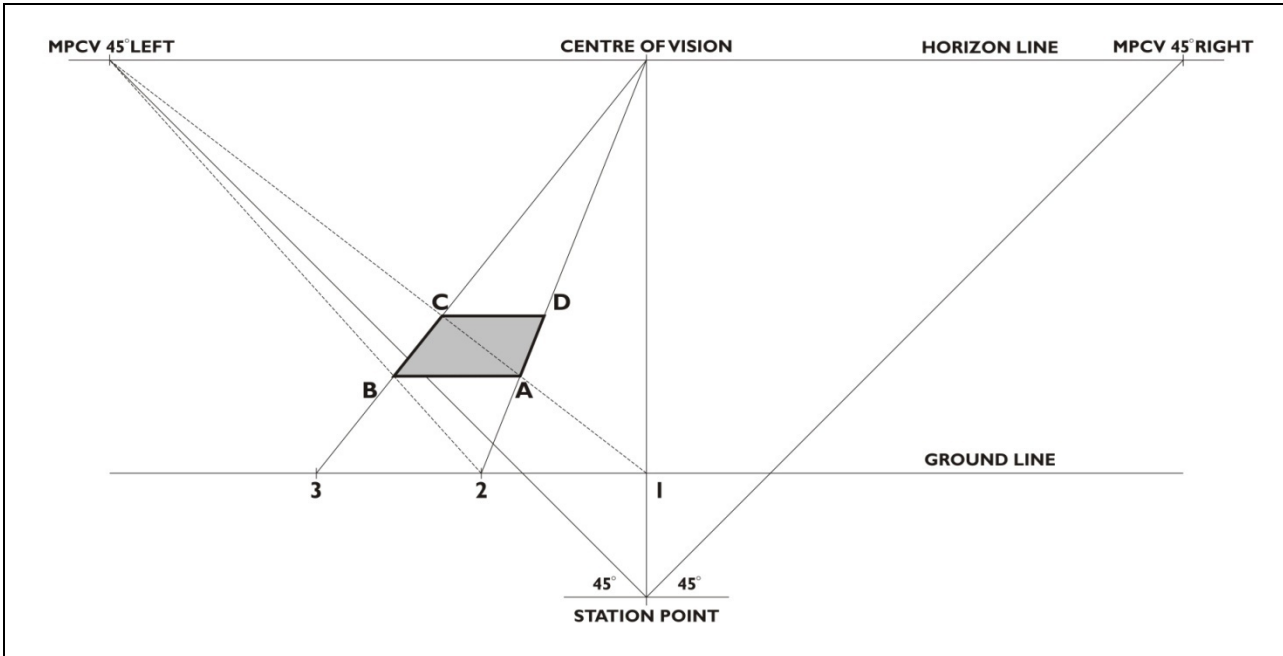


Figure 2.9 One-point perspective drawing of a square behind the Picture Plane

2.12 One-point perspective – Cube on the Ground



Worked example 3

The following steps show you how to construct the layout and the drawing in one-point perspective. Use A3 paper size (297 x 420 mm).

Step 1 Perspective of a cube on the ground

1. All measurements in millimetres.
2. Position the station point, the ground line and the horizon line as in Figure 2.5 of the layout guide.
3. The distance of the eye in front of the picture plane is 130 mm.
4. The height of the eye above the ground line is 100 mm.
5. A cube 40 x 40 x 40 mm, is positioned 40mm behind the Picture Plane.
6. Use an A3 sheet of drawing paper.

Step 2

1. Centralise Measuring Point plan over paper area. Refer to Figure 2.5 layout guide.

2. Establish the Horizon Line, and from its centre, draw a vertical line (Centre of Vision).
3. Measure vertically down 130 mm from the Horizon Line and establish the Station Point.

Step 3

1. Locate the vanishing point at the intersection of the horizon line and the centre of vision.

Step 4

1. Locate the measuring points.
2. As the vanishing point is on the centre of vision, you need to work with measuring points for the centre of vision.
3. From the station point, draw two construction lines: one at a 45° angle to the left and one at a 45° angle to the right.
4. Where the two construction lines intersect the horizon line, mark these points MPCVLT and MPCVRT.

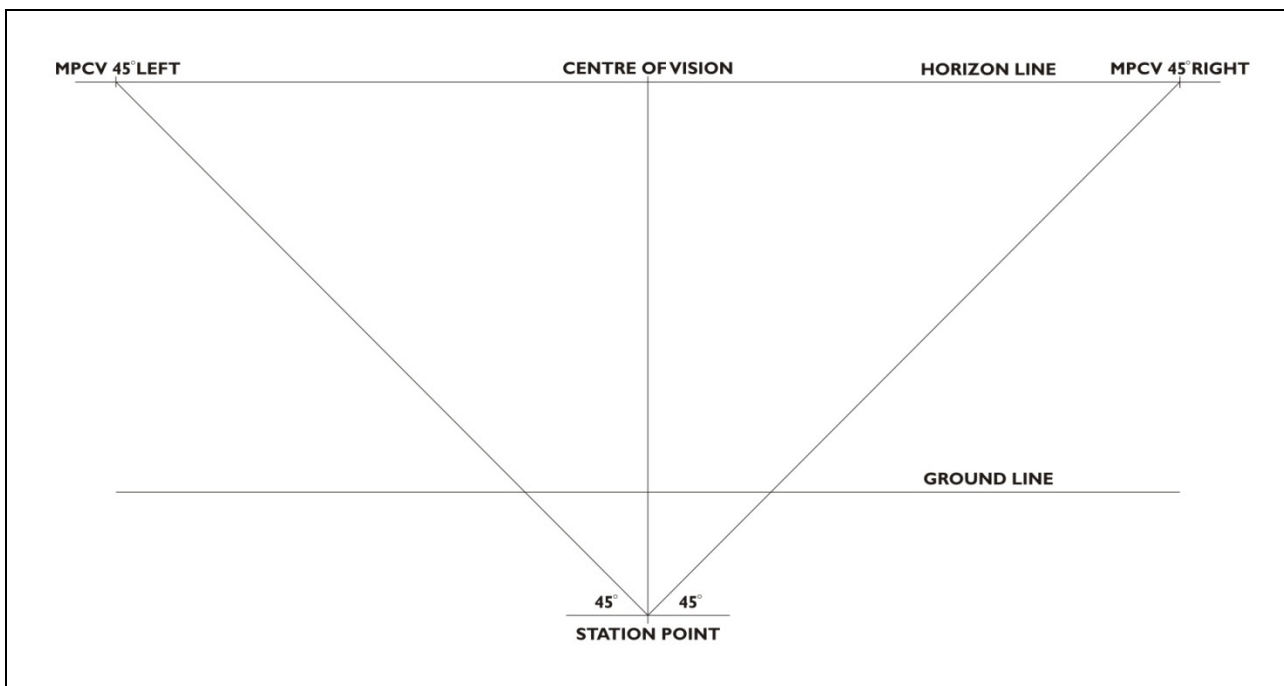


Figure 2.10 One-point perspective measuring-point plan

Step 5

1. Measure the length of the square (40 mm) from point A and establish point B on the Ground Line. Refer to Figure 2.7.
2. If we consider this to represent one side of a square, then by completing a diagonal from point B to MPCV RT will produce side C-D which is equal in

perspective foreshortened length.

Step 6

3. Measure off the width of the block along the ground line to the right of the centre of vision and ground line intersection at A.
4. Mark this point B.

Step 7

1. Measure off the length of the block along the ground line to the left of the centre of vision and the ground line intersection at A.
2. Mark this point B.

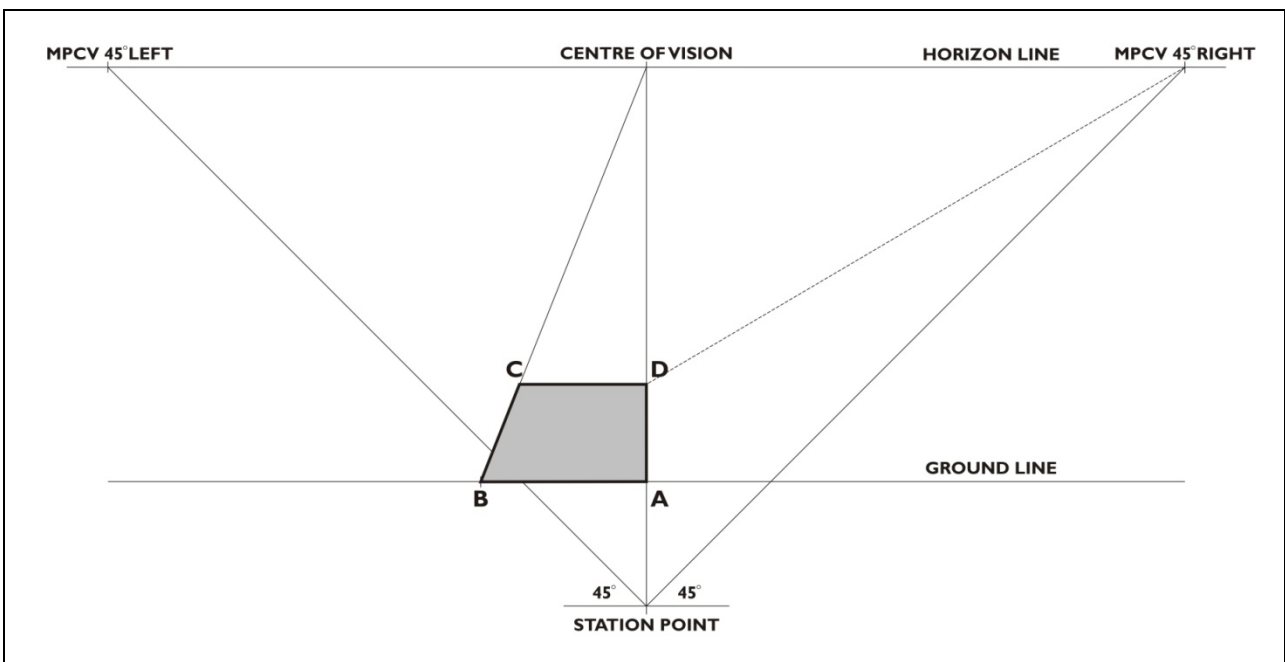


Figure 2.11 One-point perspective drawing of a square on the ground

Step 8

1. Measure the height of the cube along a vertically drawn line (40 mm) from point B and establish point b at the new height. Refer to Figure 2.12.
2. From point b draw a horizontal line parallel to B-A to create b-a.

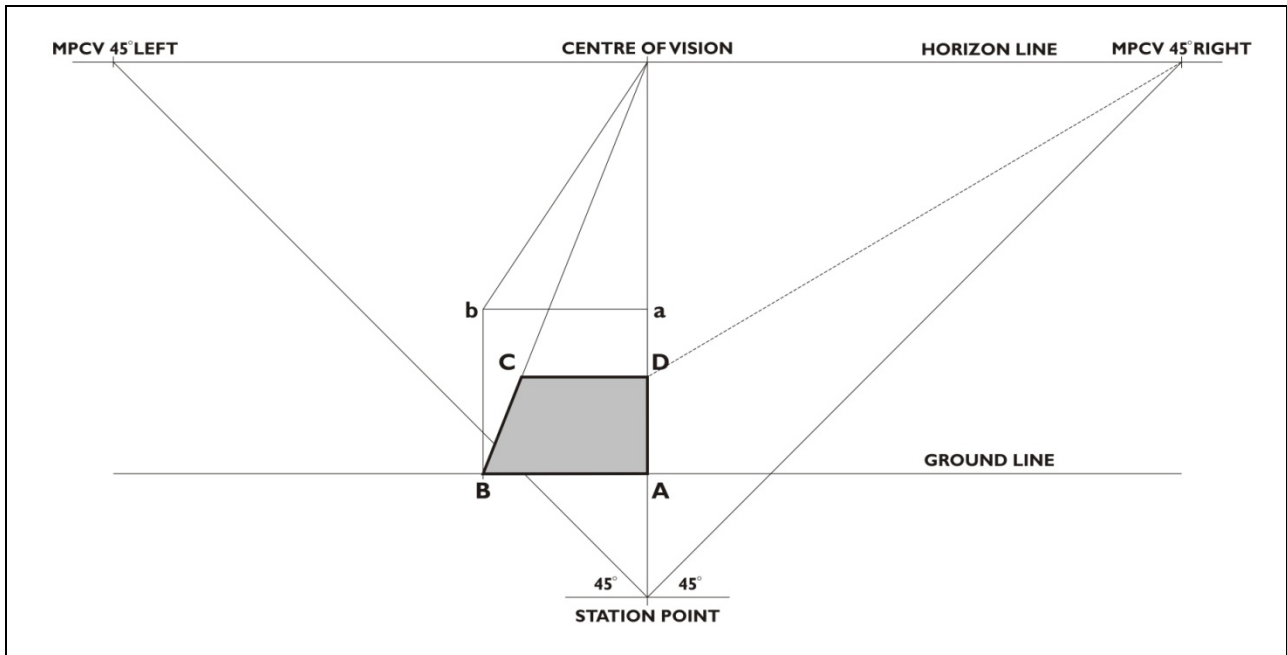


Figure 2.12 One-point perspective drawing of a cube on the ground

Step 8

1. Project a line vertically from point C and establish point c. Refer to Figure 2.13.
2. From point c draw a horizontal line parallel to C-D to create c-d.
3. So A-B-C-D represents a square on the ground. So a-b-c-d represents a square 40 mm above the ground. The two combined form a cube positioned on the ground.
4. Complete the cube using a bold line rendering.

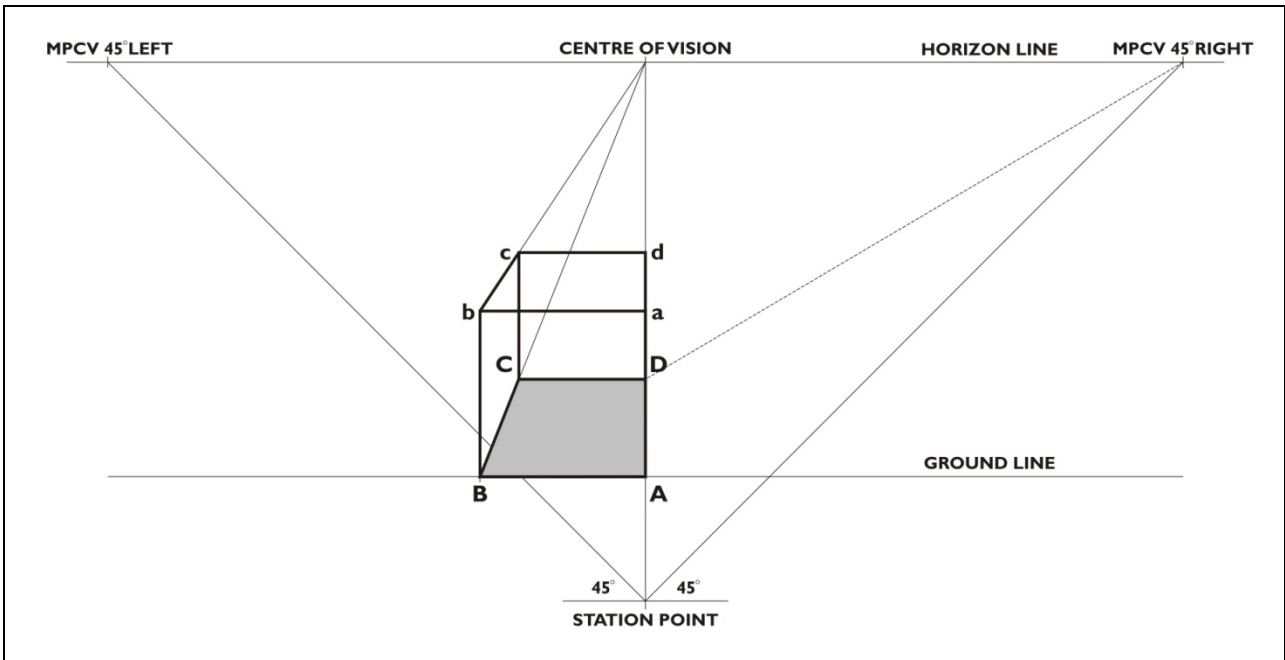


Figure 2.13 One-point perspective drawing of a cube on the ground



Activity 2.1

Figure 2.10 shows side and end views of a cube situated on a cube. All the measurements are given in millimetres.

Draw to scale of 1:1, a one-point perspective drawing of an object resting on the ground with sides vanishing to the left at an angle of 45°. Refer to Figure 2.10 for dimensions. The distance of the eye in front of picture plane is 130 mm and the height of the eye above the ground line is 100 mm.

Point A is situated on the ground, with its leading edge up against the picture plane, 30 mm to the right of the centre of vision.

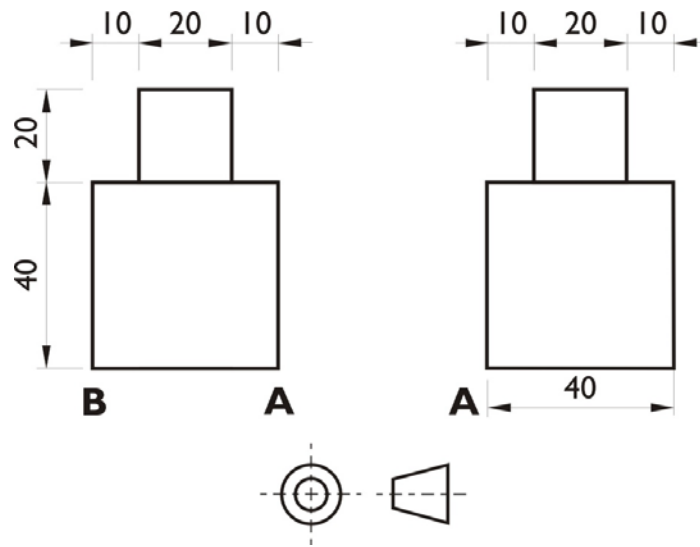


Figure 2.10 Cube situated on Cube



Important:

Layout, neatness and accuracy are important in the completion of this first activity. This will set the standard for all subsequent completed activities.



Activity 2.2

Figure 2.11 shows side and end views of two cubes marked U and V. All the measurements are given in millimetres.

Draw to scale of 1:1, a one-point perspective drawing of the two objects resting on the ground with sides vanishing to the left at an angle of 45°. Refer to Figure 2.11 for dimensions. The distance of the eye in front of picture plane is 130 mm and the height of the eye above the ground line is 100 mm.

Cube U is situated on the ground line, 50 mm to the left of the centre of vision (**point a1**) and 40 mm behind the picture plane (**point a2**) and is 40 x 40 x 40 mm.

Cube V is situated on the ground line, with its leading edge up against the picture plane, 20 mm to the right of the centre of vision (**point a1**) and is 40 x 40 x 40 mm.

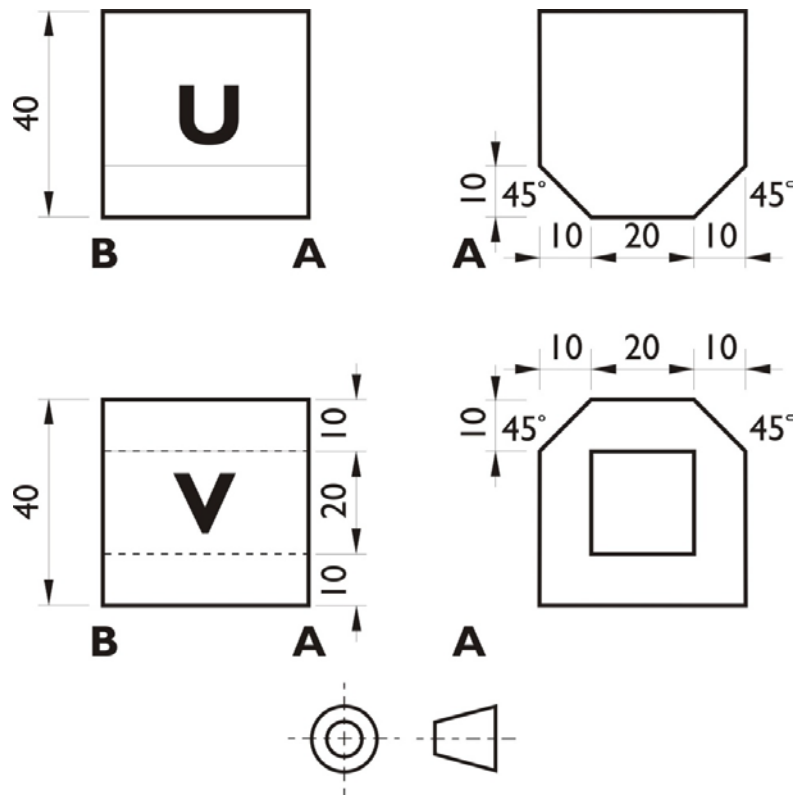


Figure 2.11 Two Cubes marked U and V



Important:

Layout, neatness and accuracy are important in the completion of this activity. This will set the standard for all subsequent completed activities.



Activity 2.3

Figure 2.12 shows side and end views of a model. All the measurements are given in millimetres.

Draw to scale of 1:1, a one-point perspective drawing of a model resting on the ground with sides vanishing to the left at an angle of 45°. Refer to Figure 2.12 for dimensions. The distance of the eye in front of picture plane is 130 mm and the height of the eye above the ground line is 90 mm.

Point A is situated on the ground, with its leading edge up against the picture plane, 30 mm to the right of the centre of vision.

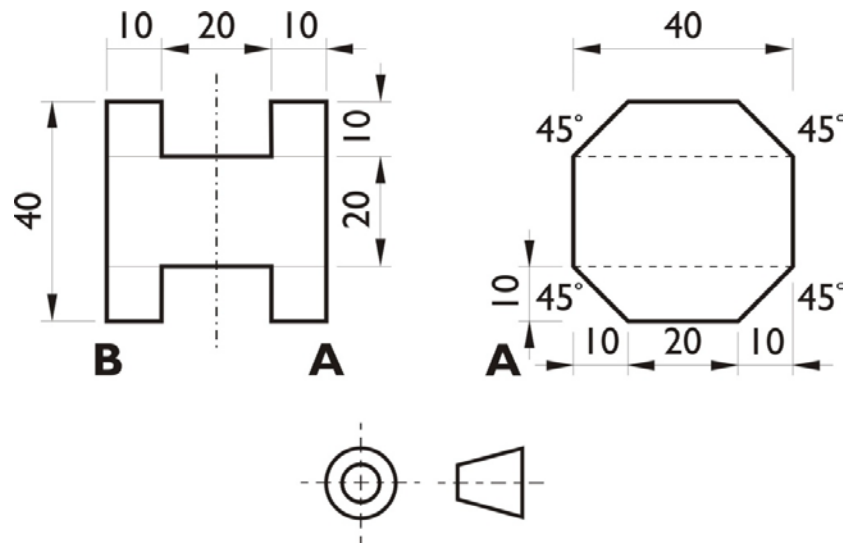


Figure 2.12 A model



Important:

Layout, neatness and accuracy are important in the completion of this activity. This will set the standard for all subsequent completed activities.



Activity 2.4

Figure 2.13 shows side and end views of a model. All the measurements are given in millimetres.

Draw to scale of 1:1, a one-point perspective drawing of an object resting on the ground with sides vanishing to the left at an angle of 45°. Refer to Figure 2.12 for dimensions. The distance of the eye in front of picture plane is 130 mm and the height of the eye above the ground line is 100 mm.

Point A is situated on the ground, with its leading edge up against the picture plane, 30 mm to the right of the centre of vision.

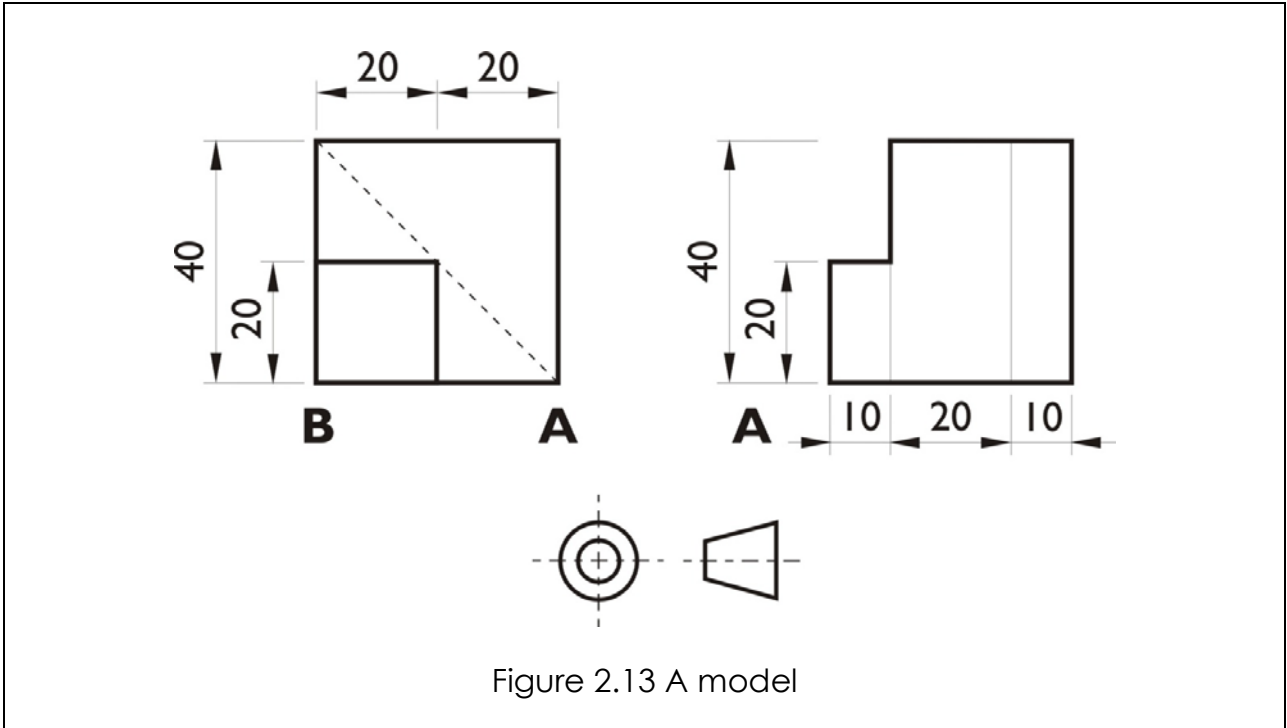


Figure 2.13 A model



Important:

Layout, neatness and accuracy are important in the completion of this activity. This will set the standard for all subsequent completed activities.



Activity 2.5

Figure 2.14 shows side and end views of a model. All the measurements are given in millimetres.

Draw to scale of 1:1, a one-point perspective drawing of an object resting on the ground with sides vanishing to the left at an angle of 45°. Refer to Figure 2.14 for dimensions. The distance of the eye in front of picture plane is 130 mm and the height of the eye above the ground line is 100 mm.

Cube U is situated on the ground line, 50 mm to the left of the centre of vision (**point a1**) and 40 mm behind the picture plane (**point a2**) and is 40 x 40 x 40 mm.

Cube V is situated on the ground line, with its leading edge up against the picture plane, 20 mm to the right of the centre of vision (**point a1**) and is 40 x 40 x 40 mm.

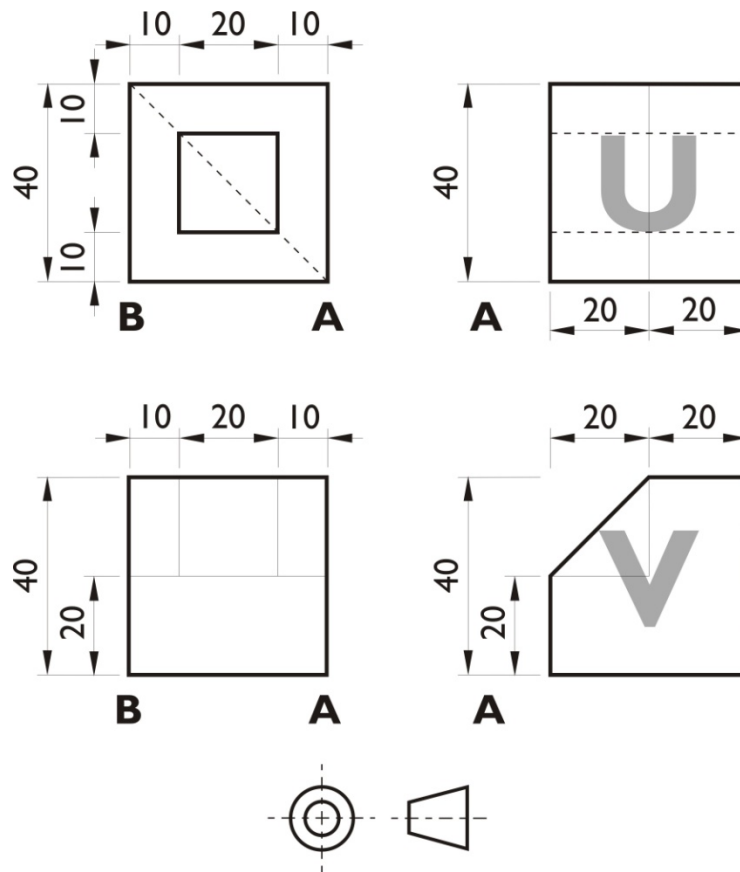


Figure 2.14 Two Cubes marked U and V



Important:

Layout, neatness and accuracy are important in the completion of this activity. This will set the standard for all subsequent completed activities.



Self-Check

I am able to:	Yes	No
1 ONE POINT PERSPECTIVE DRAWINGS		
• Identify and describe each of the following points and distances:		
○ Picture plane		
○ Left vanishing point		
○ Right vanishing point		

○ Horizon line		
○ Centre of vision		
○ Ground line		
○ Ground plane		
○ Station point (eye)		
○ Height of eye above the ground line		
○ Distance of eye in front of picture plane		
○ New centre of vision		
○ New horizon lines		
2 Accurately draw a square on the ground in one-point perspective		
3 Accurately draw a cube on the ground in one-point perspective		
4 Accurately draw two cubes on the ground in one-point perspective		

If you have answered 'no' to any of the outcomes listed above, then speak to your facilitator for guidance and further development.

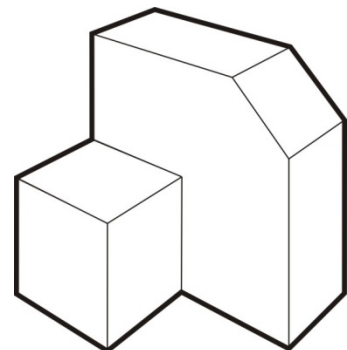
Module 3

Two-Point Perspective Drawings

Learning Outcomes

On completion of this module the student must be able to:

- identify and describe each of the following points and distances:
 - Picture plane
 - Left vanishing point
 - Right vanishing point
 - Horizon line
 - Centre of vision
 - Ground line
 - Ground plane
 - Station point (eye)
 - Height of eye above the ground line
 - Distance of eye in front of picture plane
 - New centre of vision
 - New horizon lines
 - Measuring point for the centre of vision
 - Raised ground line
 - New measuring point up/down
 - New vanishing point up/down
- Draw various two-point perspective views of single components or items as presented in Step by Step lessons and Activities.



3.1 Two-point perspective – Measuring-point method



Worked example 1

The following steps show you how to construct the layout and the drawing in two-point perspective. Use A3 paper size (297 x 420 mm).

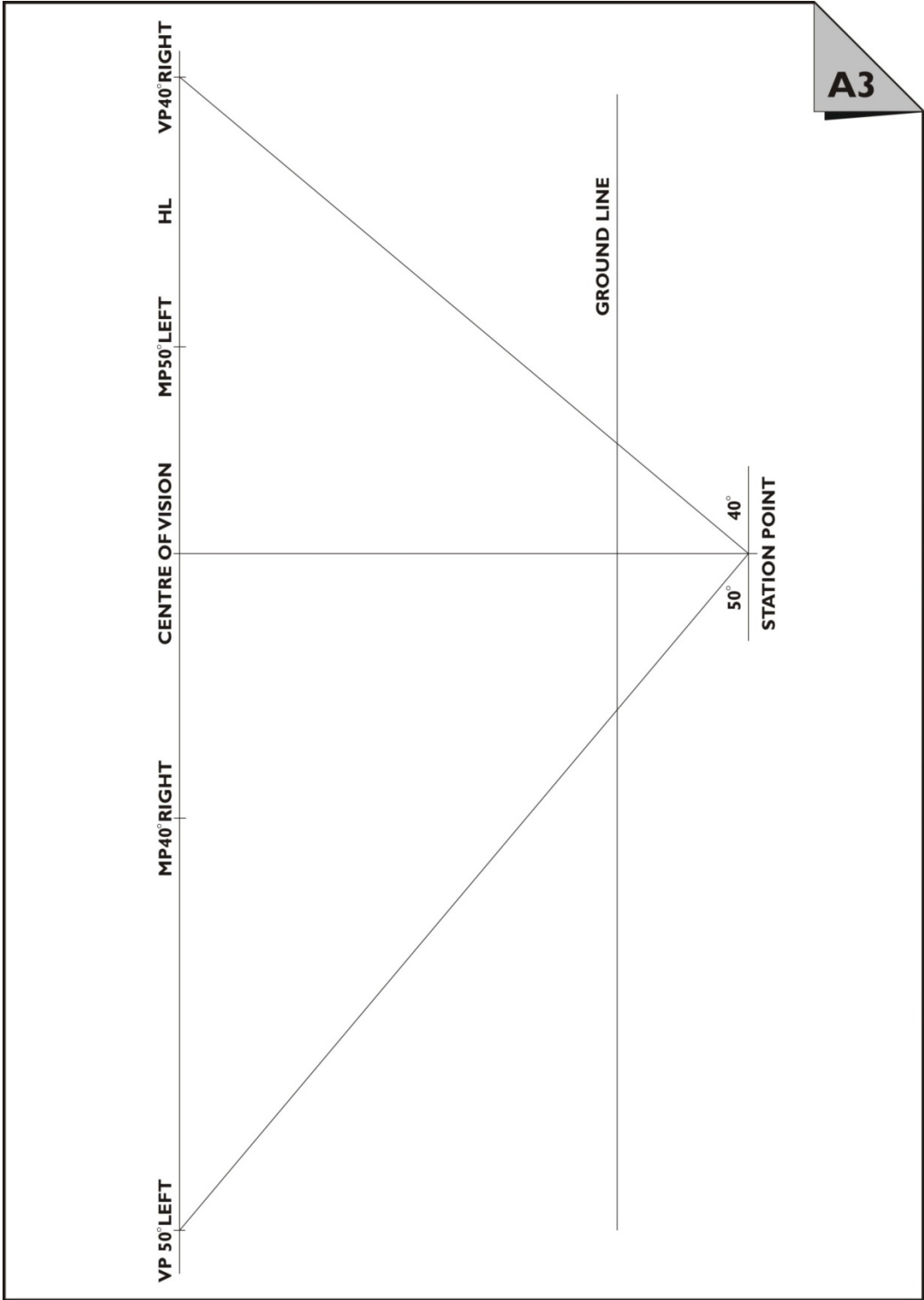


Figure 3.1 Two-point perspective measuring-point plan

Step 1 Perspective of a cube on the ground

1. All measurements in millimetres.
2. Position the station point, the ground line and the horizon line as in the layout guide. Refer to Figure 3.1.
3. The distance of the eye in front of the picture plane is 130 mm.
4. The height of the eye above the ground line is 100 mm.
5. A cube 40 x 40 x 40 mm vanishing to the right at 40° is situated on the Ground Line 26 mm to the left (a1).
6. Use an A3 sheet of drawing paper.

**IMPORTANT NOTE:**

It is important to follow the layout guide at the beginning of each module. Ensure that the layout for the drawing is central both horizontally and vertically to the dimensions of the paper to be used. (in this case A3 size) Attention to detail is most important in this subject.

Step 2

1. Position the centre of vision on the horizon line directly above the station point.

Step 3

1. Locate the vanishing point at the intersection of the horizon line and the centre of vision. Refer to Figure 3.2.

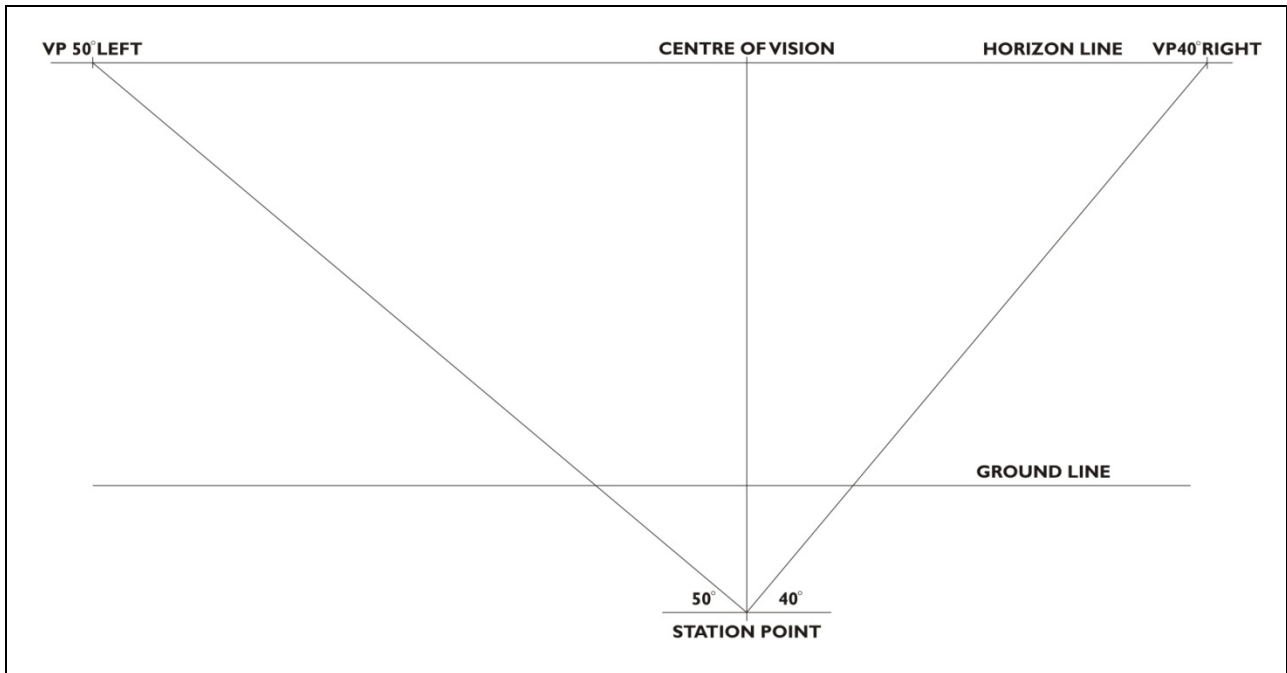


Figure 3.2 Two-point perspective measuring-point plan

Step 4

1. Locate the measuring points.
2. With the compass point on VP50° Left draw an arc from the Station Point up to the Horizon Line and mark this point MP 50° Left. Refer to Figure 3.3.

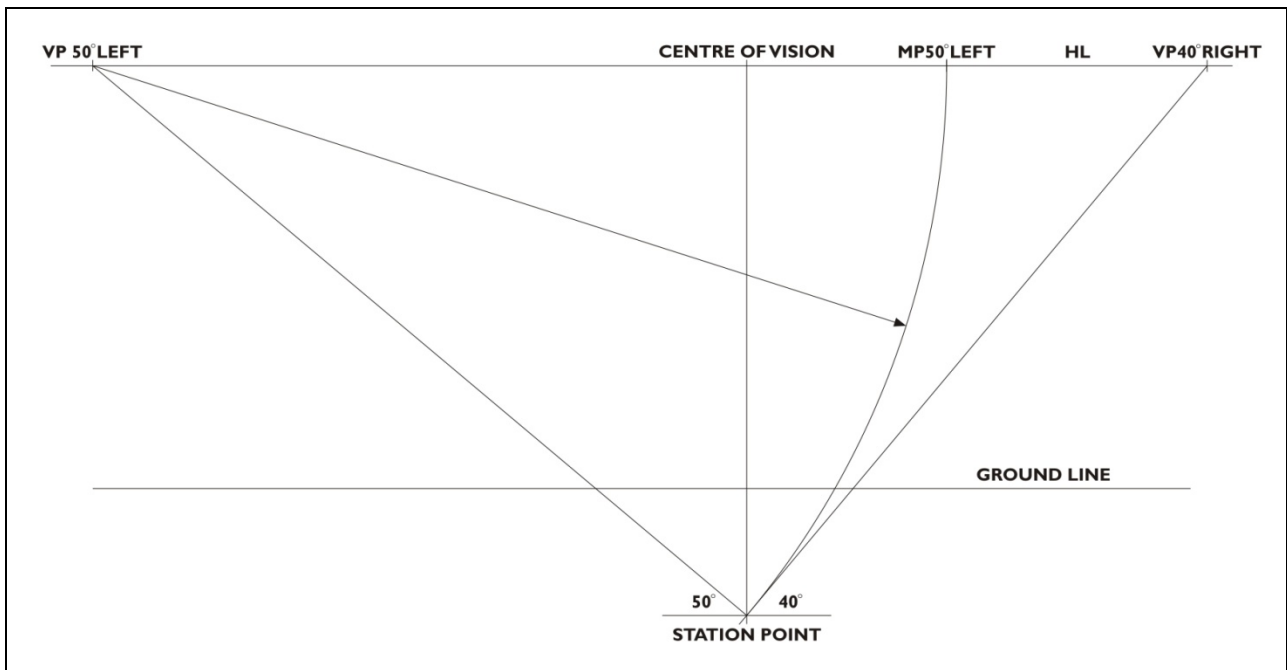


Figure 3.3 Two-point perspective establishing measuring-points

Step 4

1. Locate the measuring points.
2. With the compass point on VP40° Left draw an arc from the Station Point up to the Horizon Line and mark this point MP 40° Left. Refer to Figure 3.4.

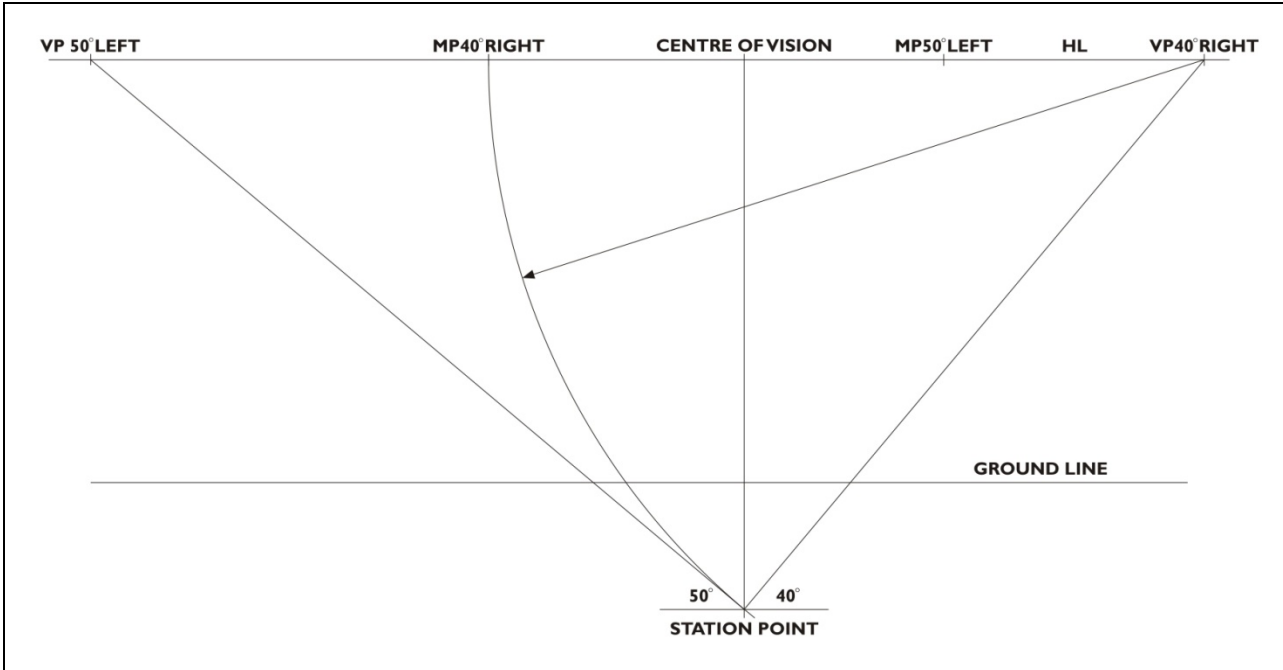


Figure 3.4 Two-point perspective establishing measuring-points

Step 5

1. Measure on the ground line point a 26 mm from the centre of vision.
2. Mark this point a.
3. From point a measure true measurement, 40 mm to the right (one side of the cube) and mark this point b.
4. From point a measure 40 mm to the left (the other side of the cube) and mark this point c. Refer to Figure 3.5.

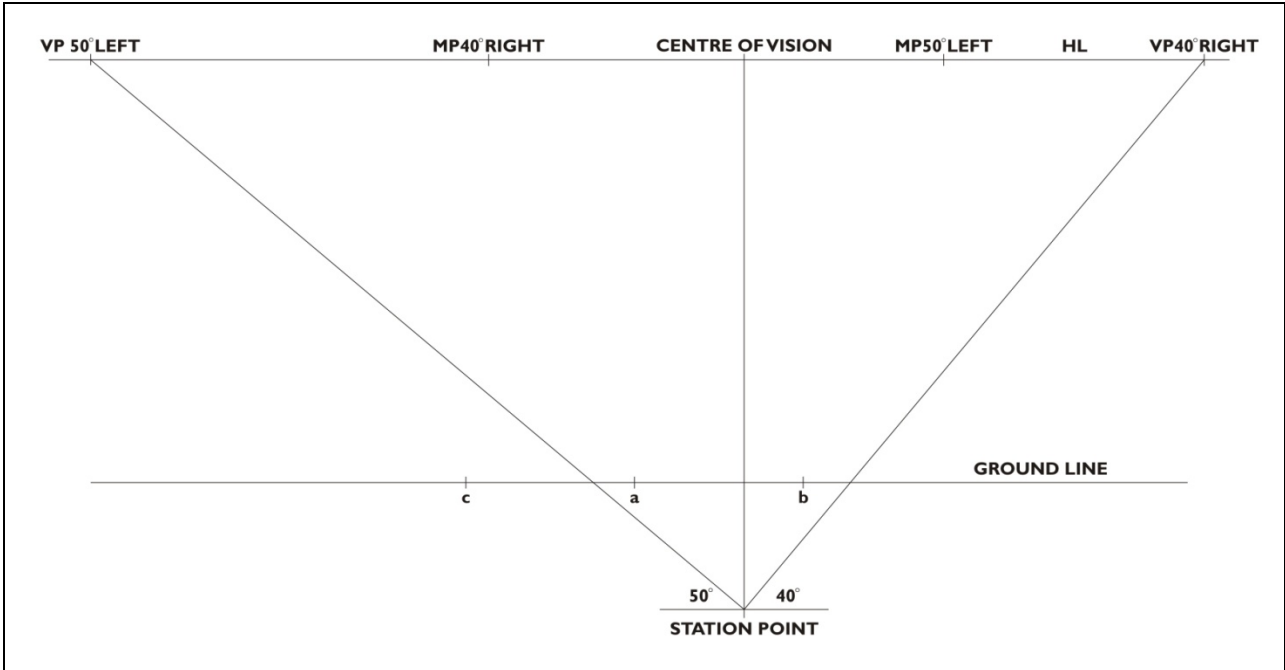


Figure 3.5 Two-point perspective establishing points a-b-c

Step 6

1. Establish the vanishing lines. From point a draw a vanishing line to VP50° Left.
2. From point a draw a vanishing line to VP40° Right. Refer to Figure 3.6.

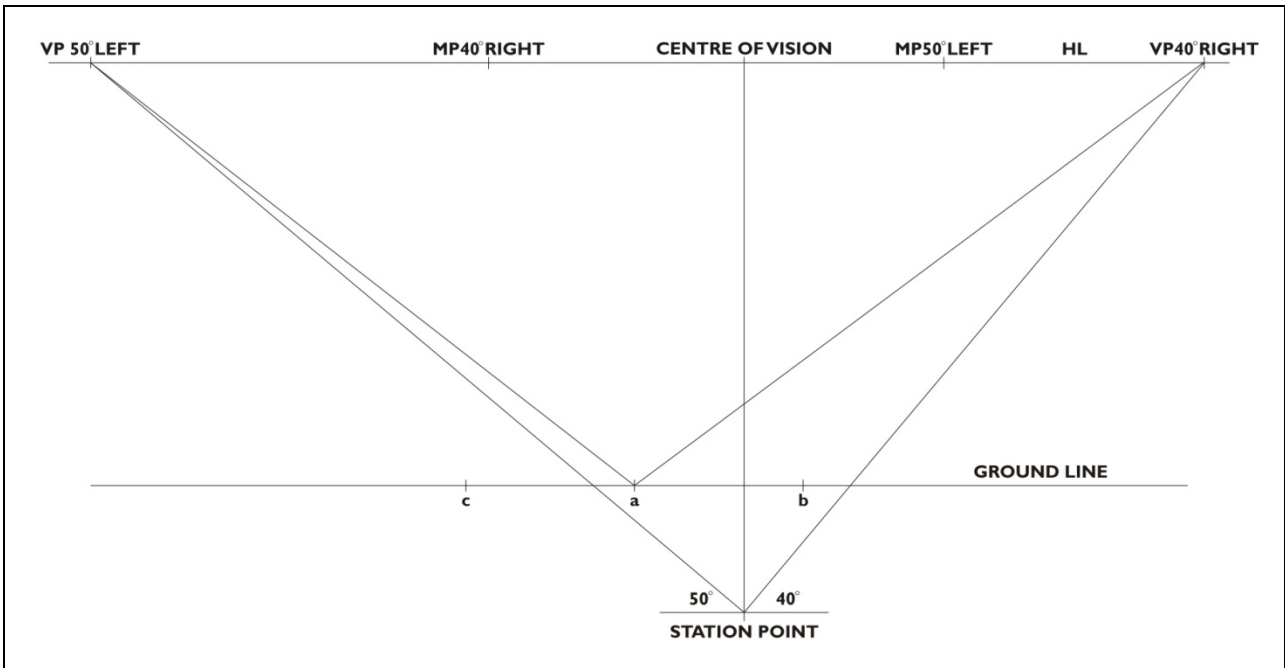


Figure 3.6 Two-point perspective vanishing lines

Step 7

1. Establish the perspective foreshortened lengths of a-b and a-c.
2. Point a vanishes to VP40° Right. To establish its perspective foreshortened length (a-b), project a line from point b to MP40° Right to create a-B.
3. Point a vanishes to VP50° Left. To establish its perspective foreshortened length (a-c), project a line from point c to MP50° Right to create a-C. Refer to Figure 3.7.

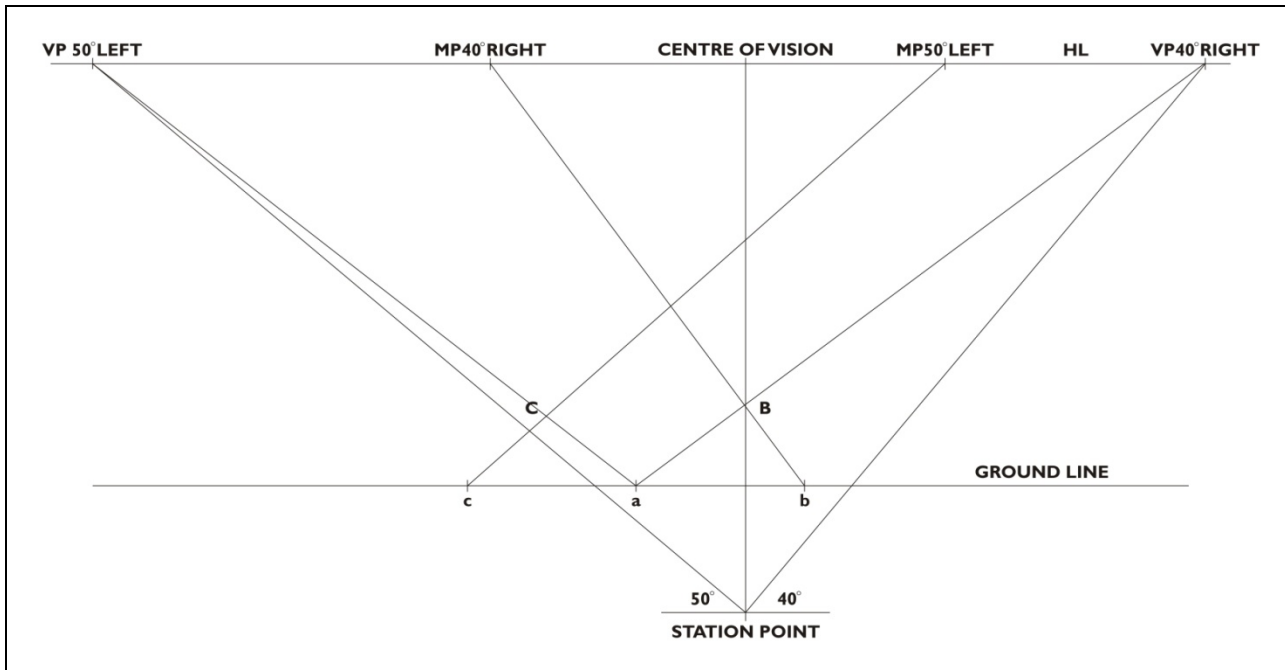


Figure 3.7 Two-point perspective using measuring points

Step 8

1. Establish the vanishing lines. From point B draw a vanishing line to VP50° Left.
2. From point C draw a vanishing line to VP40° Right.
3. Now you have created the base of the cube. Refer to Figure 3.8.

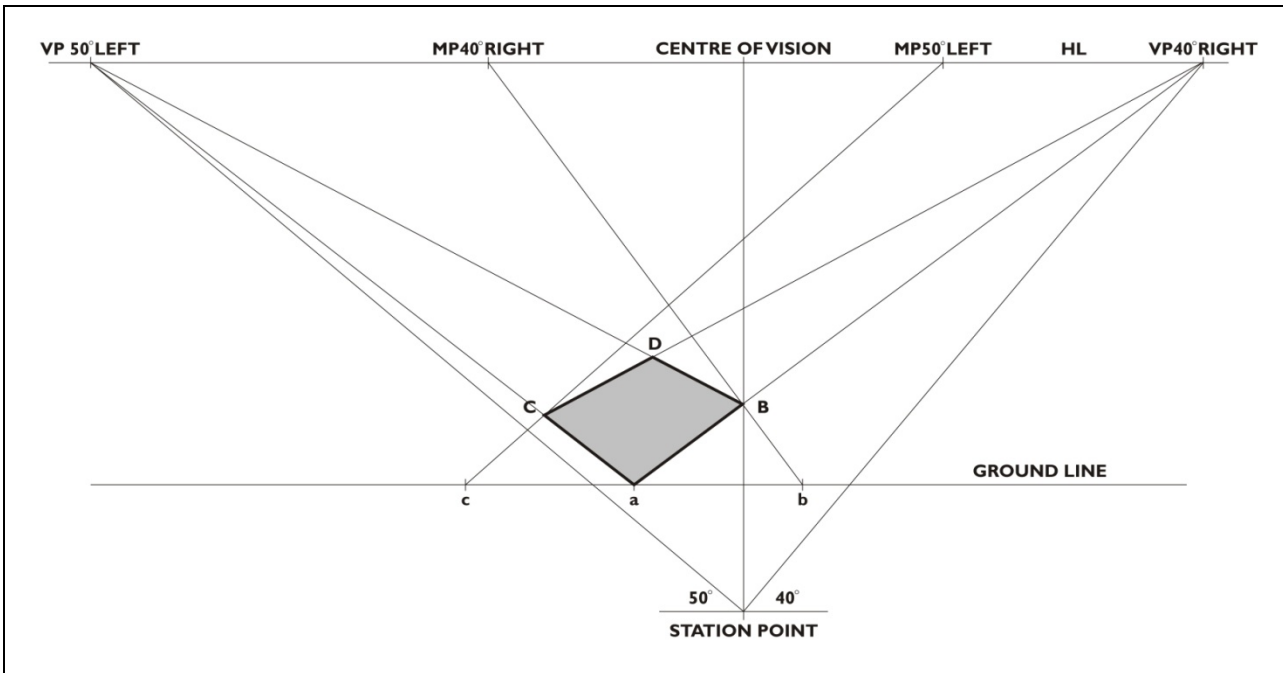


Figure 3.8 Two-point perspective base creation

Step 9

1. From point a draw a line vertically and measure 40 mm to establish the height of the cube and mark a1.
2. From point a draw a line vanishing line to VP40° Right and to VP50° Left.
3. From points B-C-D draw lines vertically to meet these vanishing lines and where they intersect create b1-c1-d1.
4. From point c1 draw a line vanishing line to VP40° Right and from b1 to VP50° Left. Refer to Figure 3.9.

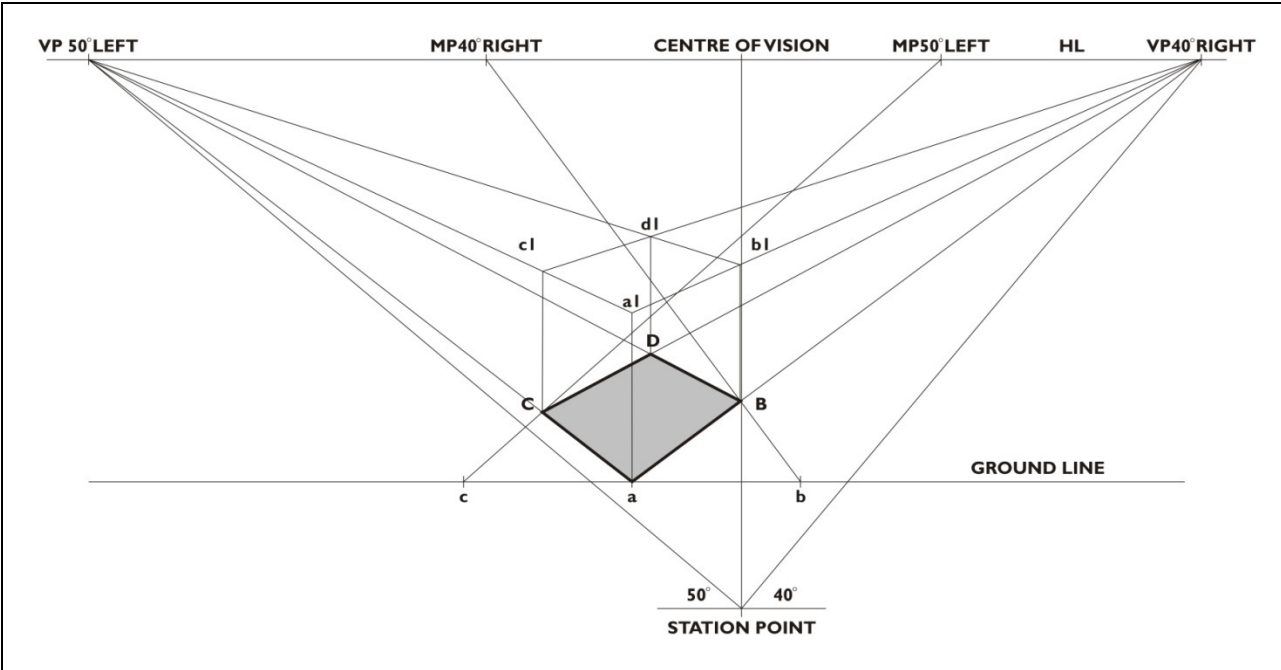


Figure 3.9 Two-point perspective cube height creation

Step 10
1. Complete the cube using a bold line rendering. Refer to Figure 3.10.

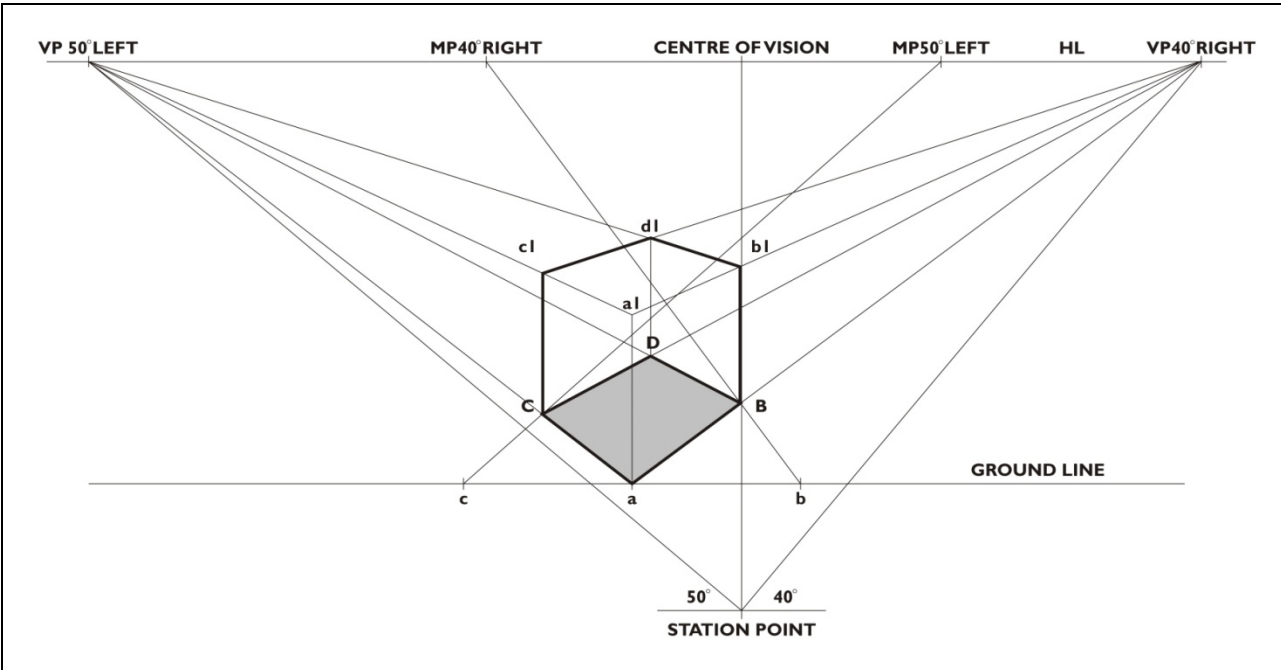


Figure 3.10 Two-point perspective cube completed



Activity 3.1

Figure 3.1 shows side and end views of a cube situated on a cube. All the measurements are given in millimetres.

Draw to scale of 1:1, a one-point perspective drawing of an object resting on the ground with sides vanishing to the left at an angle of 45°. Refer to Figure 3.11 for dimensions. The distance of the eye in front of picture plane is 130 mm and the height of the eye above the ground line is 100 mm.

Point A is situated on the ground, with its leading edge up against the picture plane, 30 mm to the right of the centre of vision.

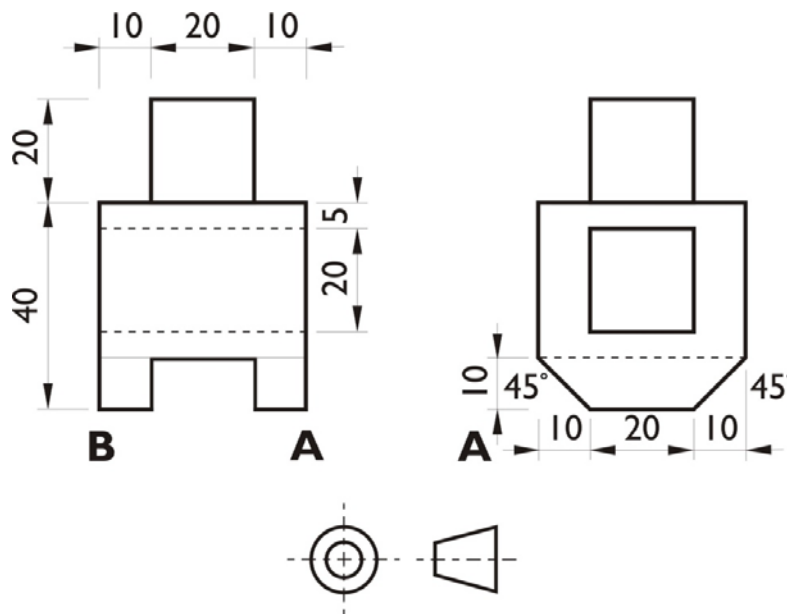


Figure 3.11 Cube situated on Cube



Important:

Layout, neatness and accuracy are important in the completion of this activity. This will set the standard for all subsequent completed activities.



Activity 3.2

Figure 3.12 shows side and end views of two cubes marked U and V. All the measurements are given in millimetres.

Draw to scale of 1:1, a one-point perspective drawing of the two objects resting on the ground with sides vanishing to the left at an angle of 45°. Refer to Figure 2.11 for dimensions. The distance of the eye in front of picture plane is 130 mm and the height of the eye above the ground line is 100 mm.

Cube U is situated on the ground line, 50 mm to the left of the centre of vision (**point a1**) and 40 mm behind the picture plane (**point a2**) and is 40 x 40 x 40 mm.

Cube V is situated on the ground line, with its leading edge up against the picture plane, 20 mm to the right of the centre of vision (**point a1**) and is 40 x 40 x 40 mm.

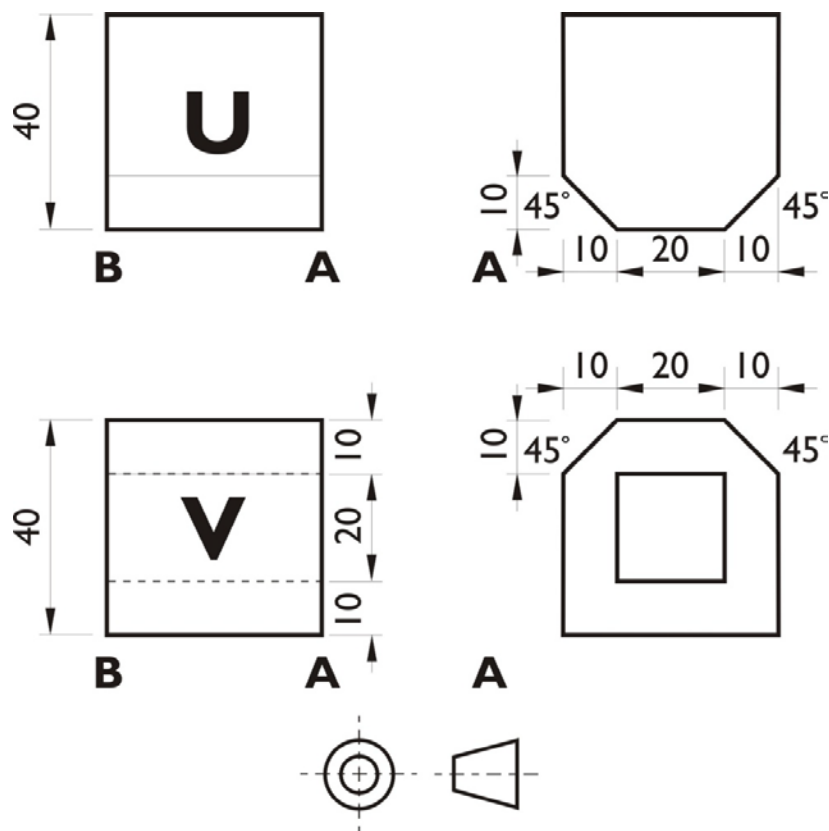


Figure 3.12 Two Cubes marked U and V



Important:

Layout, neatness and accuracy are important in the completion of this activity. This will set the standard for all subsequent completed activities.



Activity 3.3

Figure 3.13 shows side and end views of a model. All the measurements are given in millimetres.

Draw to scale of 1:1, a one-point perspective drawing of a model resting on the ground with sides vanishing to the left at an angle of 45°. Refer to Figure 2.12 for dimensions. The distance of the eye in front of picture plane is 130 mm and the height of the eye above the ground line is 90 mm.

Point A is situated on the ground, with its leading edge up against the picture plane, 30 mm to the right of the centre of vision.

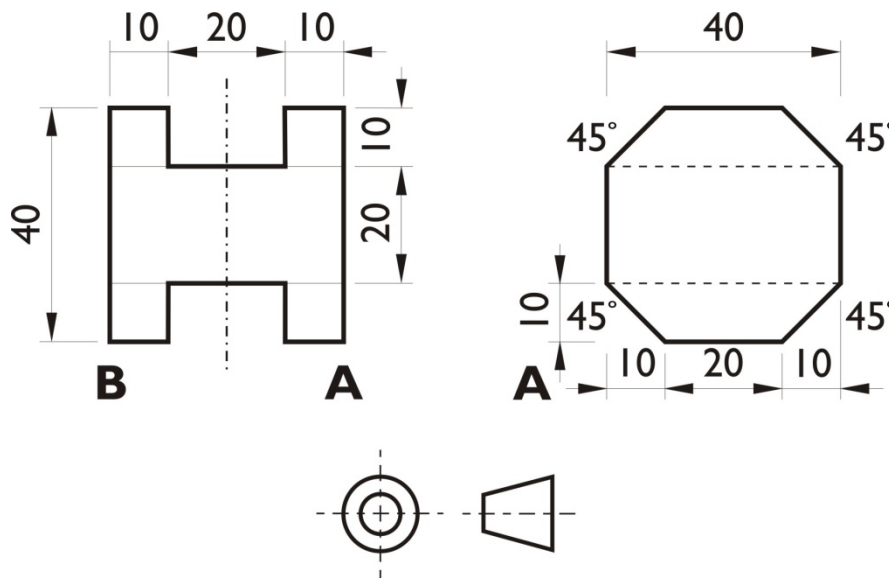


Figure 3.13 A model



Important:

Layout, neatness and accuracy are important in the completion of this activity. This will set the standard for all subsequent completed activities.



Activity 3.4

Figure 3.14 shows side and end views of a model. All the measurements are given in millimetres.

Draw to scale of 1:1, a one-point perspective drawing of an object resting on the ground with sides vanishing to the left at an angle of 45°. Refer to Figure 2.12 for dimensions. The distance of the eye in front of picture plane is 130 mm and the height of the eye above the ground line is 100 mm.

Point A is situated on the ground, with its leading edge up against the picture plane, 30 mm to the right of the centre of vision.

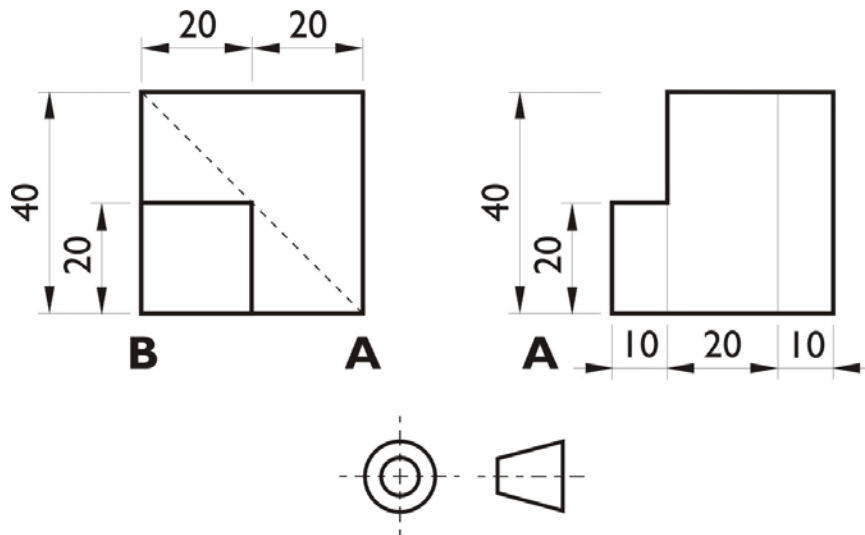


Figure 3.14 A model



Important:

Layout, neatness and accuracy are important in the completion of this activity. This will set the standard for all subsequent completed activities.



Activity 3.5

Figure 3.15 shows side and end views of a model. All the measurements are given in millimetres.

Draw to scale of 1:1, a two-point perspective drawing of an object resting on the ground with sides vanishing to the left at an angle of 45°. Refer to Figure 2.14 for dimensions. The distance of the eye in front of picture plane is 130 mm and the height of the eye above the ground line is 100 mm.

Cube U is situated on the ground line, 50 mm to the left of the centre of vision (**point a1**) and 40 mm behind the picture plane (**point a2**) and is 40 x 40 x 40 mm.

Cube V is situated on the ground line, with its leading edge up against the picture plane, 20 mm to the right of the centre of vision (**point a1**) and is 40 x 40 x 40 mm.

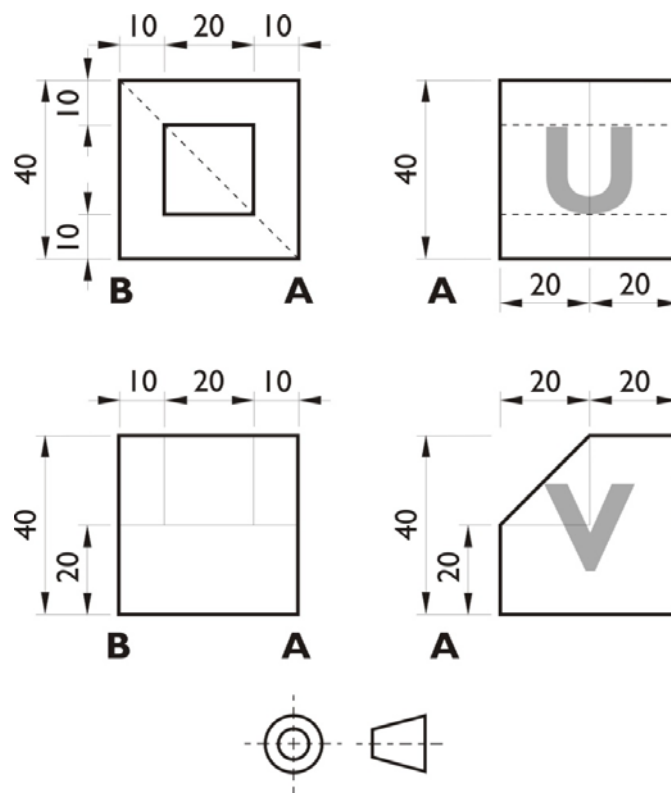


Figure 3.15 Two Cubes marked U and V



Important:

Layout, neatness and accuracy are important in the completion of this activity. This will set the standard for all subsequent completed activities.



Self-Check

I am able to:	Yes	No
1 TWO POINT PERSPECTIVE DRAWINGS		
<ul style="list-style-type: none"> • identify and describe each of the following points and distances: 		
<ul style="list-style-type: none"> ○ Picture plane 		
<ul style="list-style-type: none"> ○ Left vanishing point 		
<ul style="list-style-type: none"> ○ Right vanishing point 		
<ul style="list-style-type: none"> ○ Horizon line 		
<ul style="list-style-type: none"> ○ Centre of vision 		
<ul style="list-style-type: none"> ○ Ground line 		
<ul style="list-style-type: none"> ○ Ground plane 		
<ul style="list-style-type: none"> ○ Station point (eye) 		
<ul style="list-style-type: none"> ○ Height of eye above the ground line 		
<ul style="list-style-type: none"> ○ Distance of eye in front of picture plane 		
<ul style="list-style-type: none"> ○ New centre of vision 		
<ul style="list-style-type: none"> ○ New horizon lines 		
<ul style="list-style-type: none"> ○ Measuring point for the centre of vision 		
<ul style="list-style-type: none"> ○ Raised ground line 		
<ul style="list-style-type: none"> ○ New measuring point up/down 		
<ul style="list-style-type: none"> ○ New vanishing point up/down 		
<ul style="list-style-type: none"> • Accurately draw three two-point perspective views of single components or items as presented in Step by Step lessons and Activities. 		
<p>If you have answered 'no' to any of the outcomes listed above, then speak to your facilitator for guidance and further development.</p>		

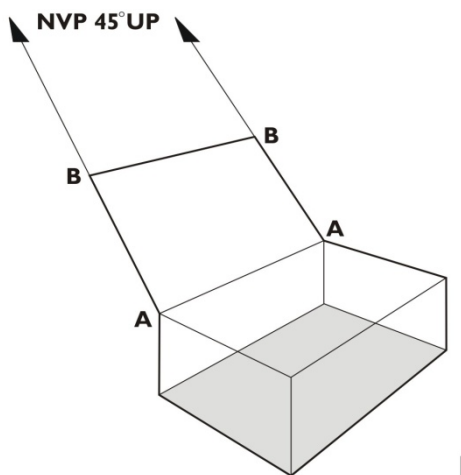
Module 4

Three-Point Perspective Drawings

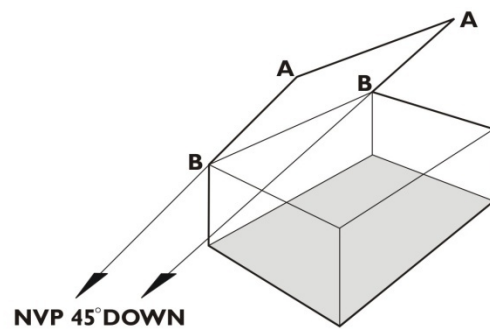
Learning Outcomes

On completion of this module the student must be able to:

- Draw the following exercises in three-point perspective:
 - Raised and lowered vanishing point.
 - Box and lid with ascending and descending planes.



1



2

- Draw various three-point perspective views of single components or items as presented in Step by Step lessons and Activities.

4.1 Introduction



In this module we will show you how to draw objects in three-point perspective, using the measuring point method. This will include:

- Preparing the measuring point plan.
- Understanding raised and lowered vanishing points and where they

occur.

- Establishing the New Centre of Vision, New Station Point, New Vanishing Point Up and Down, New Measuring Points Up and Down and the Intersection Line.

4.2 Three-point perspective – Measuring-point method



Worked example 1

The following steps show you how to construct the layout and the drawing in three-point perspective. Use A3 paper size (297 x 420 mm).

4.3 Raised and Lowered Vanishing Points

Step 1

1. Position the station point, the ground line and the horizon line. Refer to Figure 4.1 for information.
2. The distance of the eye in front of the picture plane is 130 mm.
3. The height of the eye above the ground line is 100 mm.
4. A box is situated on the ground 20 mm to the left of the Centre of Vision and 15 mm behind the Picture Plane.
5. Use an A3 sheet of drawing paper.



IMPORTANT NOTE:

It is important to follow the layout guide at the beginning of each module. Ensure that the layout for the drawing is central both horizontally and vertically to the dimensions of the paper to be used. (in this case A3 size) Attention to detail is most important in this subject.

A Box with two lids at 45° angles up and down

1. Construct the box as shown with two lids, one vanishing down and the other vanishing up.

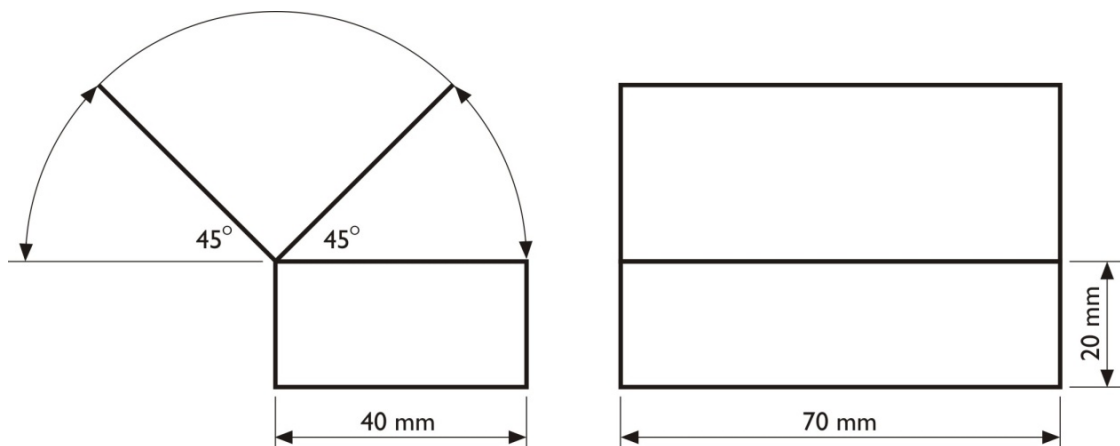


Figure 4.2 A Box with two lids dimensions



IMPORTANT NOTE:

When facing a problem involving raised and lowered Vanishing Points, first establish which side of the Picture Plane will contain the raised/lowered Vanishing Points.

AN EXAMPLE:

1. In the drawings shown in figure 4.3, the edges marked with 'A' are both nearer to the eye, therefore the Vanishing Points are along the projected line from A to B.
2. In detail (1) the raised Vanishing Points will be above VP left.
3. In detail (2) the lowered Vanishing Points will be below VP left.

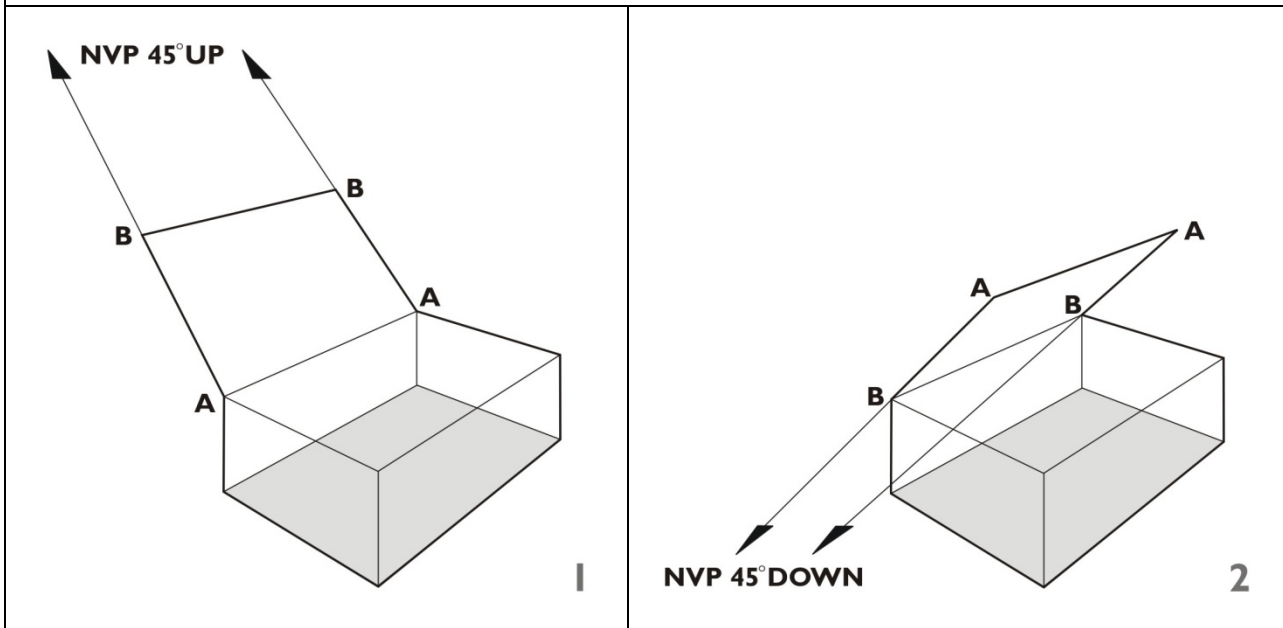


Figure 4.3 Raised (1) and Lowered (2) vanishing points example

Step 2

1. Position the centre of vision on the horizon line directly above the station point, both horizontally and vertically centred on the page as shown in Figure 4.1 and as in two point perspective. Refer to Figure 4.4 for information.

Step 3

1. As the (1) box lid vanishes up at a 45° angle to the left, so a new Horizon Line has to be established above and below VP45° Left.

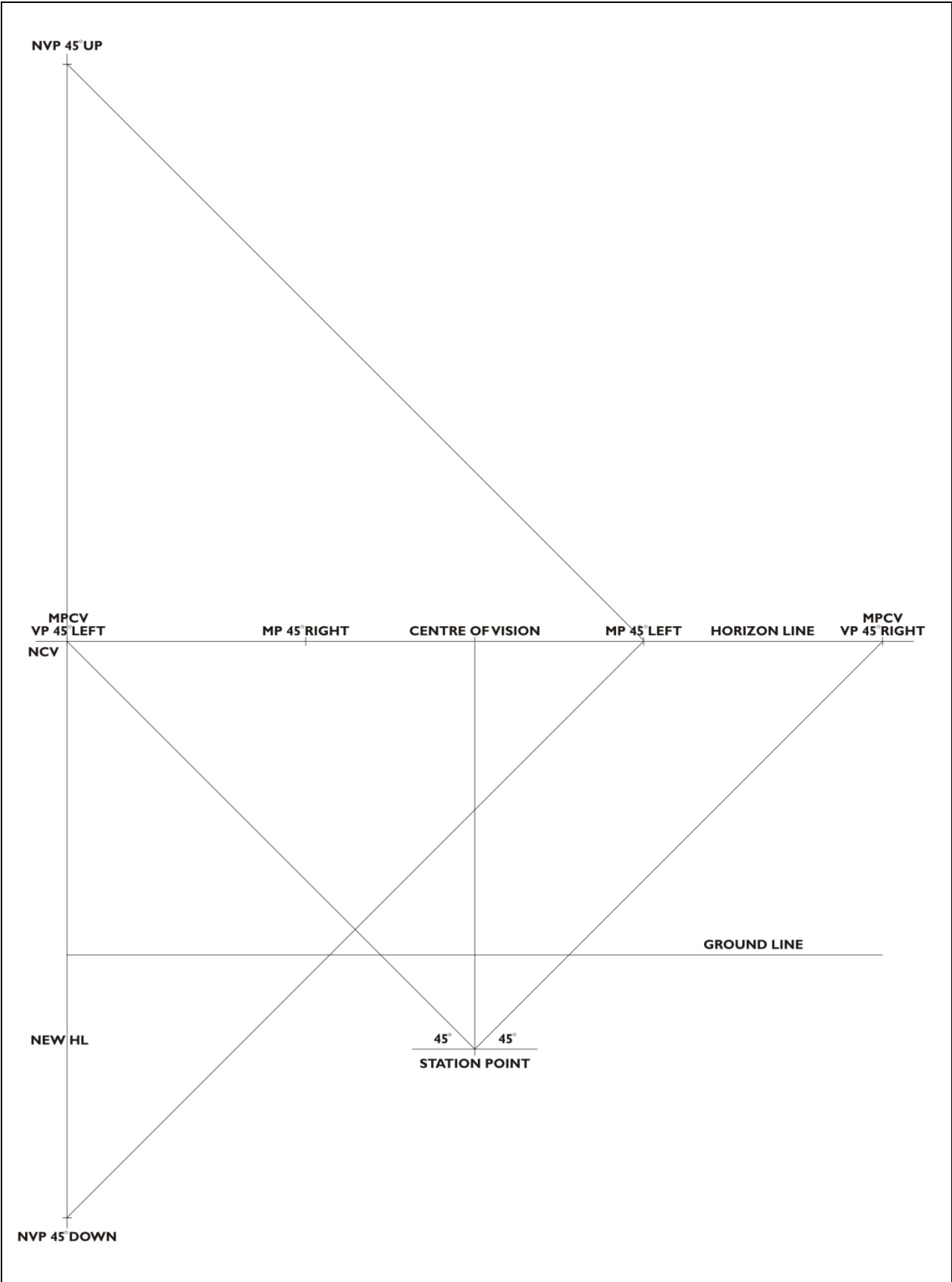


Figure 4.4 Three-point perspective layout

Step 4

1. From MP45° Left, which becomes the New Station Point, project a line at a 45° angle upwards to create New Vanishing Point 45° UP. Refer to Figure 4.5 for information.
2. From MP45° Left, project a line at a 45° angle downwards to create New Vanishing Point 45° Down.
3. Vanishing Point 45° Left now becomes the New Centre of Vision.

Step 5

1. The base of the box is situated on the ground 20 mm to the left of the Centre of Vision and 15 mm behind the Picture Plane. Refer to Figure 4.6 for information.
2. Measure to the right of the centre of vision 20mm along the ground line to create a1.
3. Measure back from a1 along the ground line 15mm to create a2.
4. Where the two intersect mark POINT A.

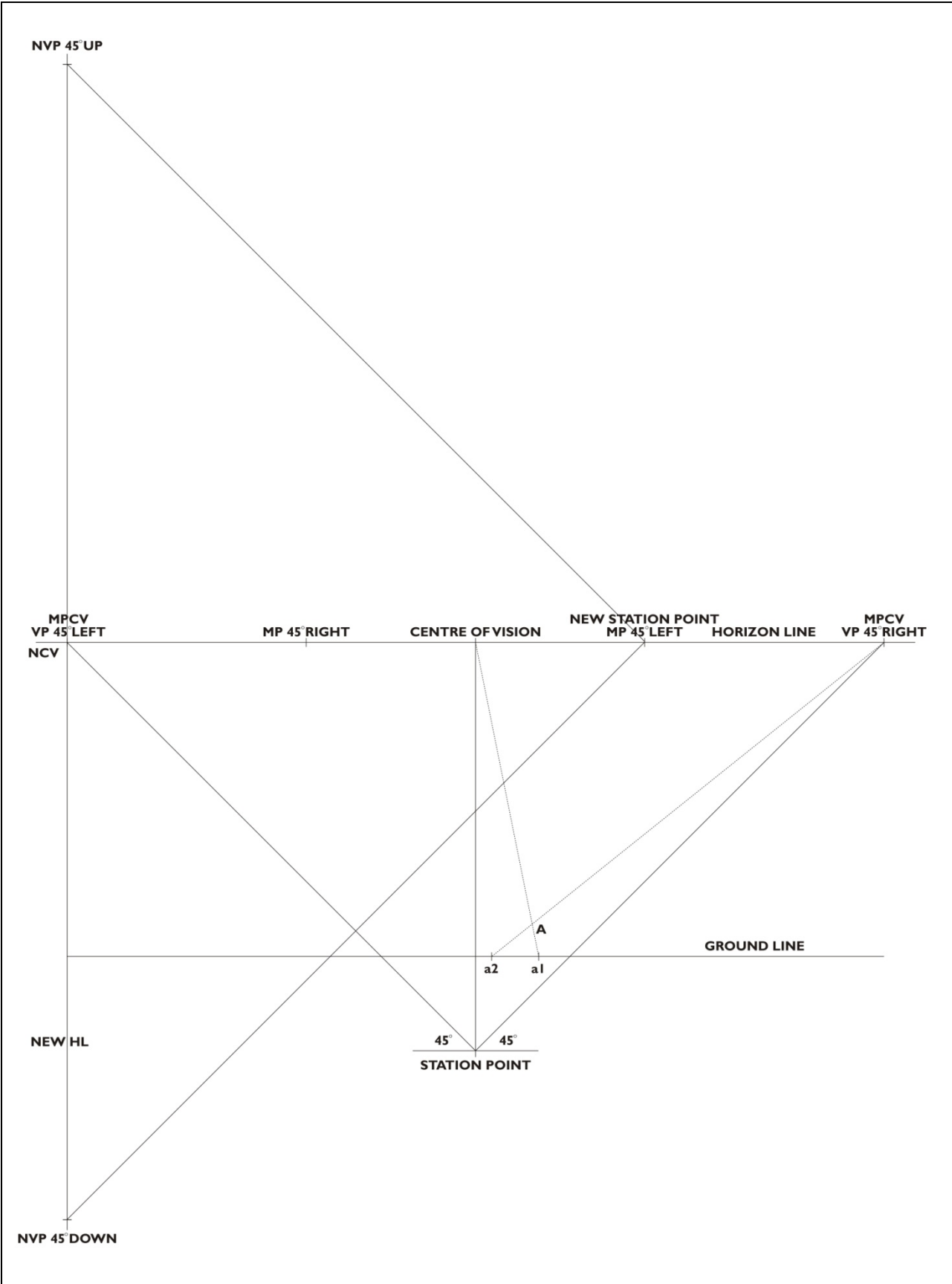


Figure 4.6 Three-point perspective establish Point A

Step 6

1. To create the base of the box on the ground line, draw a line from point A to VP 45° Right. Refer to Figure 4.7 for information.
2. To measure the length of the one side of the box, project a line from MP 45° Left through POINT A onto the ground line to create point a3 on the ground line.
3. Measure along the ground line to the right 70mm to establish point b.
4. From point b project back to MP 45° Left and where it intersects the vanishing line B creates the perspective foreshortened length of a3 - b.

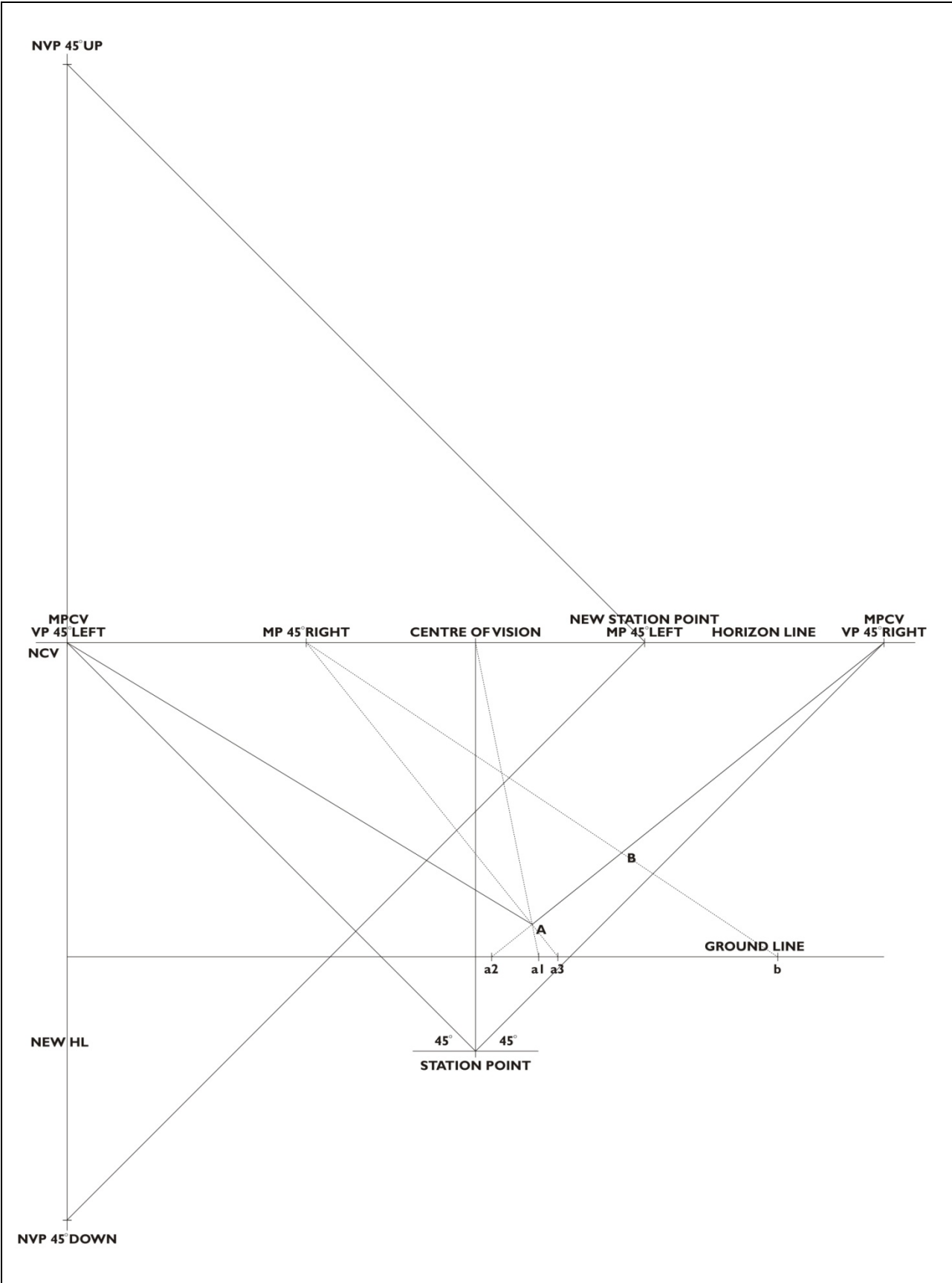


Figure 4.7 Three-point perspective establish length of one side

Step 7

1. To create the other side of the box on the ground line, draw a line from point A to VP 45° Left. Refer to Figure 4.8 for information.
2. To measure the length of the other side of the box, project a line from MP 45° Left through POINT A onto the ground line to create point a4 on the ground line.
3. Measure along the ground line to the left 40mm to establish point c.
4. From point c project back to MP 45° Left and where it intersects the vanishing line C creates the perspective foreshortened length of a4 - c.
5. To create the other sides of the box, project lines from POINTS B and C to their respective vanishing points to create D.

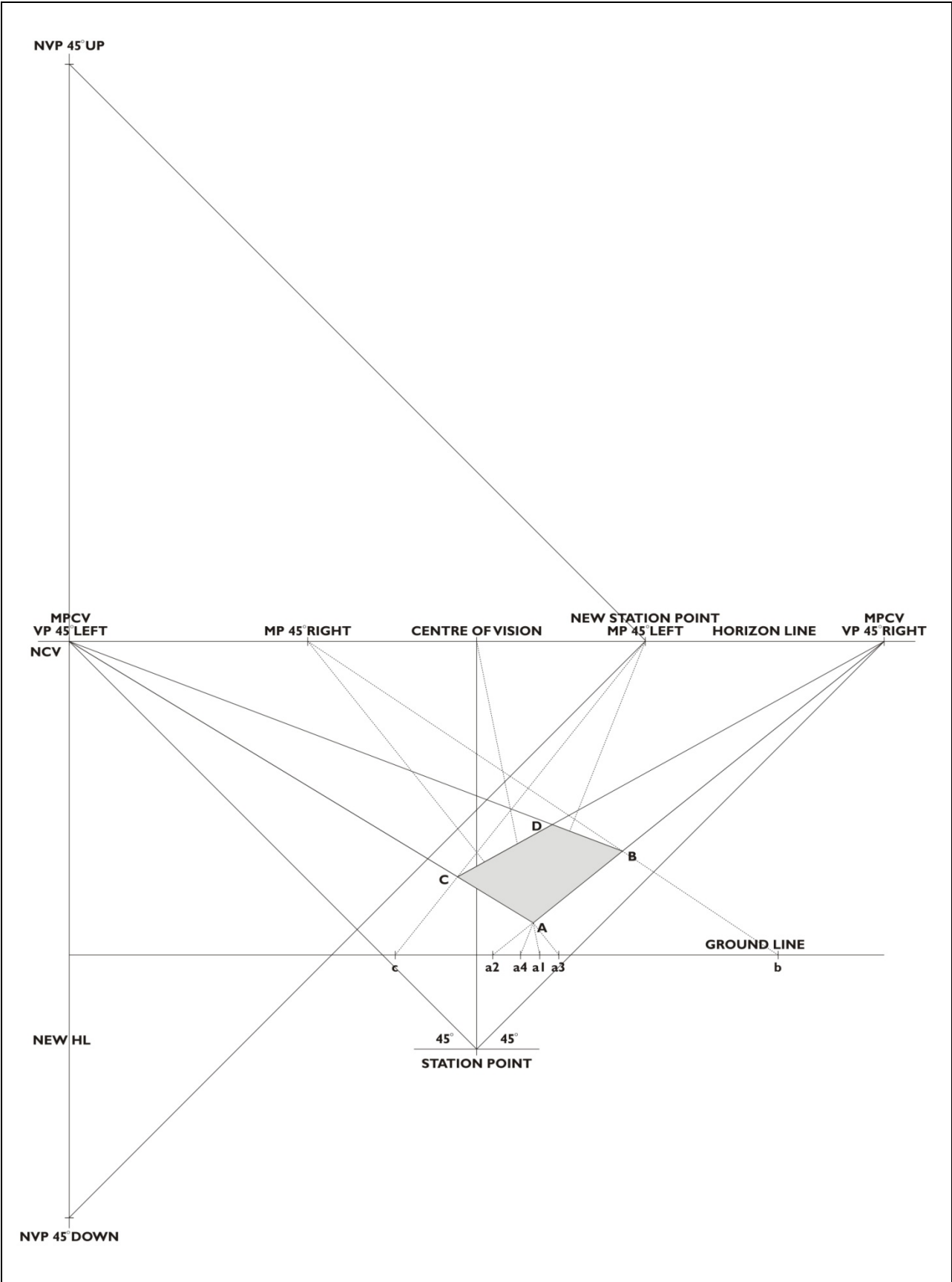


Figure 4.8 Three-point perspective establish base of box

Step 8

1. To create the height of the box from the ground line, draw a line from point a4 vertically and measure 20mm to create point e. Refer to Figure 4.9 for information.
2. Because a4 is MP 45° Left reference point on the ground line, project a line from e back to this measuring point.
3. From POINT A vertically up and where it intersects the measuring line MP 45° Left creates the perspective foreshortened length of a4 - e.
4. To create the top sides of the box, project lines from POINT E to their respective vanishing points.
5. From B-C-D project vertical lines and where they intersect the vanishing lines create B-G, C-F and D-H.
6. Project lines from F and G to their respective vanishing points and the top of the box is now complete.

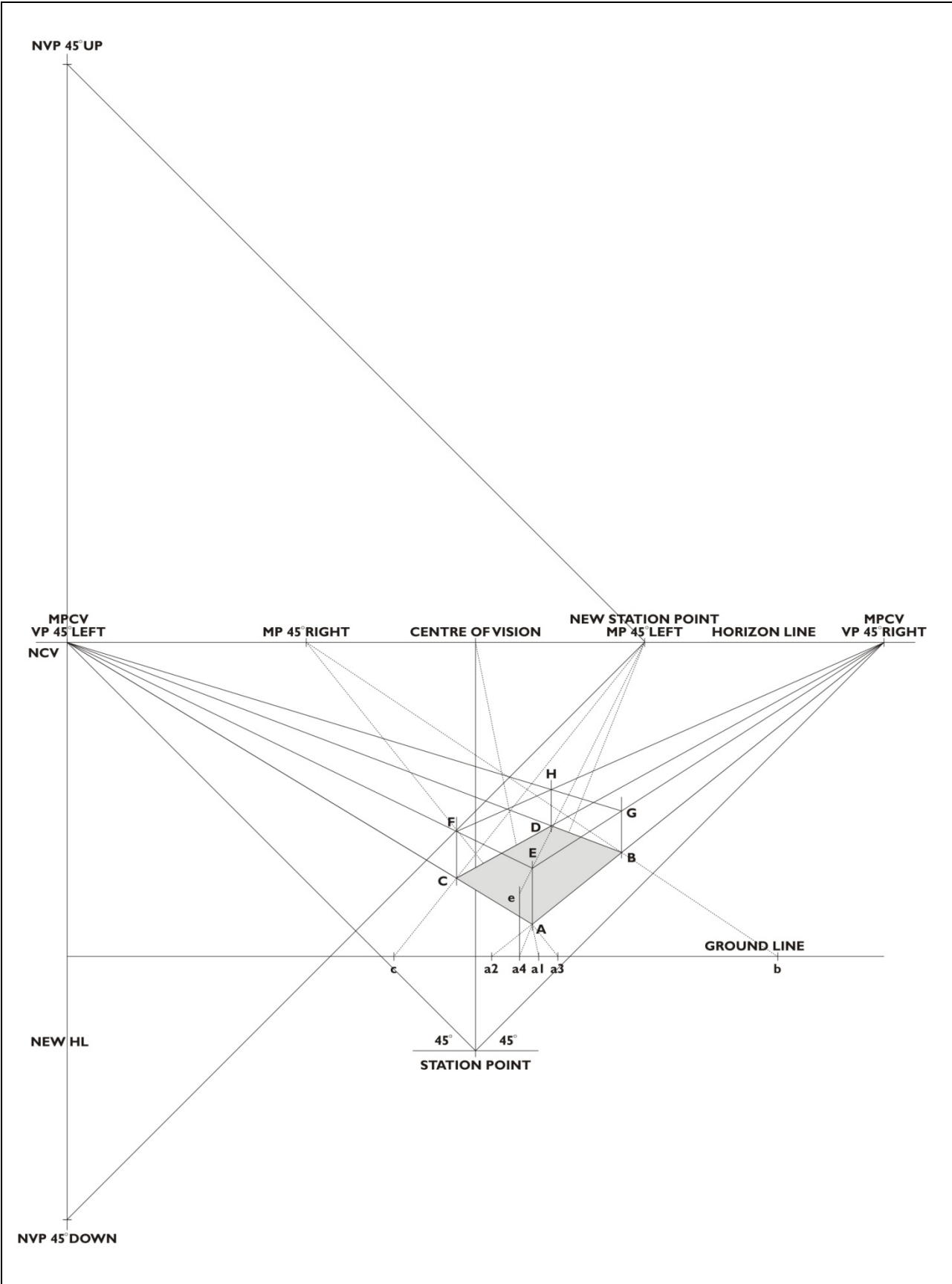


Figure 4.9 Three-point perspective establish top of box

Step 9

1. To create the lid of the box, project lines from points F and H, the pivot or hinge points, to NVP 45° Up. Refer to Figure 4.2 and 4.10 for information.
2. To measure the width of the box lid, a measuring point has to be established. As the lid is vanishing up to NVP 45° Up its measuring point has to be established.
3. With the compass point on NVP 45° Up cast an arc from MP 45° Left to the NHL and where it intersects label NMP 45° Up.
4. In order to measure the width of the lid, a ground line has to be established in the vertical plane. This is achieved by drawing a line called the INTERSECTION LINE from VP 45° Left/New CV through point A onto the original ground line.
5. Where this intersects draw a vertical line labelled New Ground Line.
6. From NMP 45° Up draw a line through point F onto the New Ground Line and label f, measure the width of the box 40mm and from that point h project back to NMP 45° Up.
7. Where the projection of h intersects F label H.
8. From H project a line to VP 45° Right.
9. This creates the perspective foreshortened length of E – F in its open position.
10. Complete the box using a bold line rendering.

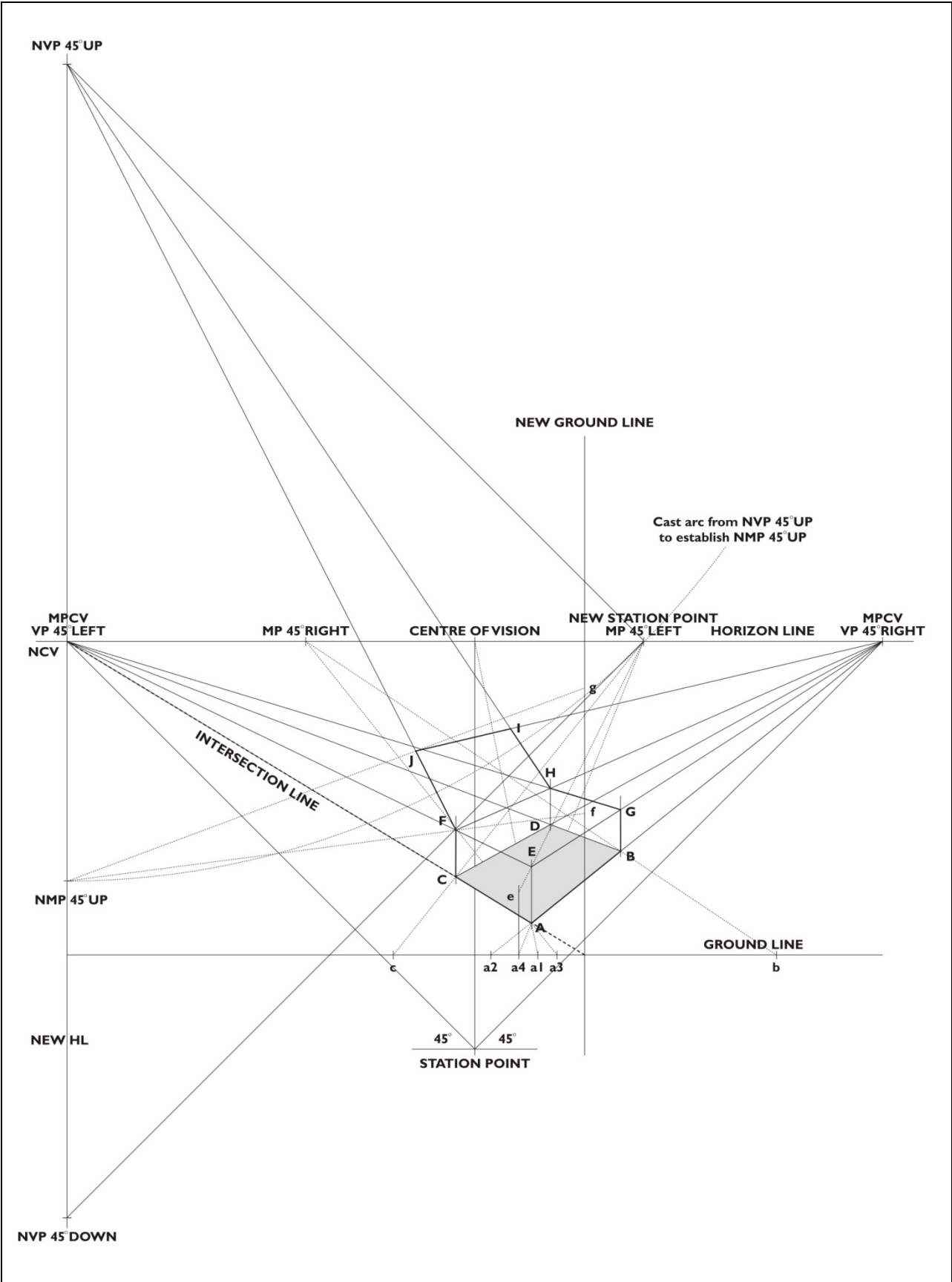


Figure 4.10 Three-point perspective establish lid of box and completion

4.4 A Box with Ascending and Descending Planes continued

Step 1

1. To create the lid vanishing down Refer to Figure 4.1 example (2) for information.
2. To create the other lid of the box, project lines from points F and H, the pivot or hinge points, to NVP 45° Down. Refer to Figure 4.2 and 4.10 for information.
3. To measure the width of the box lid, another measuring point has to be established. As the lid is vanishing down to NVP 45° Down its measuring point has to be established.
4. With the compass point on NVP 45° Down cast an arc from MP 45° Left to the NHL and where it intersects label NMP 45° Down.
5. From NMP 45° Down draw a line through point F/K onto the New Ground Line and label k, measure the width of the box 40mm and from that point I project back to NMP 45° Down.
6. Where the projection of I intersects F/K label L.
7. From L project a line to VP 45° Right.
8. This creates the perspective foreshortened length of E – F in its open position.
9. Complete the box using a bold line rendering.

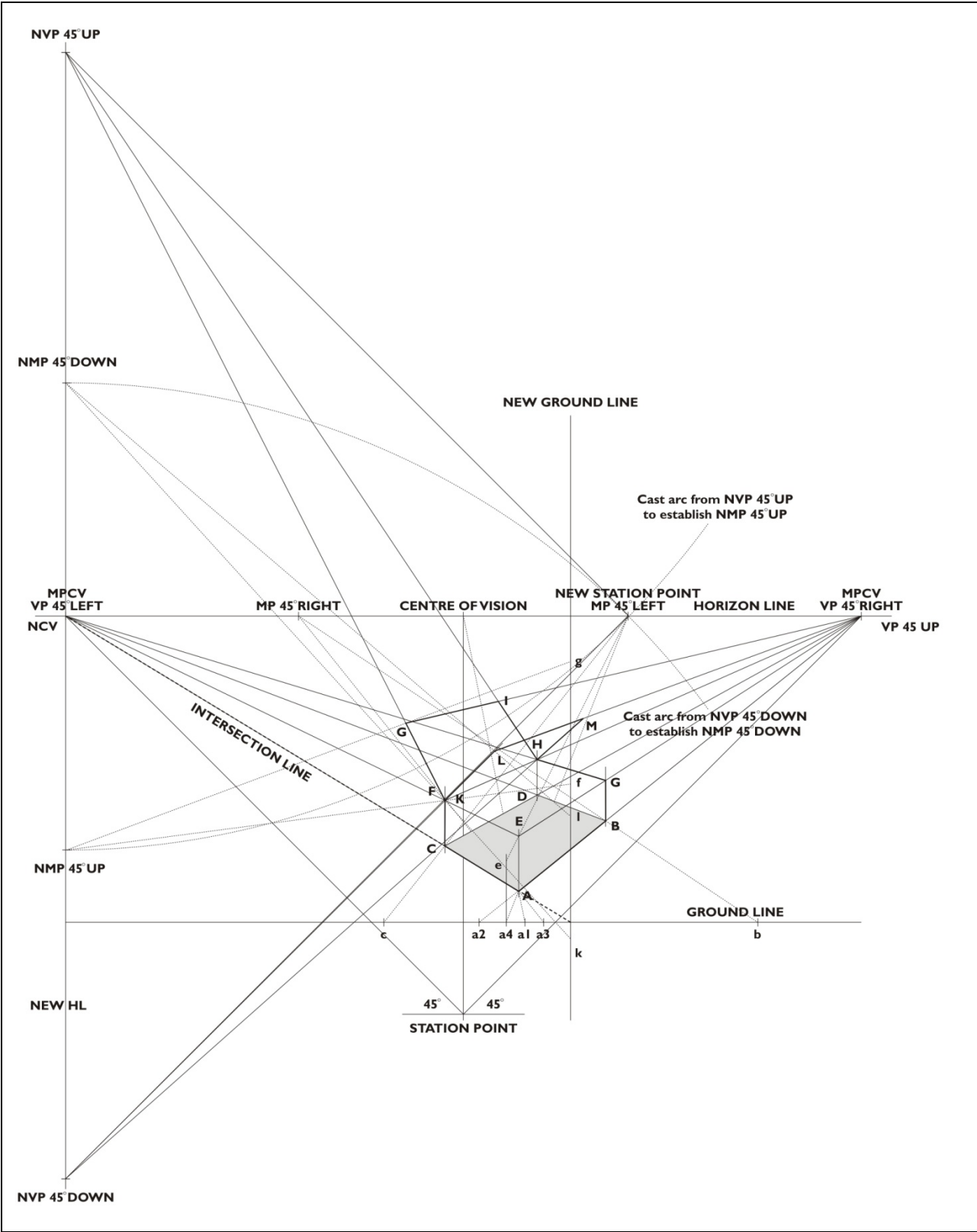


Figure 4.11 Three-point perspective establish other lid of box and completion



Activity 4.1

Figure 4.12 shows side and end views of a model. All the measurements are given in millimetres.

Draw to scale of 1:1, a three-point perspective drawing of an object resting on the ground with sides vanishing to the left at an angle of 45°. Refer to Figure 4.16 for dimensions. The distance of the eye in front of picture plane is 130 mm and the height of the eye above the ground line is 100 mm.

Point A is situated on the ground, with its leading edge up against the picture plane, 30 mm to the right of the centre of vision.

Construct as per two point perspective with a raised vanishing point.

Point A is situated 30 mm to the right (al) of the C.V.

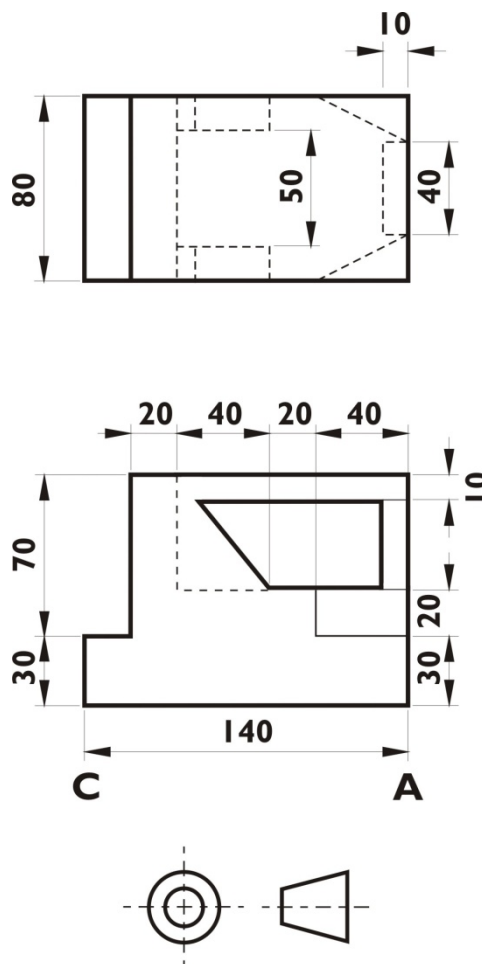


Figure 4.12 A model

**Important:**

Layout, neatness and accuracy are important in the completion of this activity. This will set the standard for all subsequent completed activities.

**Activity 4.2**

Figure 4.13 shows side and end views of a model. All the measurements are given in millimetres.

Draw to scale of 1:1, a three-point perspective drawing of an object resting on the ground with sides vanishing to the left at an angle of 45° . Refer to Figure 4.13 for dimensions. The distance of the eye in front of picture plane is 130 mm and the height of the eye above the ground line is 100 mm.

Point A is situated on the ground, with its leading edge up against the picture plane, 30 mm to the right of the centre of vision.

An object with ascending and descending planes.

Construct as per two point perspective with raised and lower vanishing points.

All measurements are given in millimetres.

Distance of the eye in front of the P.P. is 130 mm.

Height of the eye above the G.L. is 100 mm.

Point A is situated 30 mm to the right of the C.V (**a1**).

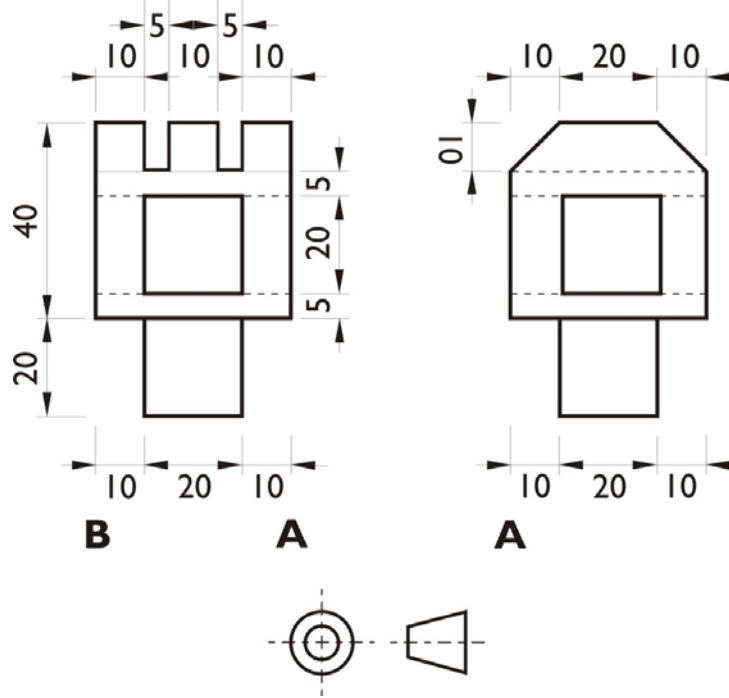


Figure 4.13 A model



Important:

Layout, neatness and accuracy are important in the completion of this activity. This will set the standard for all subsequent completed activities.



Self-Check

I am able to:	Yes	No
1 THREE POINT PERSPECTIVE DRAWINGS		
• Draw the following exercises in three-point perspective:		
○ Raised and lowered vanishing point		
○ Box and lid with ascending and descending planes		
• Draw various three-point perspective views of single components or items as presented in Step by Step lessons and Activities.		

If you have answered 'no' to any of the outcomes listed above, then speak to your facilitator for guidance and further development.

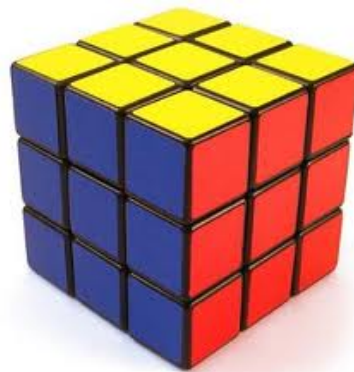
Module 5

Construct a Three-Point Perspective Grid

Learning Outcomes

On completion of this module the student must be able to:

- Construct a three-point perspective grid accurately and then draw the following objects:
 - Rubik Cube.



- Glass Rubik Cube (transparent).
- Draw the following activities on the prepared grid using a selected ratio mathematically calculated between the orthographic drawing and the grid (unit measurements).

5.1 Three-point perspective Grid – Measuring-point method



Worked example 1

The following steps show you how to plan the layout and construct the drawing of a three-point perspective grid.

Use A3 paper size (297 x 420 mm).

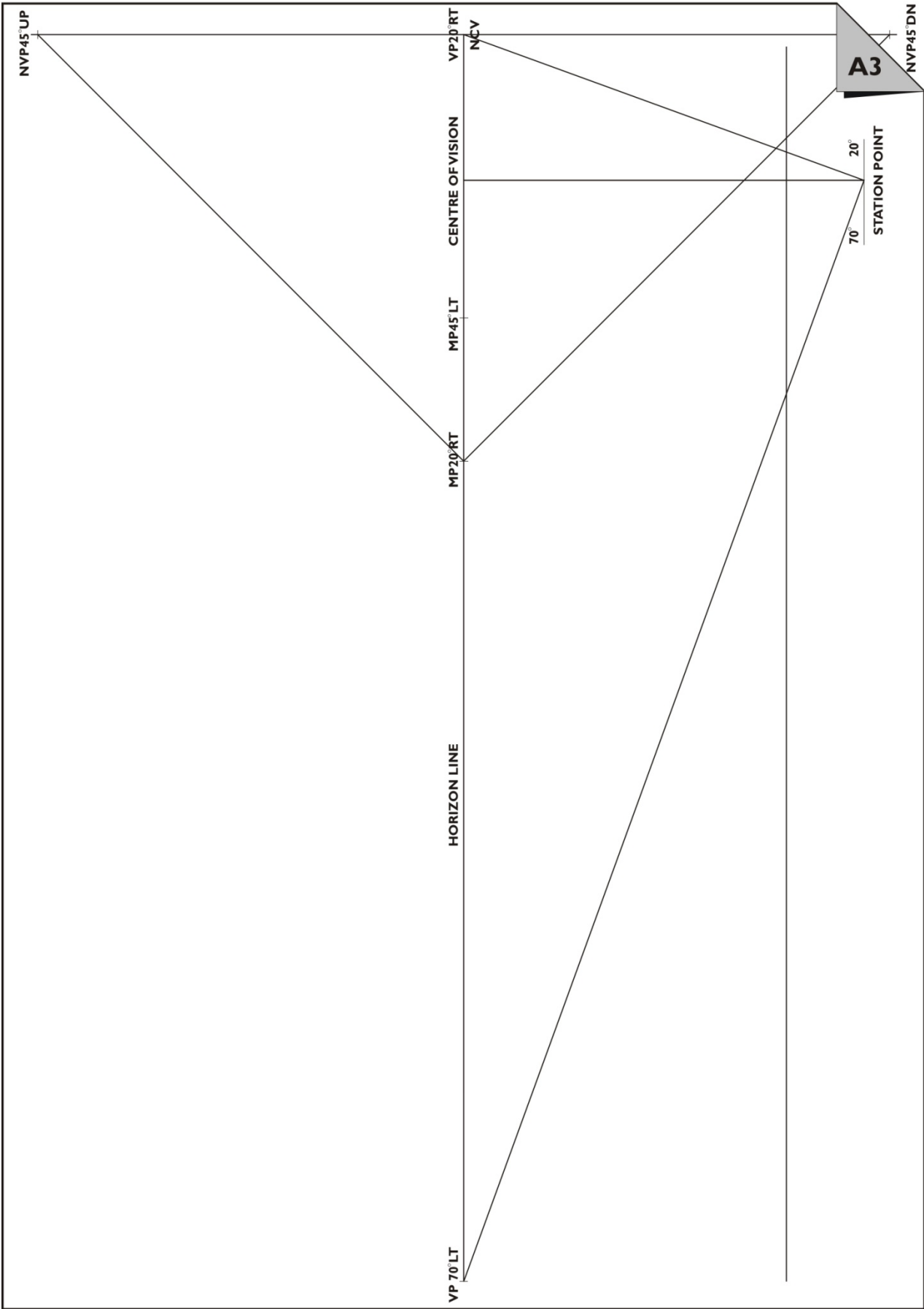


Figure 5.1 Three-point perspective grid measuring-point plan

5.2 Construction of a Three-point perspective Grid

Step 1

1. Position the station point, the ground line and the horizon line. Refer to Figure 5.1 for information.
2. The distance of the eye in front of the picture plane is 129 mm.
3. The height of the eye above the ground line is 103 mm.
4. The object is 20° to the left of Picture Plane and is elevated to the right at 45° to the ground.
5. The 3-Point Perspective Grid is convenient to construct as a cube in perspective, however in this exercise the cube is extended somewhat and is an oblong (80 high x 80 wide x 160 long).
6. ALL measurements in millimetres.



IMPORTANT NOTE:

It is important to follow the layout guide at the beginning of each module. Ensure that the layout for the drawing is central both horizontally and vertically to the dimensions of the paper to be used. (in this case A3 size) Attention to detail is most important in this subject.

Step 2

1. Position the centre of vision on the horizon line directly above the station point, both horizontally and vertically centred on the page as shown in Figure 5.1. Use calculations, as shown in Figure 5.2, to accurately position the construction on the A3 size paper.

2. The Calculations:

$$y = \text{TAN } x \ a \quad x = \text{TAN } x \ a$$

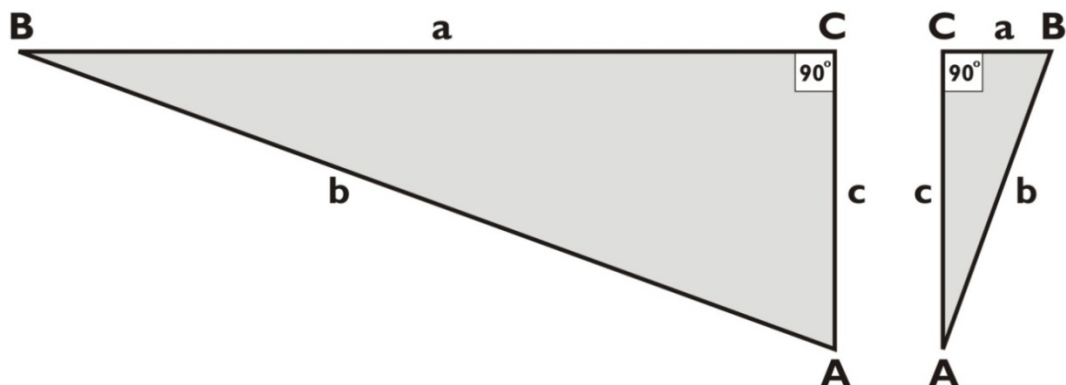


Figure 5.2 Triangle Calculus

Step 4

1. Locate the measuring points. From a1 draw a line back to the Centre of Vision.
2. Establish the MPCV by projecting a line at a 45° angle from the Station Point to the Horizon Line. Refer to Figure 5.4.

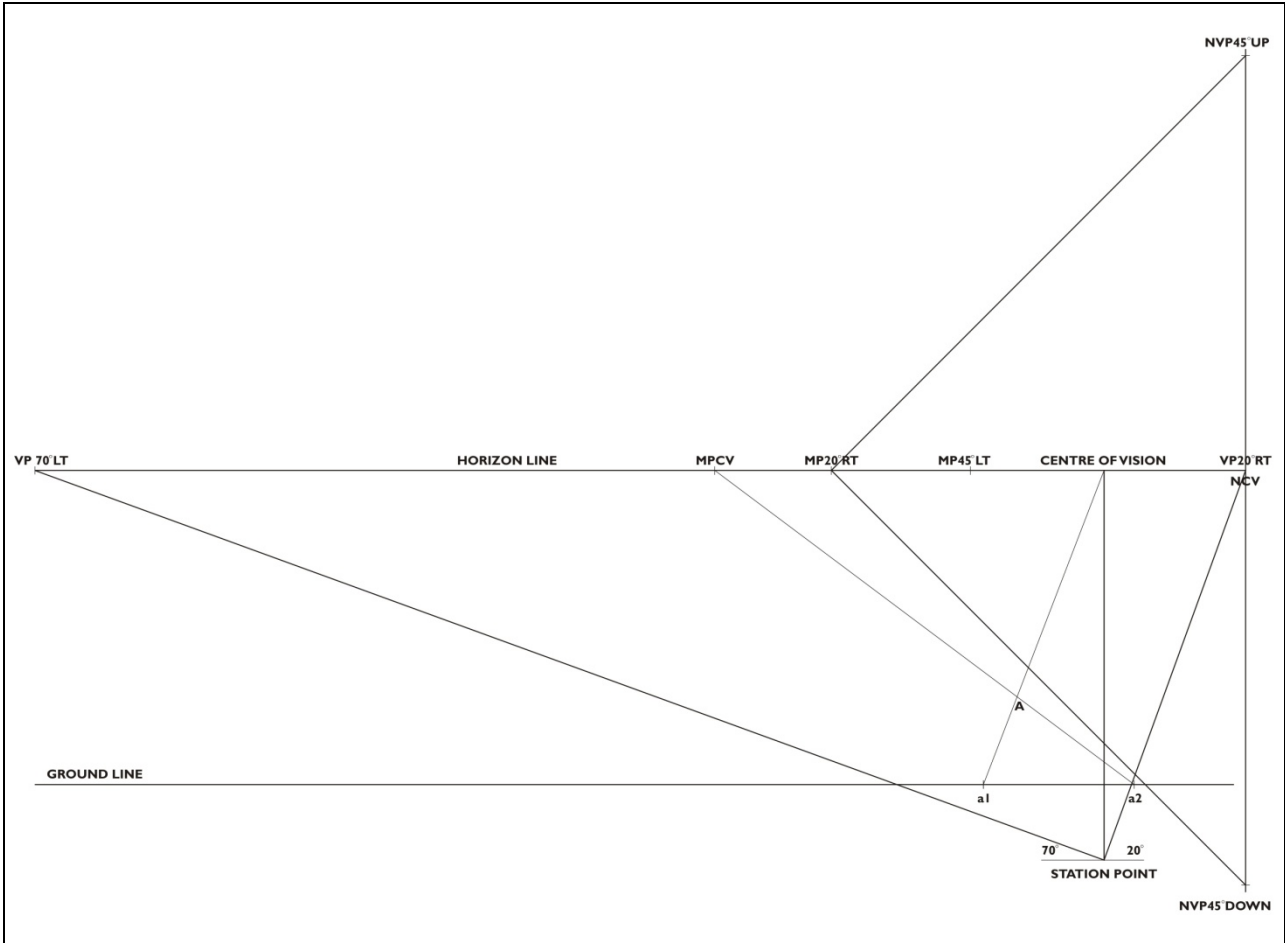


Figure 5.4 Construction of Three-Point Perspective Grid

Step 5

1. After completing this, project a line from A vertically up to the Horizon Line for the leading corner of the grid, or new point A. Refer to Figure 5.5.

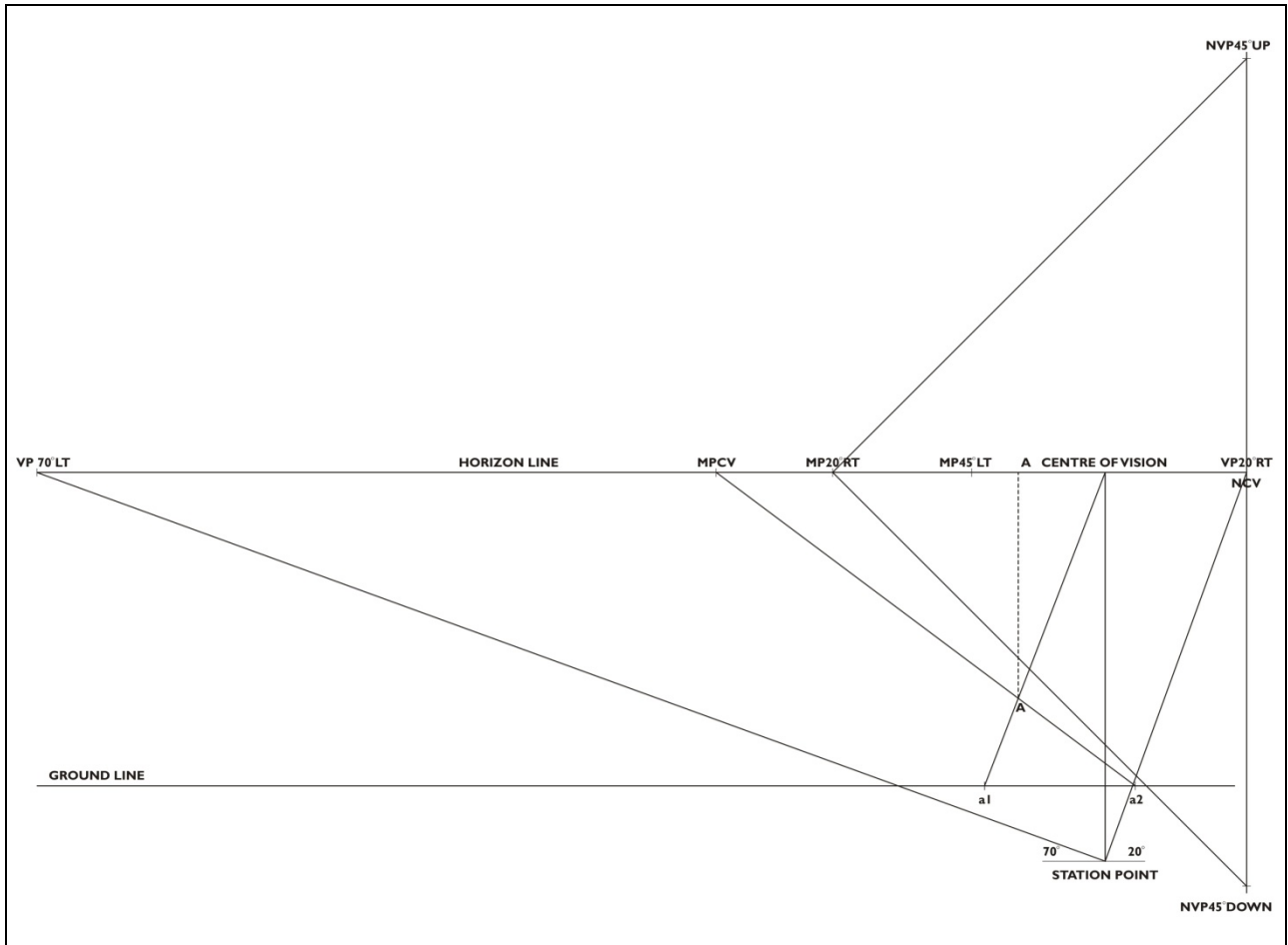


Figure 5.5 Construction of Three-Point Perspective Grid

Step 11

1. To establish a Ground Line for measuring the vertically inverted sides, project a line from the New CV through point A on the ground to the original GL. This is called the Intersection Line. Refer to Figure 5.11.

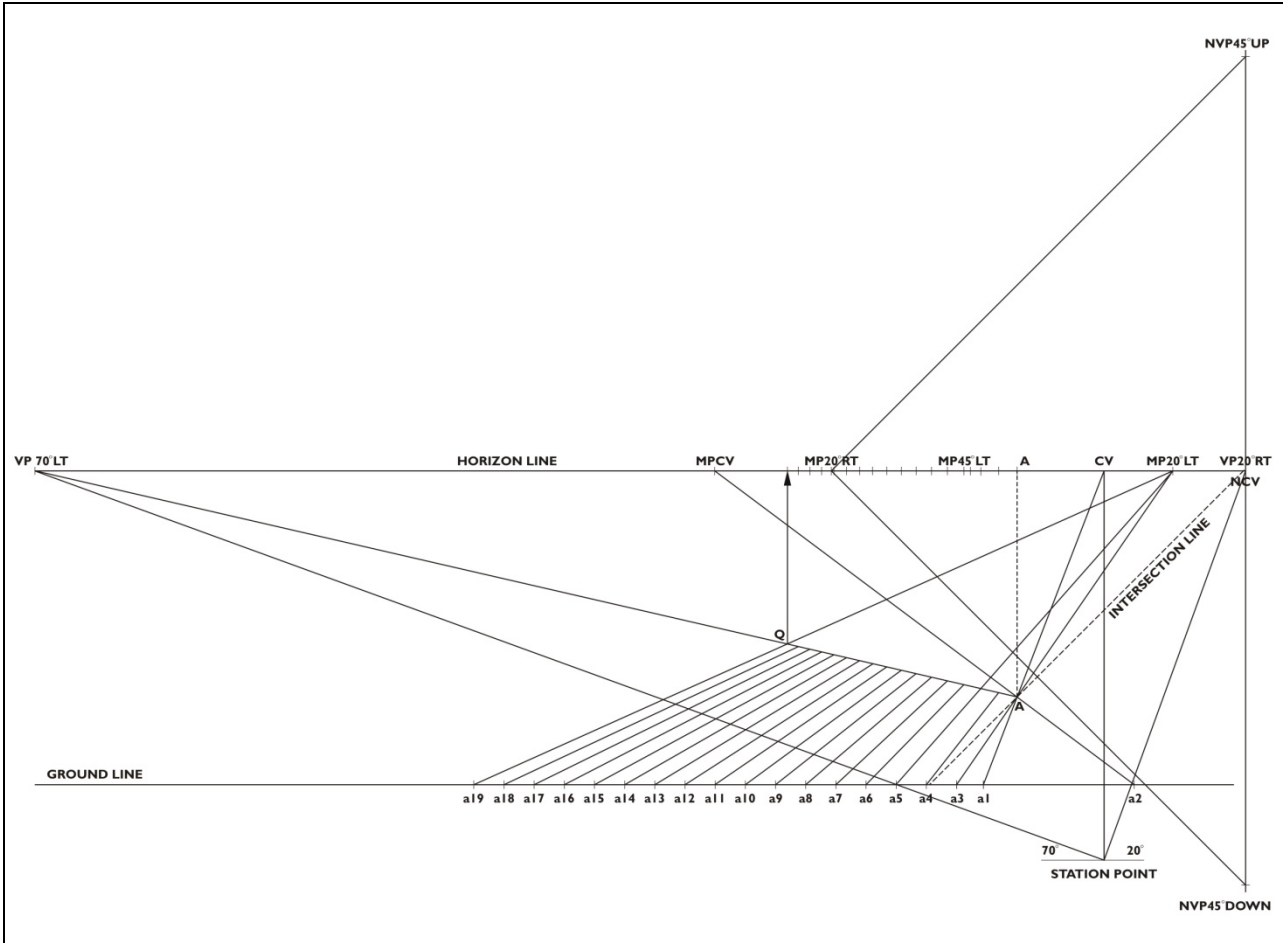


Figure 5.11 Construction of Three-Point Perspective Grid

Step 12

- 1. Where the line intersects the original GL, project a vertical line to establish the New GL. Refer to Figure 5.12.

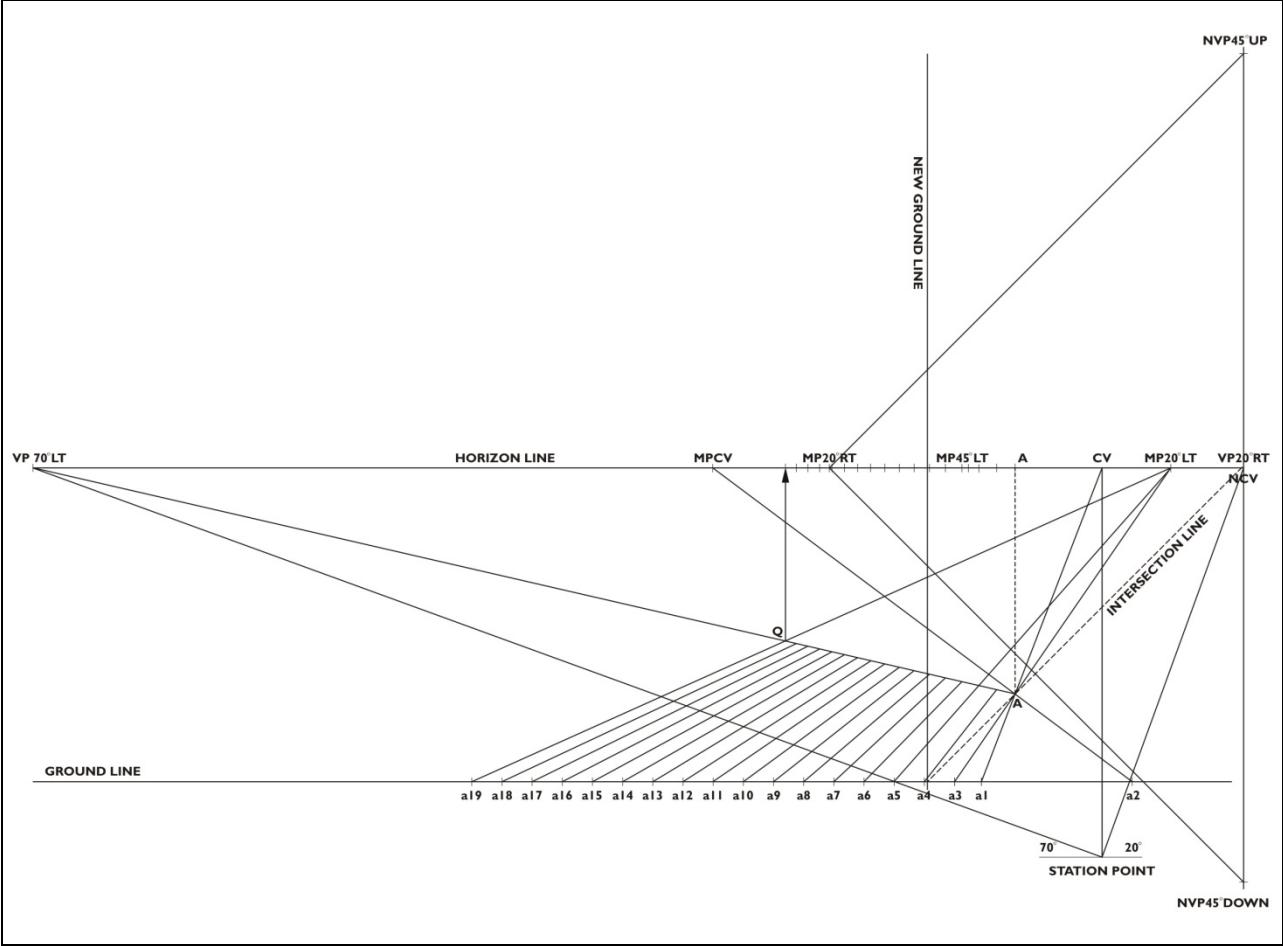


Figure 5.12 Construction of Three-Point Perspective Grid

Step 13

- 1. Project both NVP 45° down and NVP 45° up to the new raised point (A) which has already been projected from the GL to the Horizon Line. These two lines are the leading edges of the grid. Refer to Figure 5.13.

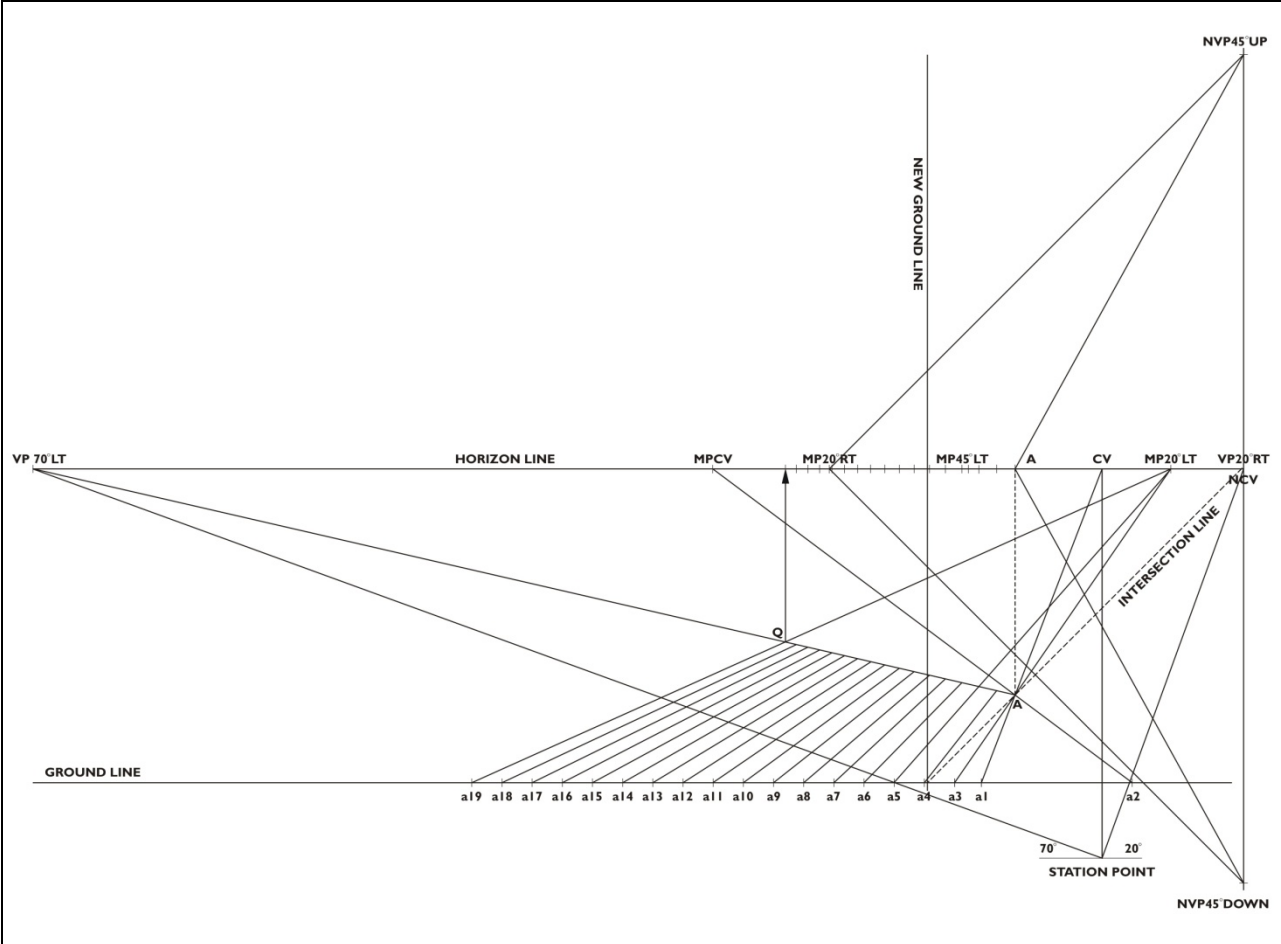


Figure 5.13 Construction of Three-Point Perspective Grid

Step 14

10. To establish the width of each side of the grid measuring points must be established. Create as in previous exercises. As one side of the grid is vanishing to the right and up to NVP 45° Up, its measuring point has to be established.
11. With the compass point on NVP 45° Up cast an arc from MP 20° Right, on the horizon, to the NHL and where it intersects label NMP 45° Up.
12. Complete the other NVP in the same way. Project both NMP 45° Down and NMP 45° Up through the new raised point (A) onto the New GL and label (a5) and (a6). Refer to Figure 5.14.

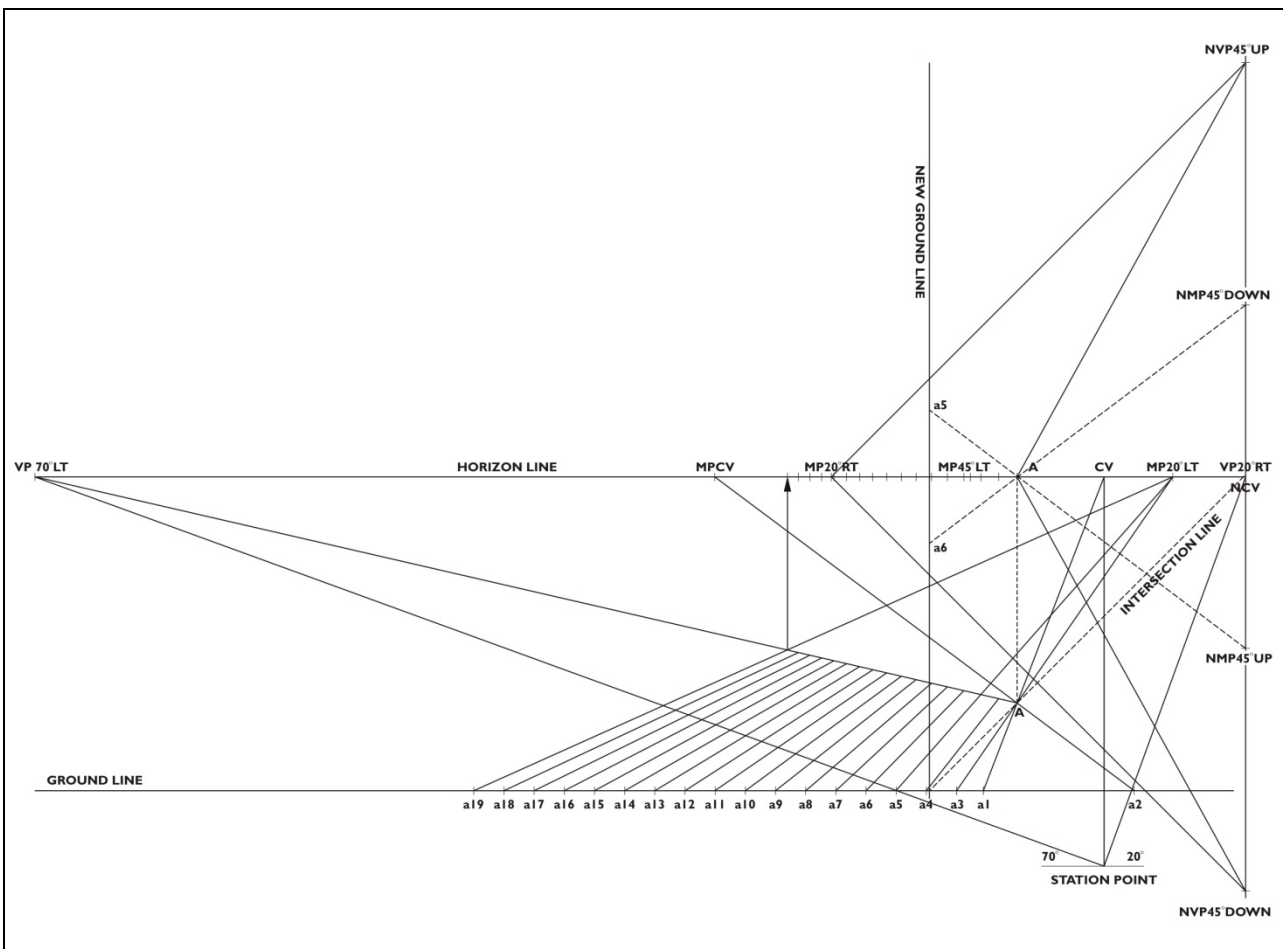


Figure 5.14 Construction of Three-Point Perspective Grid

Step 16

1. Where the measuring lines intersect the vanishing line from A to NVP 45° Up, these become the perspective foreshortened grid points. Project each of these points back to VP 70° Left. Repeat to create the other plane. Refer to Figure 5.16.

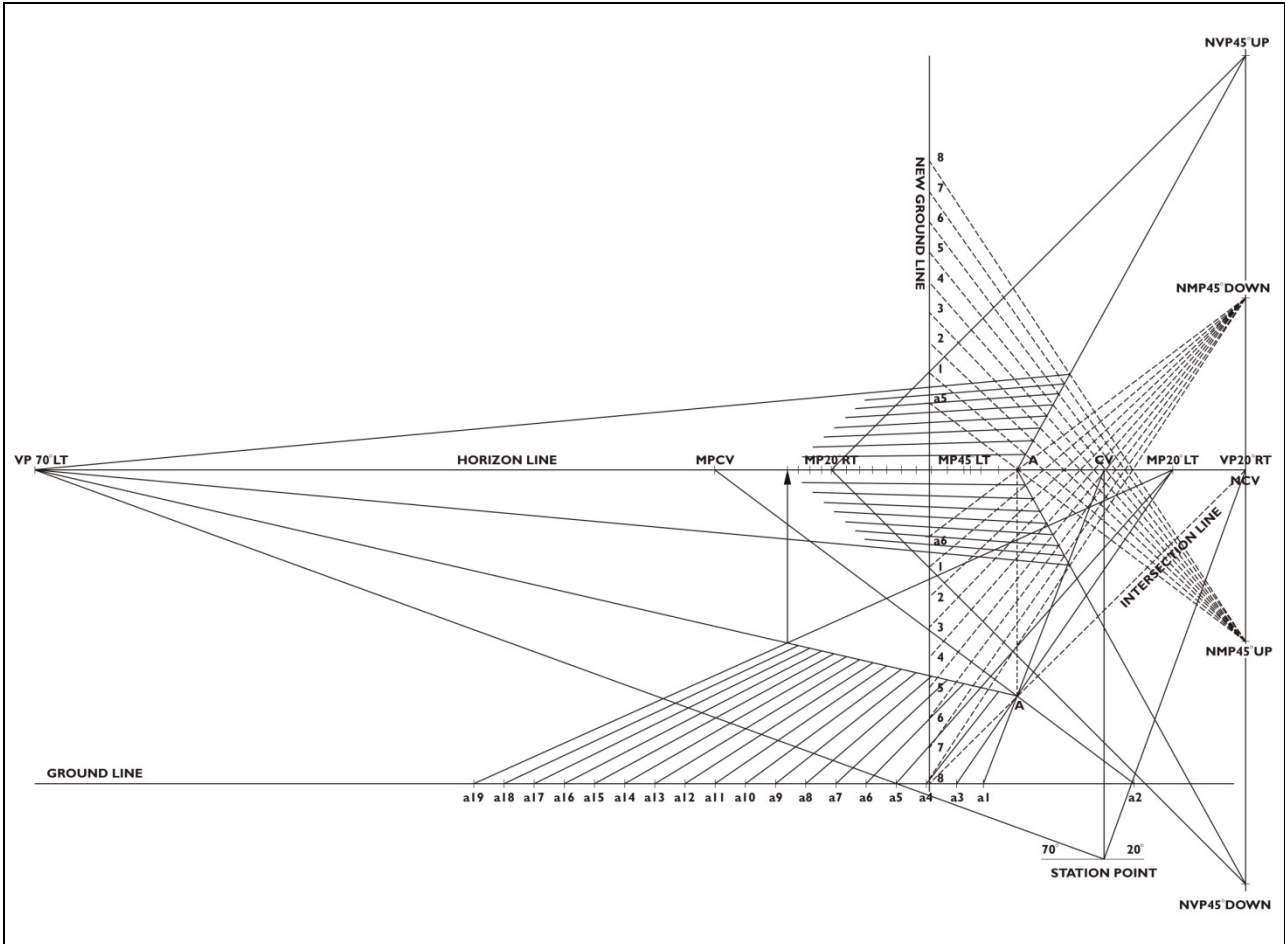


Figure 5.16 Construction of Three-Point Perspective Grid

Step 17

1. Having now established all the measuring grid points, project these points to the Vanishing Points to create the 'box' grid.
2. Where all 16 points (a3 – q1) intersect the Horizon Line at A to Q (Refer to Figure 5.10) project to NVP 45° Up, these form the perspective foreshortened grid points. Repeat to create the other plane. Refer to Figure 5.17.

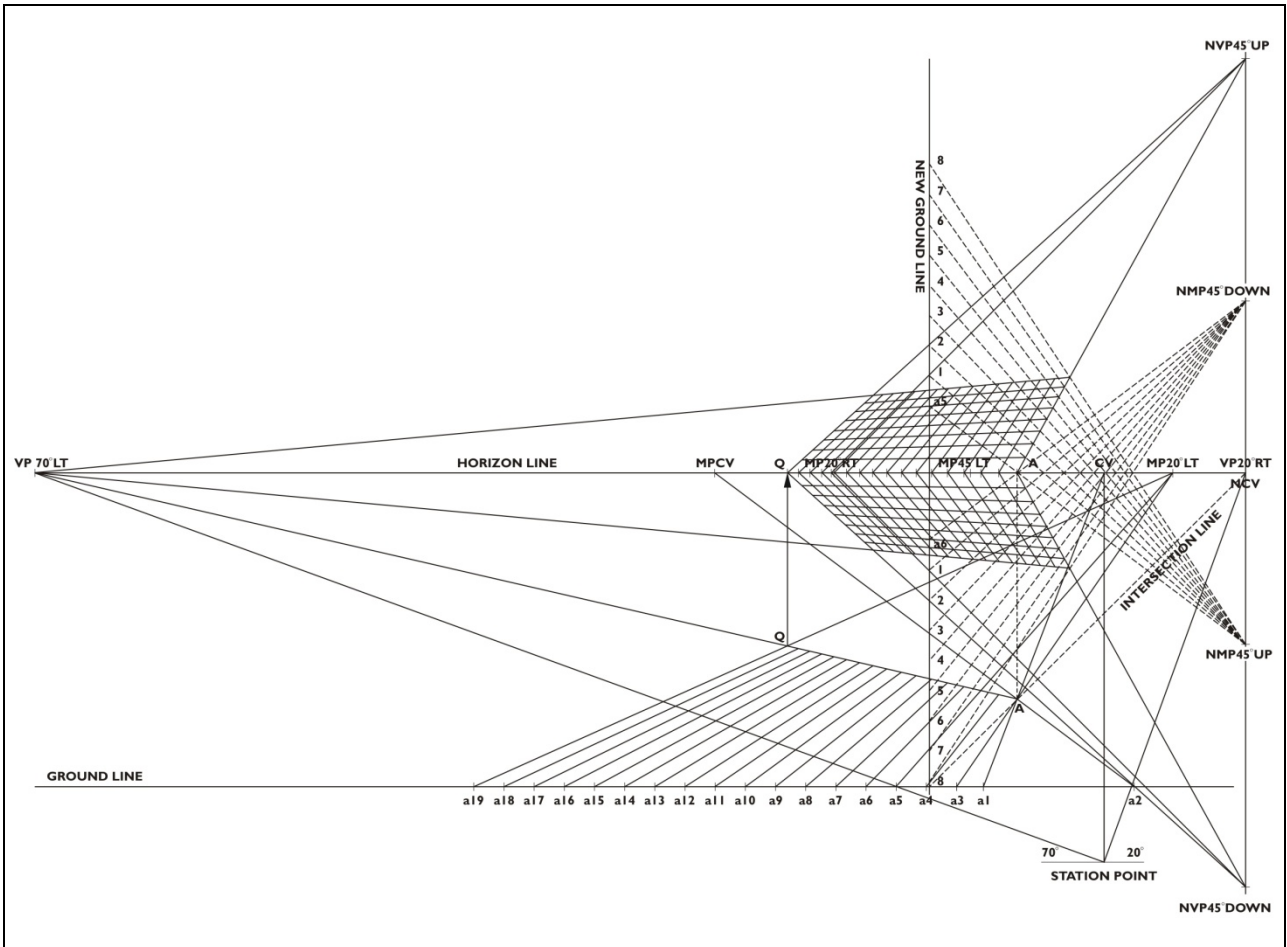


Figure 5.17 Construction of Three-Point Perspective Grid

Step 18

1. Having now established all the measuring grid points, project these points to the Vanishing Points to create the 'box' grid.
2. Where the measuring lines intersect the vanishing line from A to NVP 45° Up, these become the perspective foreshortened grid points. Project each of these points down to NVP 45° Down. Repeat to create the other plane. Refer to Figure 5.17.
3. The grid is now complete. Use this grid to construct the Rubik Cube in the next exercise 5.3.

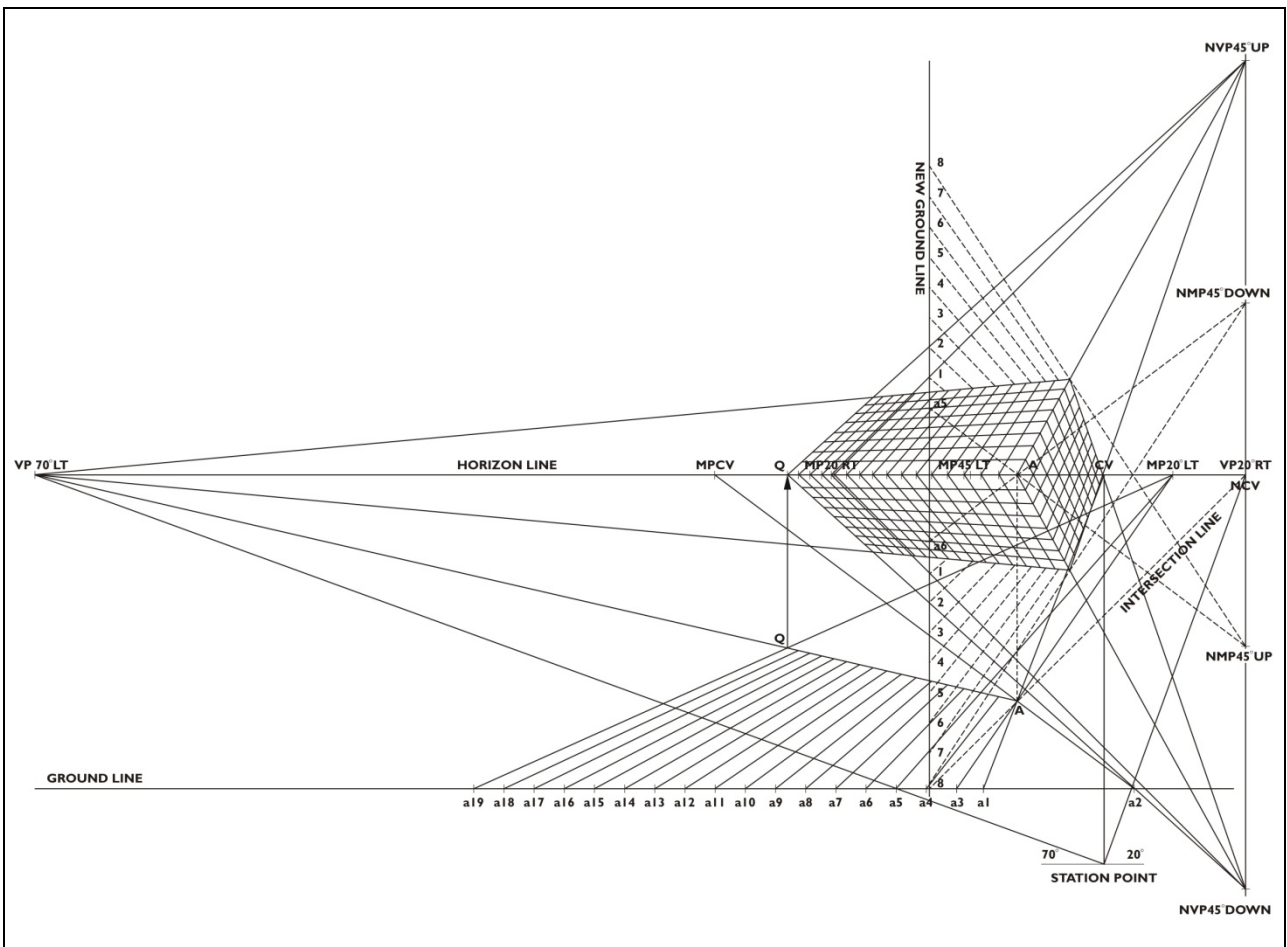


Figure 5.18 Construction of Three-Point Perspective Grid completed



IMPORTANT NOTE:

The angles chosen are not essential but they provide a useable grid. Further segments can be added in each direction to produce a larger grid.

5.3 Construction of a Rubik Cube onto a Three-point perspective Grid

Step 1

1. Use the grid that has been constructed in the previous exercise to create this Rubik Cube. Refer to Figure 5.1 for information.
2. Figure 5.2 shows seven steps in a step by step guide to be followed in drawing the Rubik Cube in 3-point perspective. The 3-point perspective illustration is drawn according to the dimensions of the Rubik Cube as shown.
3. Produce a ghosted view on A4 tracing paper as shown.
4. ALL measurements in grid units.



IMPORTANT NOTE:

It is important to follow the layout guide at the beginning of each module. Ensure that the layout for the drawing is central both horizontally and vertically to the dimensions of the paper to be used, (in this case A4 size tracing paper). Attention to detail is most important in this subject.

Step 2

1. Construct the Rubik Cube by creating one by one unit squares in each corner of the top face of level one of the grid, as shown, and project lines through to VP 45° up and down. Move down one unit measurement to create the top face of the Rubik Cube, or level two in both horizontal planes. Refer to Figure 5.2 Step 1.

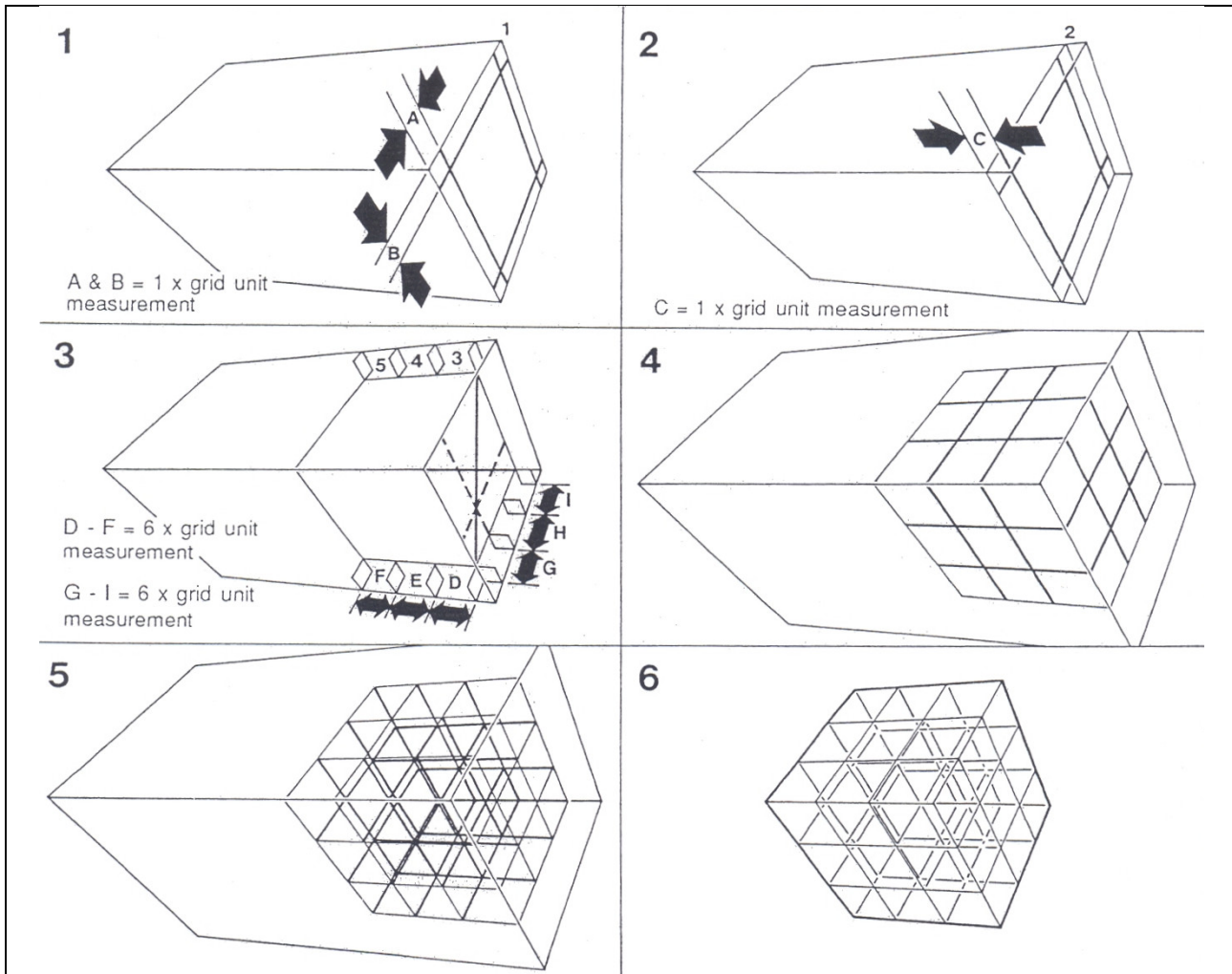


Figure 5.2 Construction of a Rubik Cube

Step 2

1. Construct the Rubik Cube by creating one by one unit squares in each corner of the top face of level one of the grid, as shown, and project lines through to VP 45° up and down. Move down one unit measurement to create the top face of the Rubik Cube, or level two in both horizontal planes. Refer to Figure 5.2 Step 1.

Step 3

1. As each square on the Rubik Cube for this exercise is two unit measurements on the grid, move down two units and create level three. Repeat this process for levels four and five. The Rubik Cube is now positioned in the middle of the grid, one unit in from each side and one unit down from the top of the grid. Refer to Figure 5.2 Step 2.

Step 4

1. Complete the Rubik Cube by projecting the horizontal points A B C and D along the outside of the grid to level two and then across in perspective to VP 45° up and down. Refer to Figure 5.2 Step 3.

Step 5

1. Where these lines intersect points E F G and H describe through to VP 20° left. Refer to Figure 5.2 Step 4.

Step 6

1. From E F project lines down to VP 45° down and from I and J project down to VP 45° down and up. Refer to Figure 5.2 Step 5.

Step 7

1. Complete each cube in the Rubik Cube by using all three vanishing points. Refer to Figure 5.2 Step 6.



Self-Check

I am able to:	Yes	No
1 THREE POINT PERSPECTIVE GRID		
<ul style="list-style-type: none"> • Construct a three-point perspective grid accurately and then draw the following objects: <ul style="list-style-type: none"> ○ Rubik Cube ○ Glass Rubik Cube (transparent) • Draw the following exercises on the prepared grid using a selected ratio mathematically calculated between the orthographic drawing and the grid (unit measurements). 		
If you have answered 'no' to any of the outcomes listed above, then speak to your facilitator for guidance and further development.		

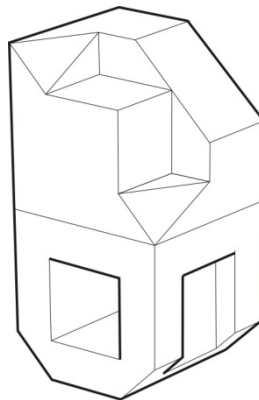
Module 6

How to use the prepared Three-Point Perspective Grid

Learning Outcomes

On completion of this module the student must be able to:

- Draw a three dimensional illustration, to a given ratio, using the orthographic drawings supplied.



- Draw a three dimensional illustration, to a given ratio, using the orthographic drawings supplied.
- Draw a three dimensional illustration, to a given ratio, using the orthographic drawings supplied.

6.1 Three-point perspective Grid - Prepared



Worked example 1

The following steps show you how to use and construct a drawing on a prepared three-point perspective grid.

Use A4 tracing paper size (297 x 210 mm).

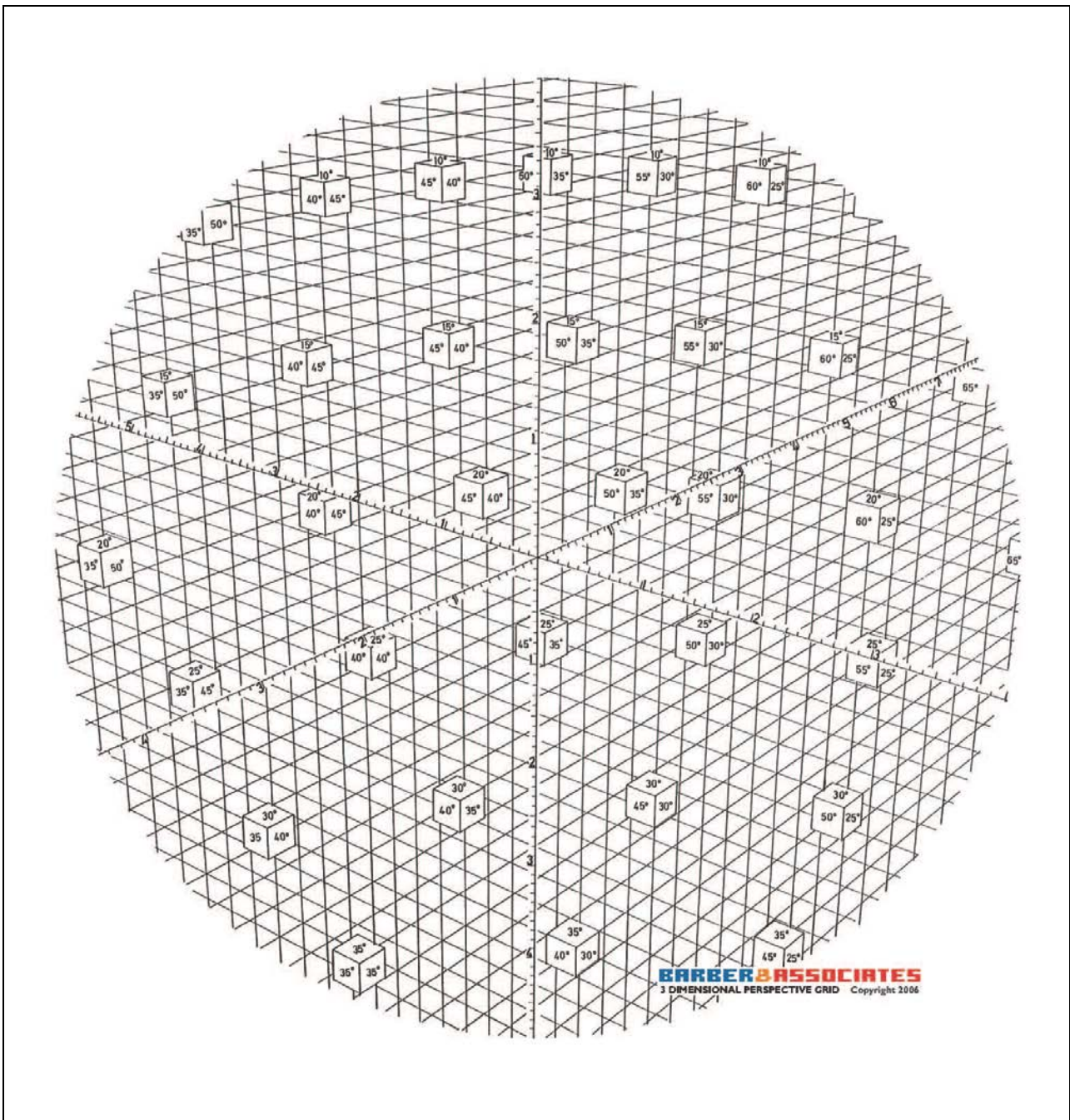


Figure 6.1 Prepared three-point perspective grid

6.2 Introduction to the 3-Dimensional Perspective Grid

Printed perspective grids

Grid sheets provide a printed framework for one-, two- and three-point perspective views from normal eye level, ground level and aerial viewpoints.

The grids range in complexity from simple block shapes providing an obvious three-dimensional structure to all-over networks of squares and diagonals in diminishing perspective.

Measuring systems or *graticulations incorporated in the grids enable the illustrator to plot receding planes in the correct perspective proportion.

6.3 How to use the Three-point Perspective Grid

Introduction

Before using the grid sheet, it is important to understand that this is an enlarged version of the one that has been already constructed in Module 5. The one exception is that there are no Vanishing Points on the paper to refer to. But there is a perspective matrix or network of lines in both the vertical and two horizontal planes, which if correctly followed, will provide assistance.

All these lines vanish at the same rate to their various vanishing points. The rate of vanishing has been selected to correspond with the natural viewer's optical experience, although more extreme rates of vanish can be employed for different end results.

The centre of the grid provides all of the answers and this is where all beginners on the grid should start. It also provides the starting point or measuring in unit measurements and if followed correctly, will supply an end product which is in perfect proportion.

Remember, the grid is like a maze, so use the same entry and exit points, otherwise you will undoubtedly get lost. Follow the step by step guide as shown pictorially in **Figure 6.2**.



IMPORTANT NOTE:

It is important to follow the layout guide at the beginning of each module. Ensure that the layout for the drawing is central both horizontally and vertically to the dimensions of the paper to be used. (in this case A4 size tracing paper) Attention to detail is most important in this subject.

* The division of a design or draught into squares, in order to more easily reproduce it in larger or smaller dimensions.

Step 1

1. Use an A4 piece of tracing paper.
2. ALL measurements in grid measurements.
3. Follow the steps as outlined in Figure 6.2.

Step 2

1. Construct a cube 60 wide x 60 high x 60 deep in unit measurements on the grid provided, in pencil.
2. Position the leading edge of the cube A as in Step 1.
3. Measure six units to the left of Point A to establish Point D.
4. Step 3 provides you with an example of what you are trying to achieve.
5. You will notice that because there are no vanishing points on the paper, Step 2 provides a way to establish the rate at which the lines vanish. The rate of vanish in the two horizontal planes and the vertical plane can be bisected by constructing perspective squares close to the vanishing lines you require.

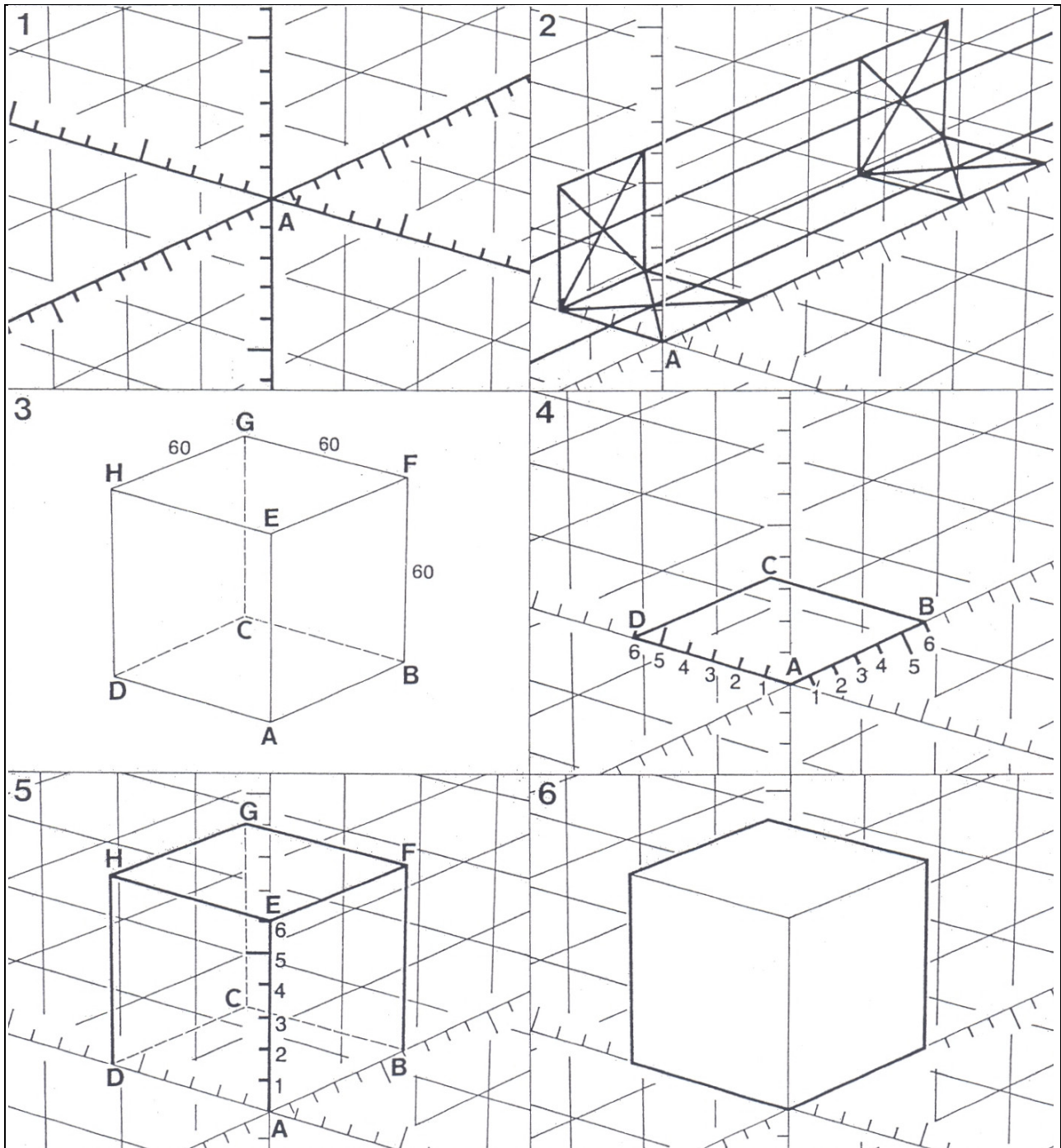


Figure 6.2 Constructing Simple Shapes on the Grid - A cube

Step 3

1. Measure six units to the right of Point A to establish Point B.
2. Draw a line in perspective, following the perspective lines as a guide, from Point D and draw a line in perspective from Point B to establish Point C.
3. The base of the cube has now been created as shown in Step 4.

Step 4

1. Measure six units from Point A to establish the height Point E as shown in Step 5.
2. Draw a line in perspective, following the perspective lines as a guide, from Point E to establish Point H. Draw a line in perspective, following the perspective lines as a guide, from Point E to establish Point F.
3. Draw a line in perspective, following the perspective lines as a guide, from Point H to establish Point G. Draw a line in perspective, following the perspective lines as a guide, from Point F to establish Point G.
4. Draw a vertical line in perspective, following the perspective lines as a guide, from Point D to Point H. Draw a vertical line in perspective, following the perspective lines as a guide, from Point B to Point F and from Point C to Point G
5. The drawing should resemble the example in Step 6 and is now complete.



Self-Check

I am able to:	Yes	No
• THREE POINT PERSPECTIVE GRID		
• Draw a three dimensional illustration, to a given ratio, using the orthographic drawings supplied.		
• Draw a three dimensional illustration, to a given ratio, using the orthographic drawings supplied.		
• Draw a three dimensional illustration, to a given ratio, using the orthographic drawings supplied.		

If you have answered 'no' to any of the outcomes listed above, then speak to your facilitator for guidance and further development.

Past Examination Papers



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APRIL 2011

**NATIONAL CERTIFICATE: MULTI-DISCIPLINARY
DRAWING OFFICE PRACTICE**

TECHNICAL ILLUSTRATION N5

**(X-Paper)
09:00 – 12:00**

REQUIREMENTS: A3 drawing paper

Calculators may be used.

Candidates will require drawing instruments, pens and a ruler.

This question paper consists of 4 pages, 4 diagram sheets and a 1-page answer sheet.

NOTE: If you answer more than the required number of questions, only the required number of questions will be marked. All work you do not want to be marked, must be clearly crossed out.

TIME: 3 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Answer **ALL** the questions.
2. Read **ALL** the questions carefully.
3. Number the answers correctly according to the numbering system used in this question paper.
4. Write neatly and legibly.
5. Use only **ONE** side of the drawing and tracing paper.
6. A balanced layout is very important. Candidates will be penalised for poor planning.
7. The question numbers must be clearly indicated.
8. **ALL** drawing work, including the candidate's information, must be done in pencil.
9. **ALL** the construction lines must be shown.
10. Marks will be awarded for neatness and accuracy.
11. Answer **QUESTION 1** on the attached answer sheet. Make sure that you have filled in your examination number in the space provided on the answer sheet.
12. **TWO** sheets of A3 drawing paper for **QUESTION 2 and 3**, as well as **ONE** sheet of A4 tracing paper and a grid for **QUESTION 4** are supplied.

SECTION A

QUESTION 1

1.1 Fill in the missing words:

Write the answers on the dotted lines.

- 1.1.1 Technical Illustration is the technique of translating pure engineering drawings into, accurate and easily recognisable illustrations by a process of perspective projection.
- 1.1.2 Although Technical Illustration is simple to, but it is not simple to
- 1.1.3 By the end of these modules, the student will have a sound knowledge of, two-point and perspective.

[6]

QUESTION 2: TWO-POINT PERSPECTIVE

2.1 Construct the following, using the information provided (refer to **DIAGRAM SHEET 1** for dimensions):

Top view of situation:

Two cubes (U and V) resting on the ground plane vanishing to the right at 45°.

All the measurements are given in millimetres.

Distance of the eye in front of P.P. is 130 mm.

Height of the eye above the G.L. is 100 mm.

Cube U is situated on the ground line, 50 mm to the left of the C.V. (a1) and 40 mm behind the P.P. (a2) and is 40 x 40 x 40 mm.

Cube V is situated on the ground line, 20 mm to the right of the C.V. (a1) and is 40 x 40 x 40 mm.

[16]

QUESTION 3: OBLIQUE PERSPECTIVE

- 3.1** An object with ascending planes (refer to **DIAGRAM SHEET 2** for dimensions).

Construct as per two point perspective with raised and lower vanishing points.

All measurements are given in millimetres.

Distance of the eye in front of the P.P. is 130 mm.

Height of the eye above the G.L. is 100 mm.

Point A is situated 30 mm to the right of the C.V (**a1**).

[22]

QUESTION 4: CONSTRUCTION OF OFF-PLANE ANGLES

- 4.1** Construct an exploded view illustration of the assembly as shown on the attached **DIAGRAM SHEET 3**.

Scale: All measurements in grid units.

NOTE: When the construction is complete, outline the object in bolder line treatment 0.5 mm thick.

DO NOT SHOW THE DIMENSIONS ON THE FINAL ILLUSTRATION.

(56)

GRAND TOTAL: 100

APRIL 2011

DIAGRAM SHEET 1 FIGURE 1

MULTI-DISCIPLINARY DRAWING OFFICE PRACTICE (N4/N5) Technical Illustration N5 April 2011
MULTIDISCIPLINÈRE TEKENKANTOORPRAKTYK Tegnese Illustrasie N5 April 2011

DIAGRAM SHEET
 DIAGRAMVEL **1**

The figure consists of four orthographic views of a square object with a U-shaped cutout and a trapezoidal cutout. The views are arranged in a 2x2 grid:

- Top-left view:** Front view of the square object with a U-shaped cutout. The cutout has a width of 20 units and a depth of 20 units. The object has a total width of 40 units. Section lines A-A and B-B are shown.
- Top-right view:** Top view of the square object with a U-shaped cutout. The cutout has a width of 20 units and a depth of 20 units. The object has a total width of 40 units. Section lines A-A and B-B are shown.
- Bottom-left view:** Front view of the square object with a trapezoidal cutout. The cutout has a top width of 20 units, a bottom width of 10 units, and a depth of 20 units. The object has a total width of 40 units. Section lines A-A and B-B are shown.
- Bottom-right view:** Top view of the square object with a trapezoidal cutout. The cutout has a top width of 20 units, a bottom width of 10 units, and a depth of 20 units. The object has a total width of 40 units. Section lines A-A and B-B are shown.

At the bottom right of the diagram, there are two additional views: a front view of a trapezoidal object and a top view of the same object, both with dashed lines indicating hidden edges.

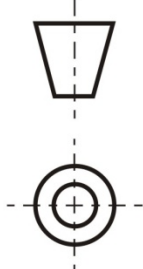
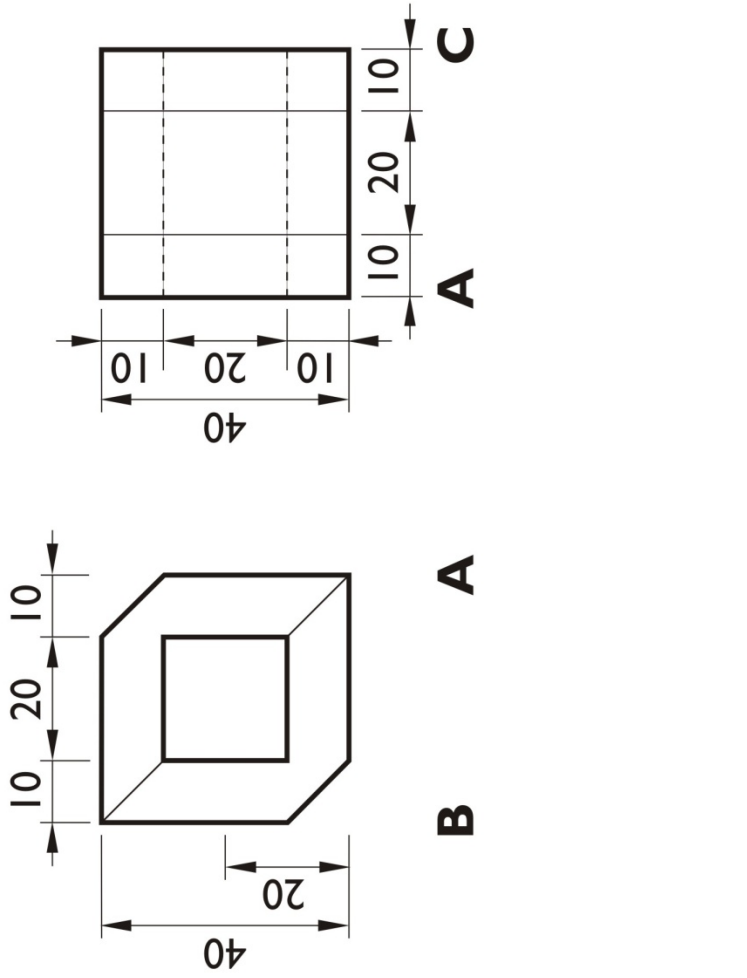
APRIL 2011

DIAGRAM SHEET 2 FIGURE 2

DIAGRAM SHEET
DIAGRAMVEL
2

Technical Illustration
Tegniese Illustrasie
N5 April 2011

MULTI-DISCIPLINARY DRAWING OFFICE PRACTICE
MULTIDISCIPLINÊRE TEKENKANTOORPRAKTYK



APRIL 2011

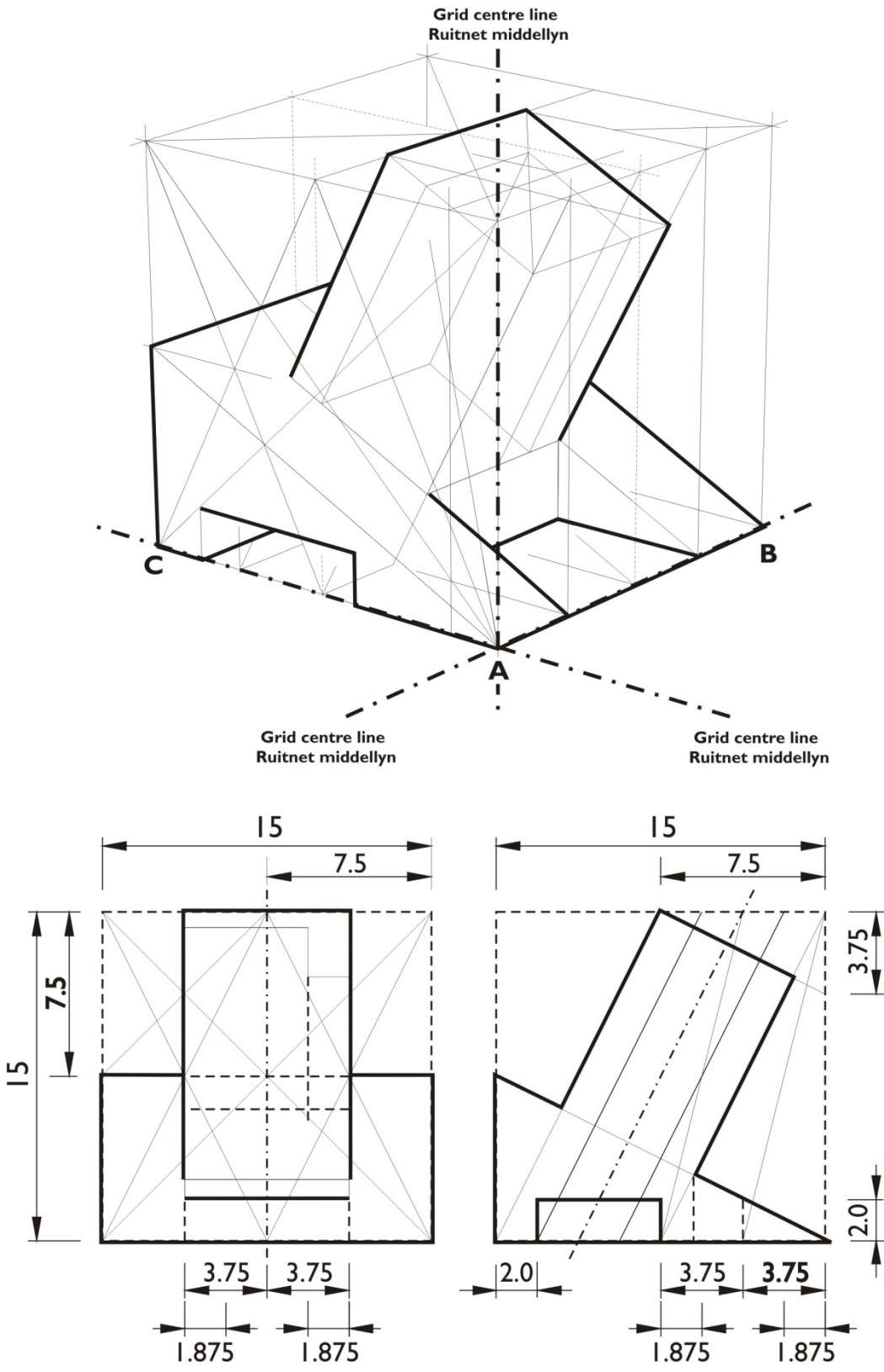
DIAGRAM SHEET 3 FIGURE 3

DIAGRAM SHEET
DIAGRAMMVEL
3

April 2011
N5

Technical Illustration
Tegniese Illustrasie
(N4/N5)

**MULTI-DISCIPLINARY DRAWING OFFICE PRACTICE
MULTIDISCIPLINÊRE TEKENKANTOORPRAKTYK**



ALL MEASUREMENTS IN GRID UNITS

Marking Guidelines



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REPUBLIC OF SOUTH AFRICA

APRIL 2011

**NATIONAL CERTIFICATE: MULTI-DISCIPLINARY
DRAWING OFFICE PRACTICE**

TECHNICAL ILLUSTRATION N5

**(X-Paper)
09:00 – 12:00**

QUESTION 1: WRITTEN QUESTIONS

1.1 Fill in the missing words:

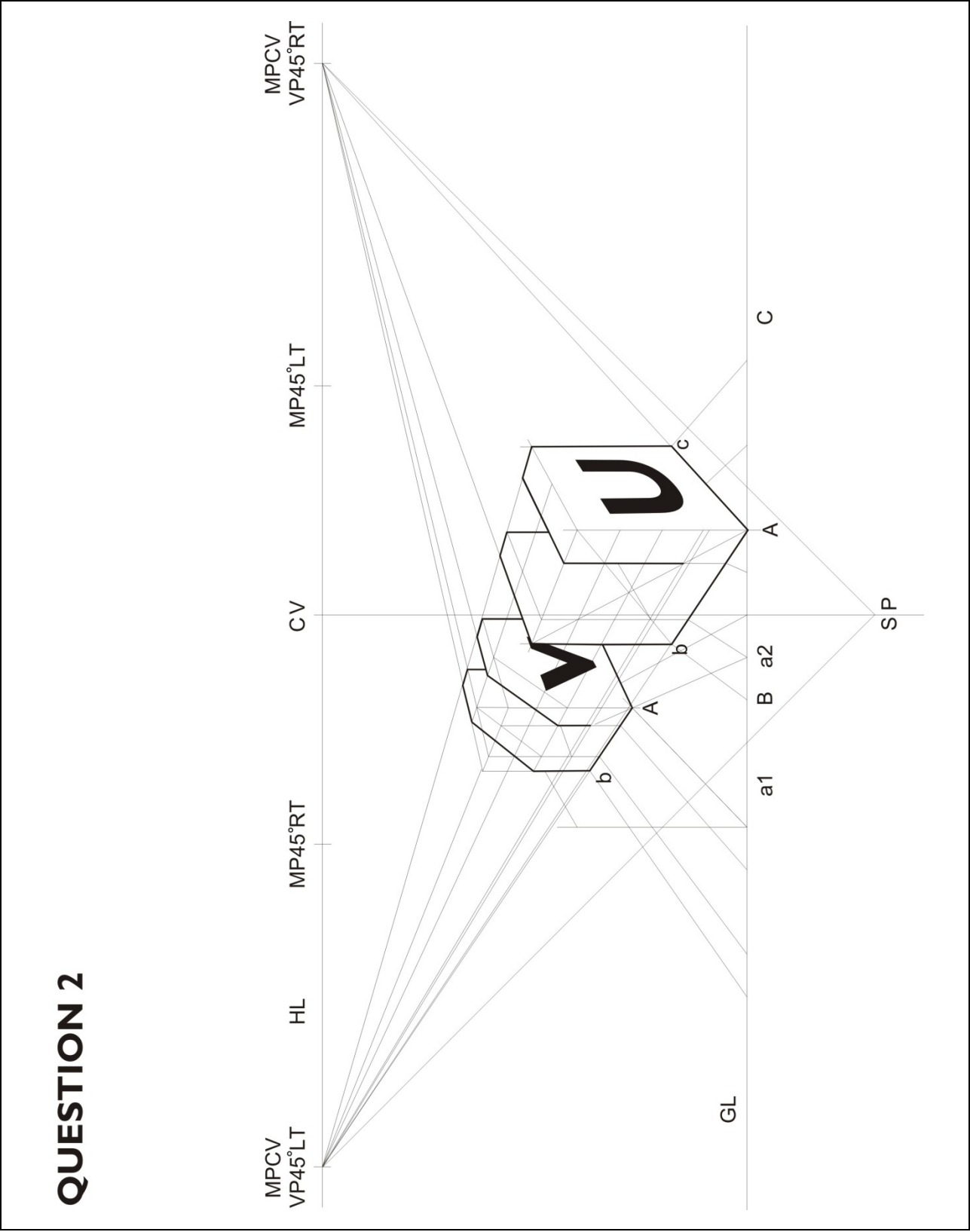
NUMBER	ANSWERS
1.1.1	REALISTIC, THREE POINT
1.1.2	UNDERSTAND, EXECUTE
1.1.3	ONE-POINT, THREE-POINT

(2 X 3 = 6) (6)

[6]

APRIL 2011

QUESTION 2: TWO-POINT PERSPECTIVE

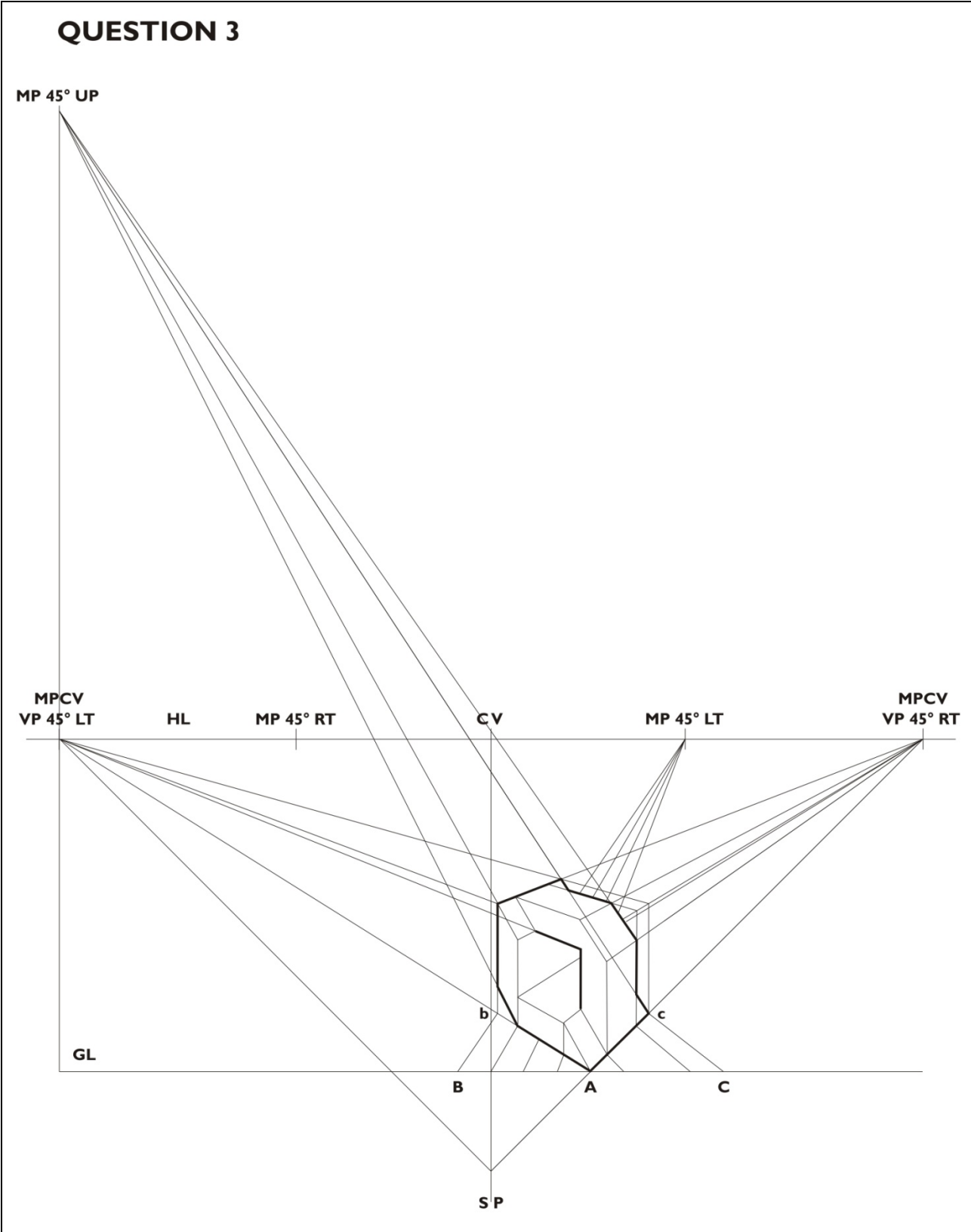


QUESTION 2

[16]

APRIL 2011

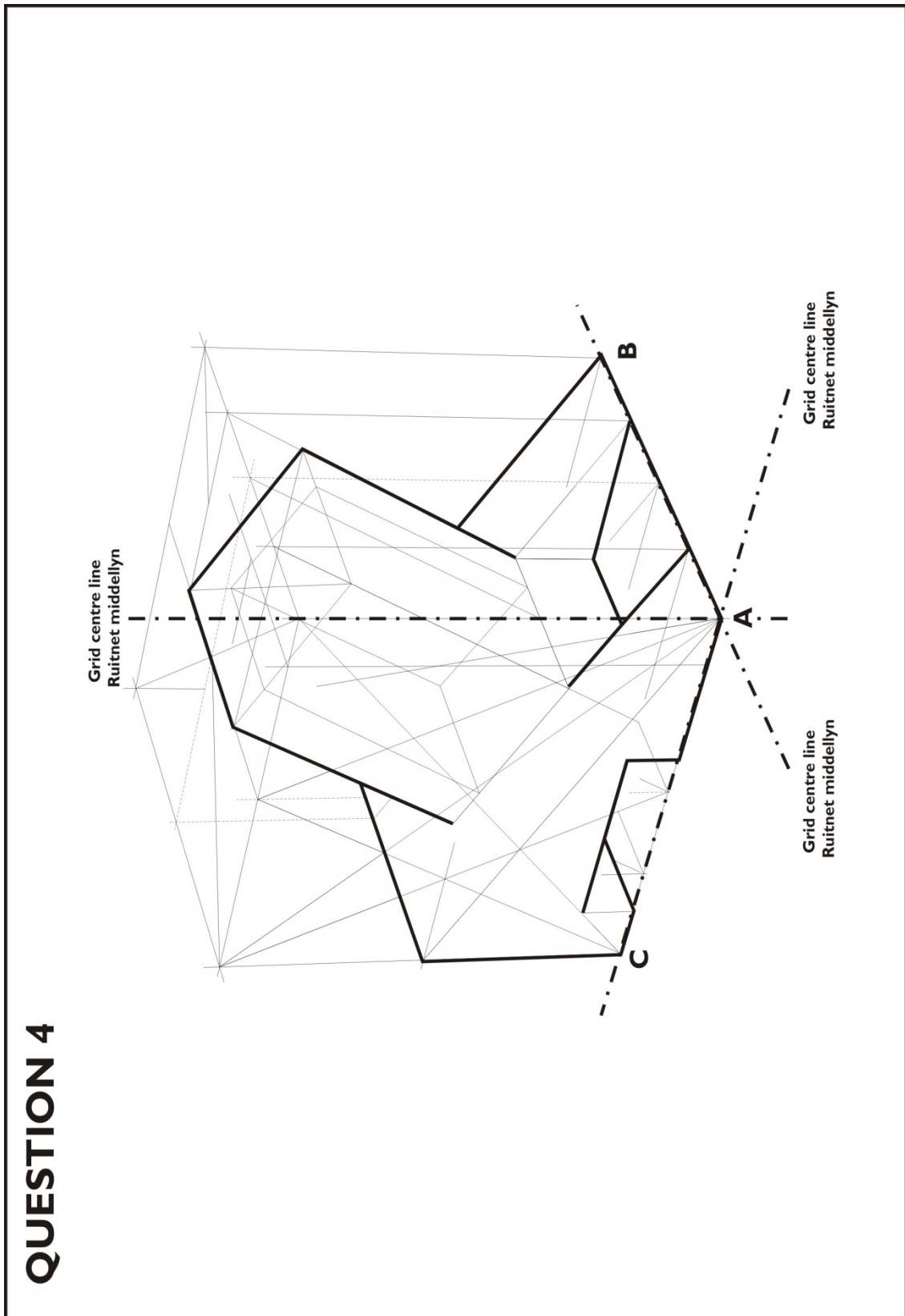
QUESTION 3: OBLIQUE PERSPECTIVE



[22]

APRIL 2011

QUESTION 4: CONSTRUCTION OF OFF-PLANE ANGLES



QUESTION 4

**GRAND TOTAL: [56]
100**

Past Examination Papers



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

AUGUST 2011

**NATIONAL CERTIFICATE: MULTI-DISCIPLINARY
DRAWING OFFICE PRACTICE**

TECHNICAL ILLUSTRATION N5

**(X-Paper)
09:00 – 12:00**

REQUIREMENTS: A3 drawing paper

Calculators may be used.

Candidates will require drawing instruments, pens and a ruler.

This question paper consists of 4 pages, 4 diagram sheets and a 1-page answer sheet.

NOTE: If you answer more than the required number of questions, only the required number of questions will be marked. All work you do not want to be marked, must be clearly

crossed out.

TIME: 3 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Answer **ALL** the questions.
2. Read **ALL** the questions carefully.
3. Number the answers correctly according to the numbering system used in this question paper.
4. Write neatly and legibly.
5. Use only **ONE** side of the drawing and tracing paper.
6. A balanced layout is very important. Candidates will be penalised for poor planning.
7. The question numbers must be clearly indicated.
8. **ALL** drawing work, including the candidate's information, must be done in pencil.
9. **ALL** the construction lines must be shown.
10. Marks will be awarded for neatness and accuracy.
11. Answer **QUESTION 1** on the attached answer sheet. Make sure that you have filled in your examination number in the space provided on the answer sheet.
12. **TWO** sheets of A3 drawing paper for **QUESTION 2 and 3**, as well as **ONE** sheet of A4 tracing paper and a grid for **QUESTION 4** are supplied.

SECTION A**QUESTION 1****1.1 Fill in the missing words:**

Write the answers on the dotted lines.

- 1.1.1 Engineering drawings communicate information in a formal,
..... language seldom fully understood
by any but professional.....
- 1.1.2 The gap in between the qualified
engineer and the uninitiated operative is completely bridged by
the technical
- 1.1.3 Important and often complicated information which cannot be
imparted by any other means is clearly and quickly
..... by the Illustrator.

[6]**QUESTION 2: TWO-POINT PERSPECTIVE****2.1 Construct the following, using the information provided:**

Top view of situation:

A model with its sides vanishing to the left at an angle of 45° .

(Refer to **DIAGRAM SHEET 1** for dimensions)

All the measurements are given in millimetres.

Distance of the eye in front of P.P. is 120 mm.

Height of the eye above the G.L. is 90 mm.

The model lies on the G.L with its leading edge **point A** 30 mm to the right.

[16]

QUESTION 3: OBLIQUE PERSPECTIVE

- 3.1** An object with ascending planes (refer to **DIAGRAM SHEET 2** for dimensions).

Construct as per two point perspective with raised and lower vanishing points.

All measurements are given in millimetres.

Distance of the eye in front of the P.P. is 130 mm.

Height of the eye above the G.L. is 100 mm.

Point A is situated 30 mm to the right of the C.V (a1).

[22]

QUESTION 4: THREE-POINT PERSPECTIVE EXPLODED VIEW ILLUSTRATION OF A MODEL ASSEMBLY

- 4.1** Construct a model assembly as shown on the attached **DIAGRAM SHEET 3**.

Scale: TWO grid units equal 10 millimetres.

NOTE: When the construction is complete, outline the object in bolder line treatment 0.5 mm thick.

DO NOT SHOW THE DIMENSIONS ON THE FINAL ILLUSTRATION.

(56)

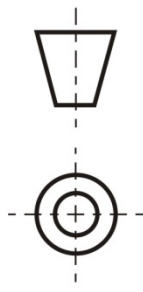
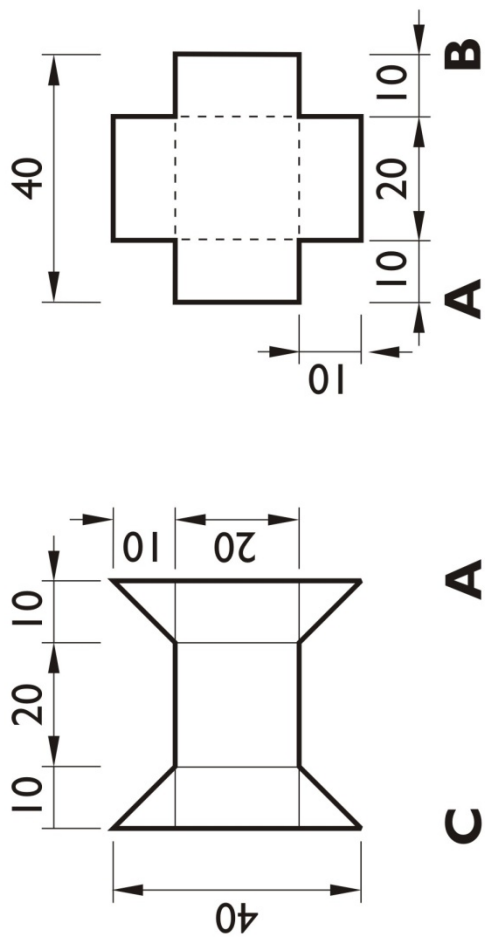
GRAND TOTAL: 100

AUGUST 2011

DIAGRAM SHEET 1 FIGURE 1

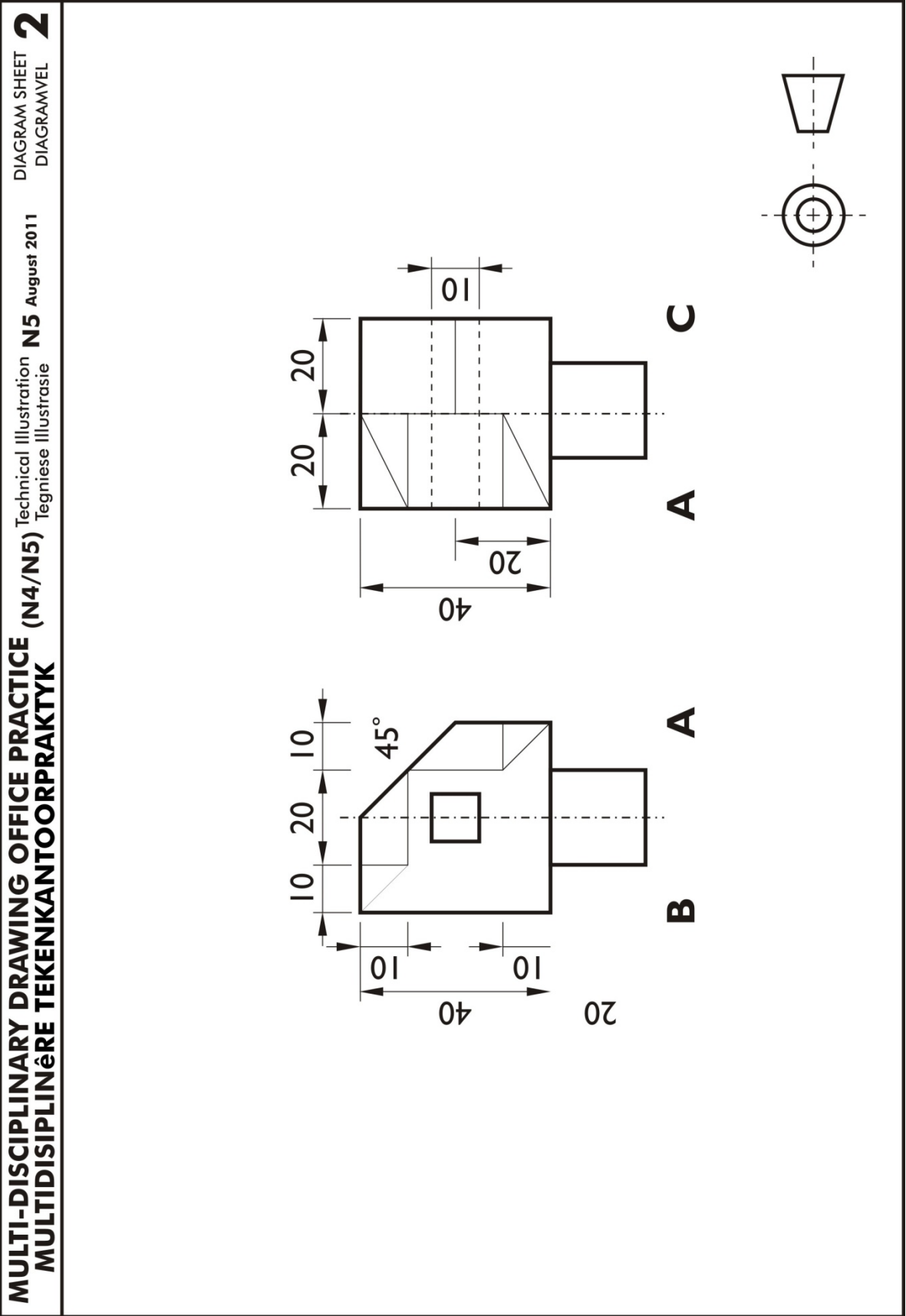
MULTI-DISCIPLINARY DRAWING OFFICE PRACTICE (N4/N5) Technical Illustration N5 August 2011
MULTIDISCIPLINÊRE TEKENKANTOORPRAKTYK

DIAGRAM SHEET
DIAGRAMMVEL **1**



AUGUST 2011

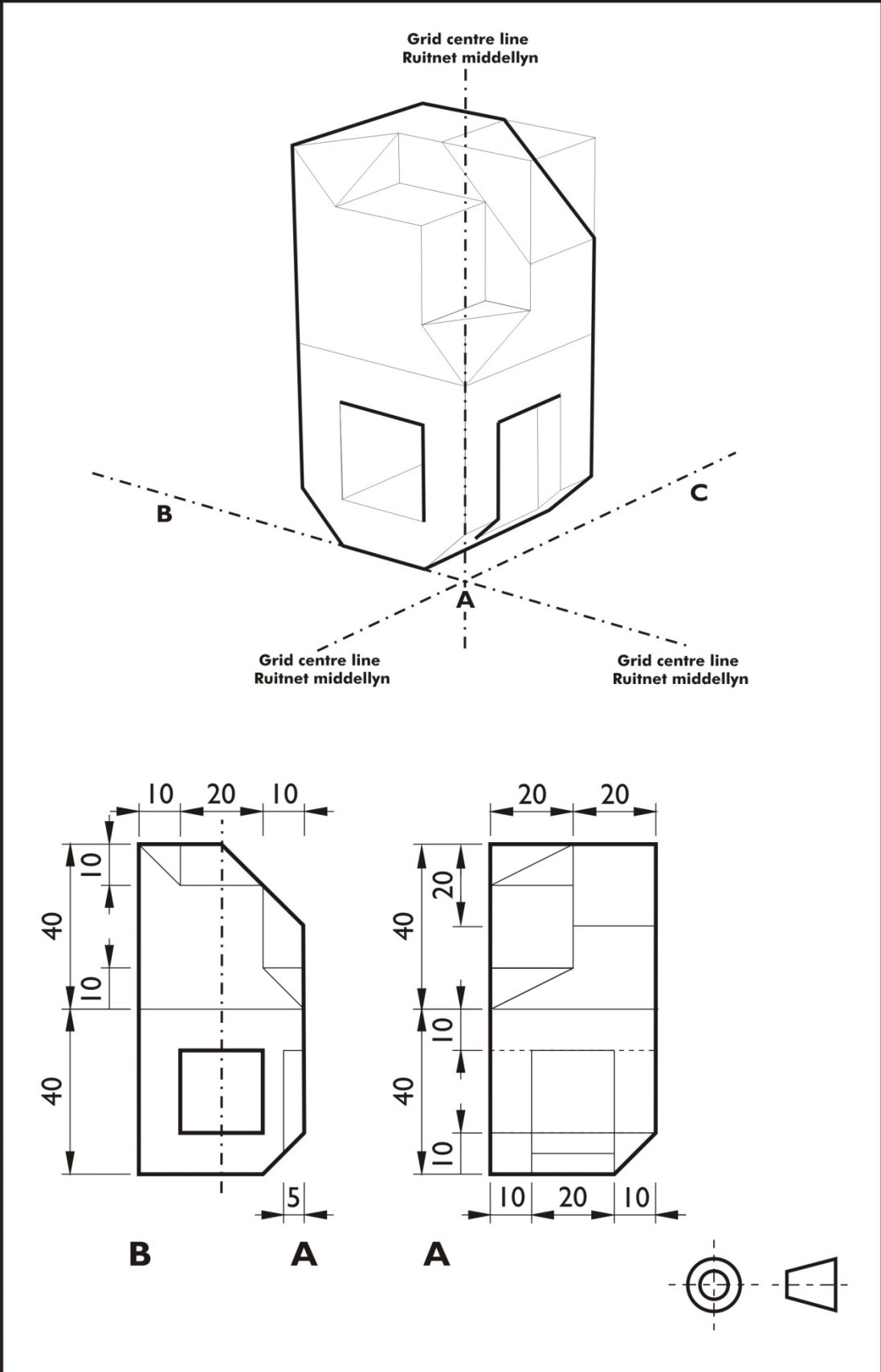
DIAGRAM SHEET 2 FIGURE 2



AUGUST 2011

DIAGRAM SHEET 3 FIGURE 3

3
 DIAGRAM SHEET
 DIAGRAMMVEL
 Technical Illustration
 Tegnieise Illustrasie
N5 August 2011
(N4/N5)
MULTI-DISCIPLINARY DRAWING OFFICE PRACTICE
MULTIDISCIPLINÊRE TEKENKANTOORPRAKTYK



Marking Guidelines



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REPUBLIC OF SOUTH AFRICA

AUGUST 2011

NATIONAL CERTIFICATE: MULTI-DISCIPLINARY
DRAWING OFFICE PRACTICE

TECHNICAL ILLUSTRATION N5

(X-Paper)
09:00 – 12:00

AUGUST 2011

QUESTION 1: WRITTEN QUESTIONS

1.1 Fill in the missing words:

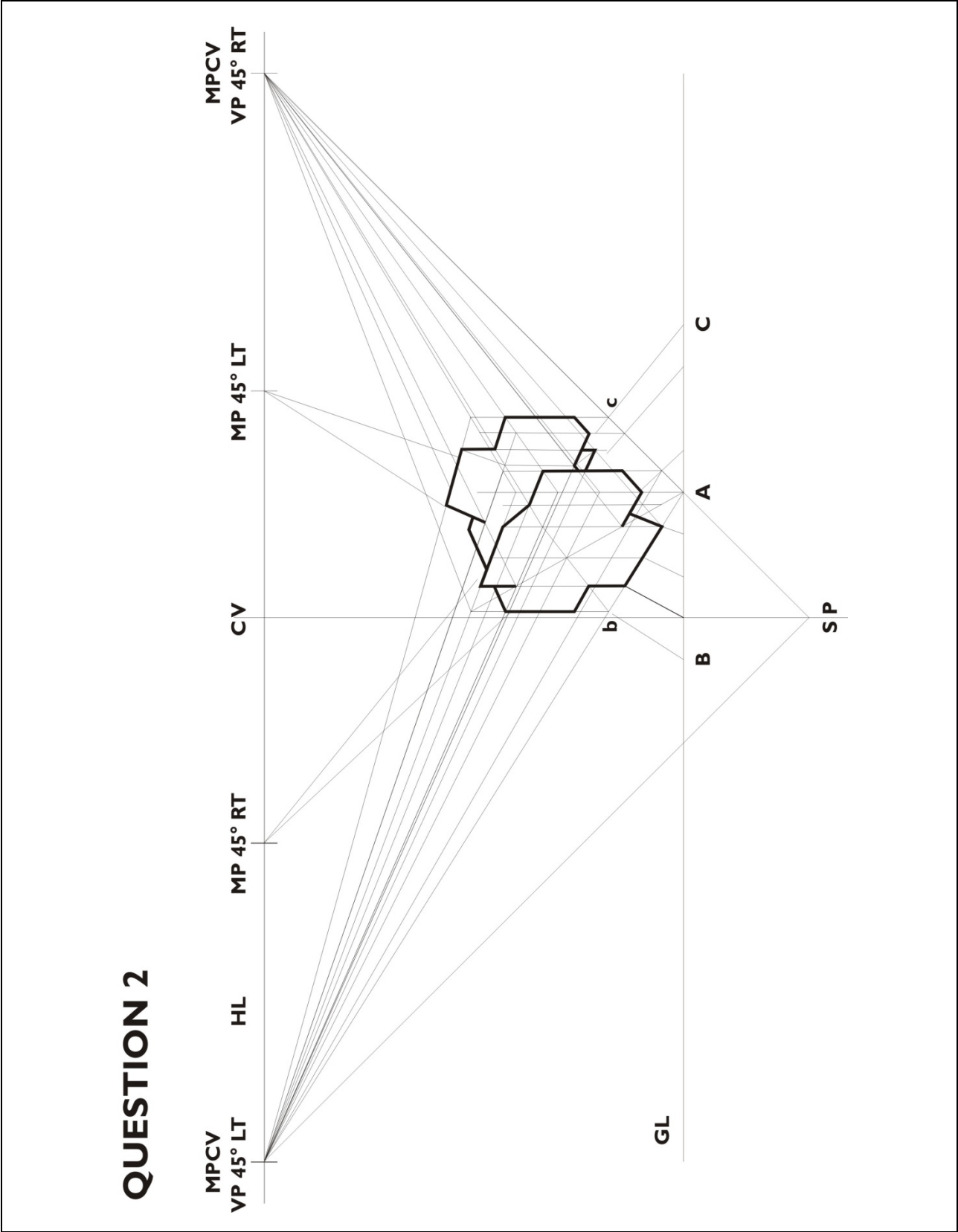
NUMBER	ANSWERS
1.1.1	TECHNICAL, ENGINEERS
1.1.2	UNDERSTANDING, ILLUSTRATOR
1.1.3	COMMUNICATED, TECHNICAL

(2 X 3 = 6) (6)

[6]

AUGUST 2011

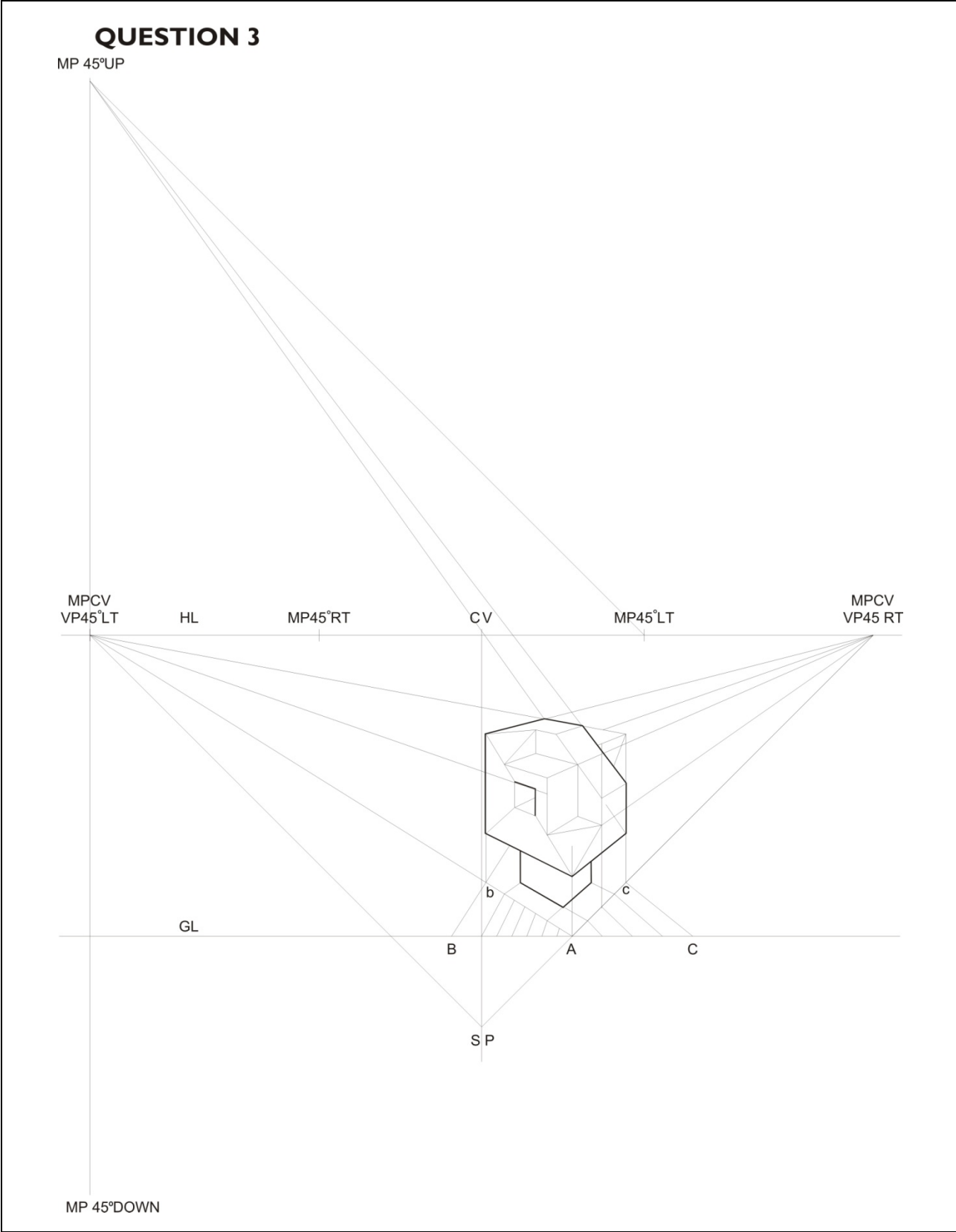
QUESTION 2: TWO-POINT PERSPECTIVE



[16]

AUGUST 2011

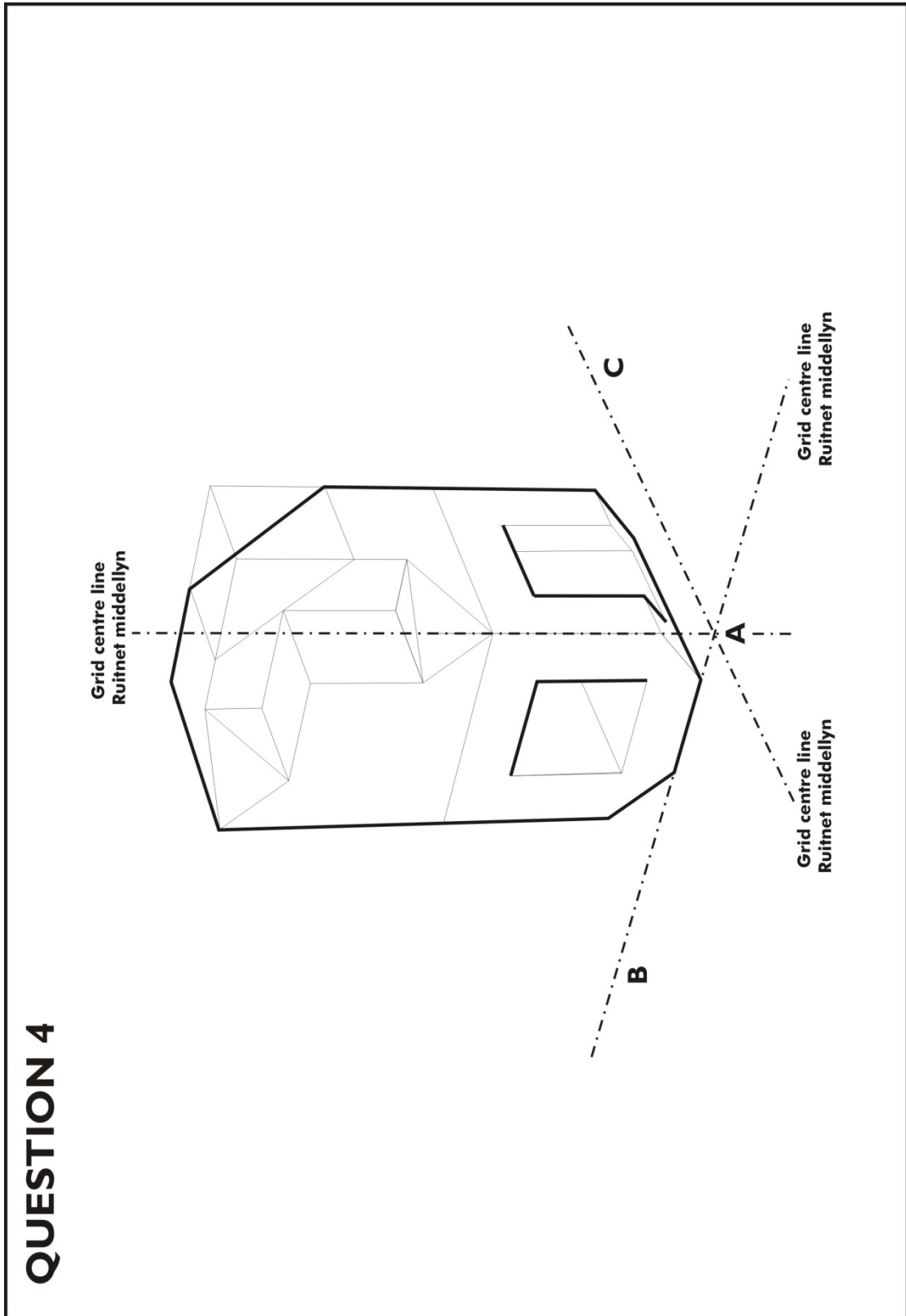
QUESTION 3: OBLIQUE PERSPECTIVE



[22]

AUGUST 2011

QUESTION 4: CONSTRUCTION OF OFF-PLANE ANGLES



QUESTION 4

**GRAND TOTAL: [56]
100**

Past Examination Papers



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Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NOVEMBER 2011

**NATIONAL CERTIFICATE: MULTI-DISCIPLINARY
DRAWING OFFICE PRACTICE**

TECHNICAL ILLUSTRATION N5

**(X-Paper)
09:00 – 12:00**

REQUIREMENTS: A3 drawing paper

Calculators may be used.

Candidates will require drawing instruments, pens and a ruler.

This question paper consists of 4 pages, 4 diagram sheets and a 1-page answer sheet.

NOTE: If you answer more than the required number of questions, only the required number of questions will be marked. All work you do not want to be marked must be clearly crossed out.

TIME: 3 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Answer **ALL** the questions.
2. Read **ALL** the questions carefully.
3. Number the answers correctly according to the numbering system used in this question paper.
4. Write neatly and legibly.
5. Use only **ONE** side of the drawing and tracing paper.
6. A balanced layout is very important. Candidates will be penalised for poor planning.
7. The question numbers must be clearly indicated.
8. **ALL** drawing work, including the candidate's information, must be done in pencil.
9. **ALL** the construction lines must be shown.
10. Marks will be awarded for neatness and accuracy.
11. Answer **QUESTION 1** on the attached answer sheet. Make sure that you have filled in your examination number in the space provided on the answer sheet.
12. **TWO** sheets of A3 drawing paper for **QUESTION 2 and 3**, as well as **ONE** sheet of A4 tracing paper and a grid for **QUESTION 4** are supplied.

SECTION A**QUESTION 1****1.1 Fill in the missing words:**

Write the answers on the dotted lines.

2.1.1 In - perspective the convergence of lines travelling away from theoccurs at a single point on the

2.1.3 The of vision is at right angles to one side of the.....; this side is parallel to the picture

[6]

QUESTION 2: TWO-POINT PERSPECTIVE**2.1 Construct the following, using the information provided:**

Top view of situation:

An object resting on the ground with sides vanishing to the left at an angle of 45° .

(Refer to **DIAGRAM SHEET 1** for dimensions)

All the measurements are given in millimetres.

Distance of the eye in front of P.P. is 130 mm.

Height of the eye above the G.L. is 100 mm.

The object lies on the G.L. with its leading edge **point A** 30 mm to the right of the C.V.

[16]

QUESTION 3: OBLIQUE PERSPECTIVE**3.1 Construct a three-point perspective grid using the following information:**

Distance of the eye in front of the P.P. is 120 mm.

Height of the eye above the G.L. is 104 mm.

Oblong 8 x 8 units, 16 units long, where each unit is 10 mm.

The oblong is 20° to the left of the P.P. and is elevated to the right at 45° to the ground.

Point A the leading edge of the oblong is situated 40 mm to the left of the C.V. and 50 mm behind the P.P.

[22]

QUESTION 4: THREE-POINT PERSPECTIVE ILLUSTRATION OF A MODEL ASSEMBLY**4.1 Construct a model as shown on the attached DIAGRAM SHEET 2.**

Scale: TWO grid units equal 10 millimetres.

NOTE: When the construction is complete, outline the object in bolder line treatment 0.5 mm thick.

DO NOT SHOW THE DIMENSIONS ON THE FINAL ILLUSTRATION.

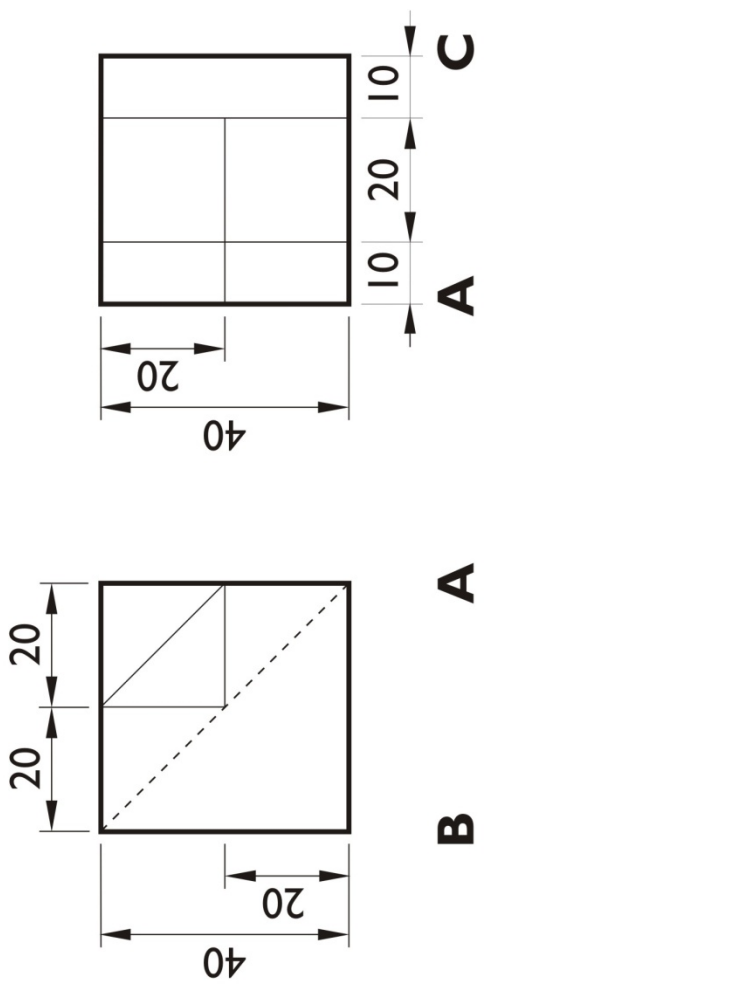
(56)

GRAND TOTAL: 100

NOVEMBER 2011

DIAGRAM SHEET 1 FIGURE 1

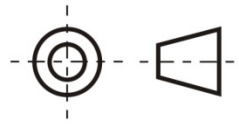
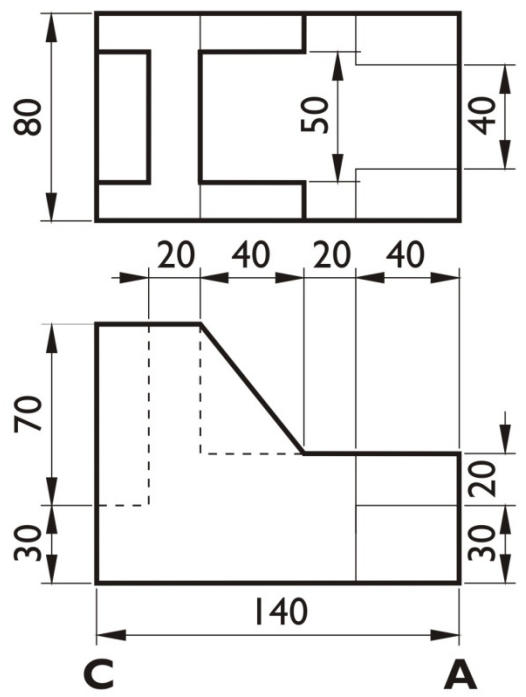
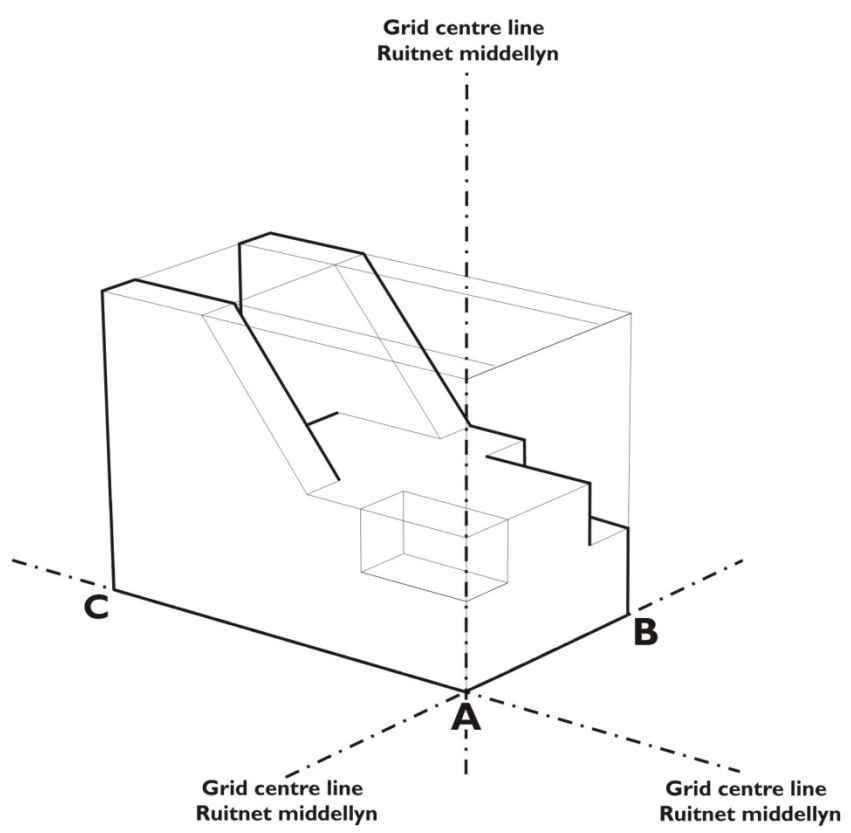
MULTI-DISCIPLINARY DRAWING OFFICE PRACTICE (N4/N5) Technical Illustration **N5** November 2011 **DIAGRAM SHEET 1**
MULTIDISCIPLINÈRE TEKENKANTOORPRAKTYK Tegnieise Illustrasie



NOVEMBER 2011

DIAGRAM SHEET 2 FIGURE 3

2
 DIAGRAM SHEET
 DIAGRAMMVEL
 N5 November 2011
 Technical Illustration
 Tegnieuse Illustrasie
(N4/N5)
MULTI-DISCIPLINARY DRAWING OFFICE PRACTICE
MULTIDISCIPLINÊRE TEKENKANTOORPRAKTYK



Marking Guidelines



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REPUBLIC OF SOUTH AFRICA

NOVEMBER 2011

NATIONAL CERTIFICATE: MULTI-DISCIPLINARY
DRAWING OFFICE PRACTICE

TECHNICAL ILLUSTRATION N5

(X-Paper)
09:00 – 12:00

NOVEMBER 2011

QUESTION 1: WRITTEN QUESTIONS

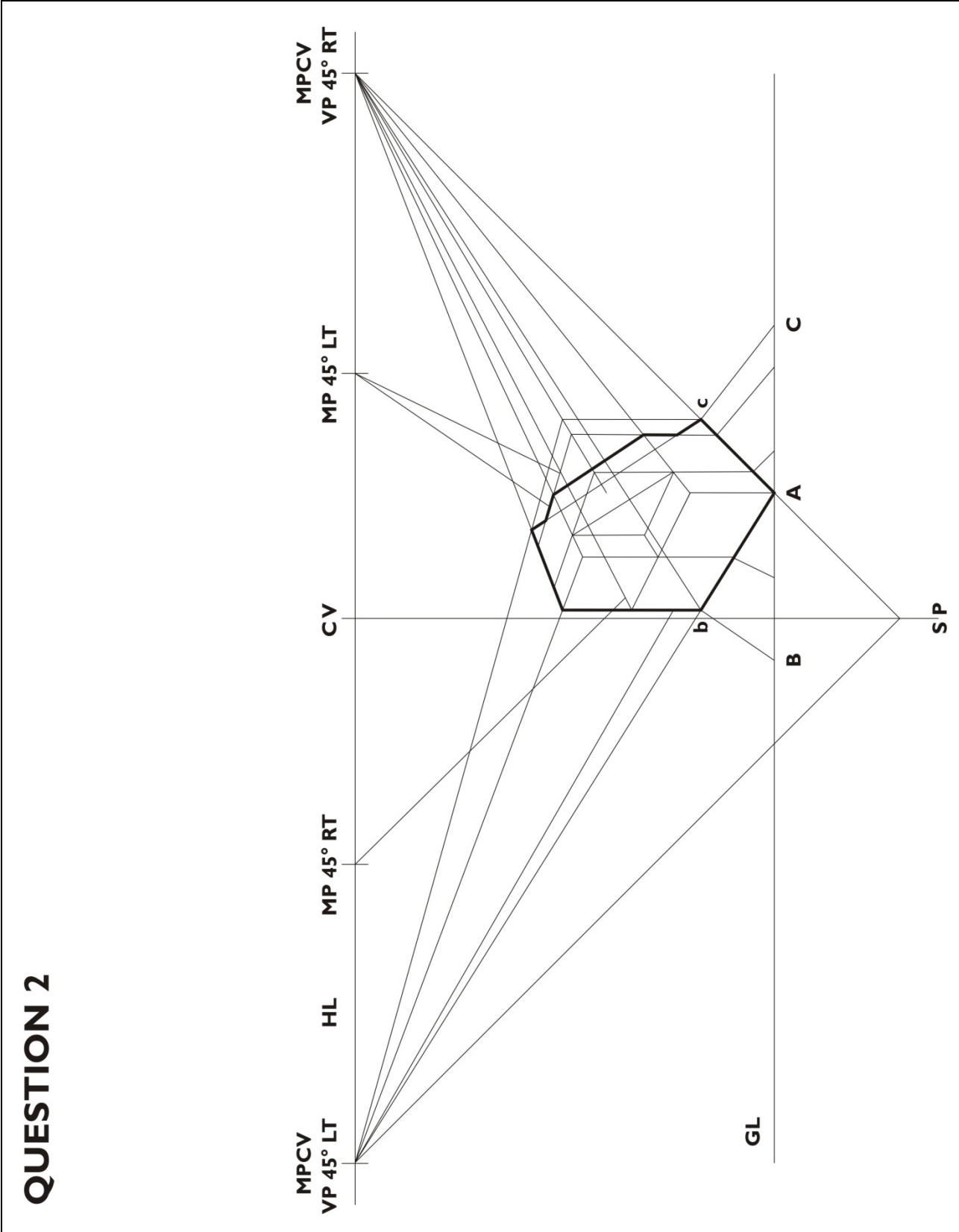
1.1 Fill in the missing words:

NUMBER	ANSWERS
1.1.1	ONE – POINT, VIEWER, HORIZON
1.1.2	CENTRE, OBJECT, PLANE

 $(3 \times 2 = 6)$ (6)**[6]**

NOVEMBER 2011

QUESTION 2: TWO-POINT PERSPECTIVE

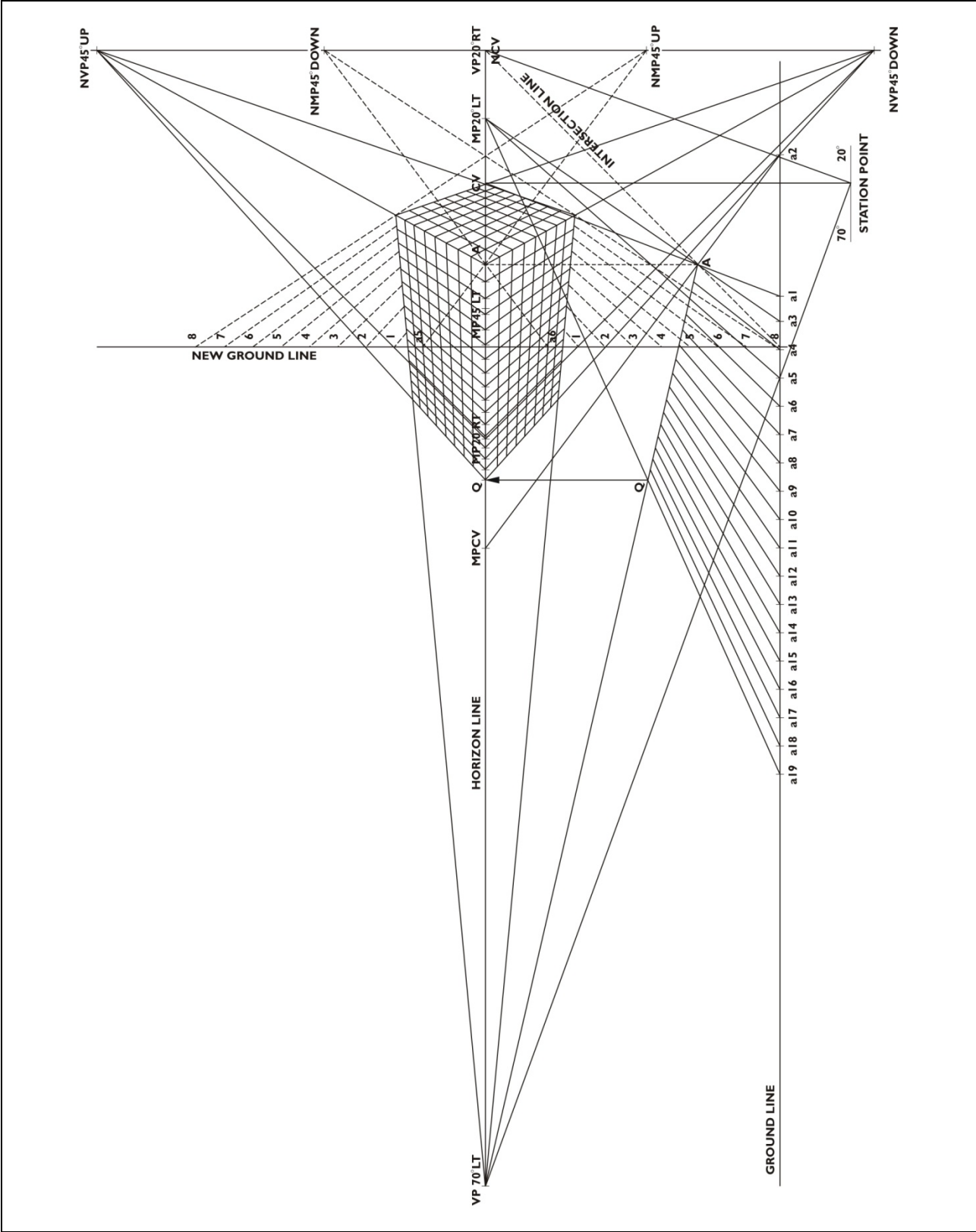


QUESTION 2

[16]

NOVEMBER 2011

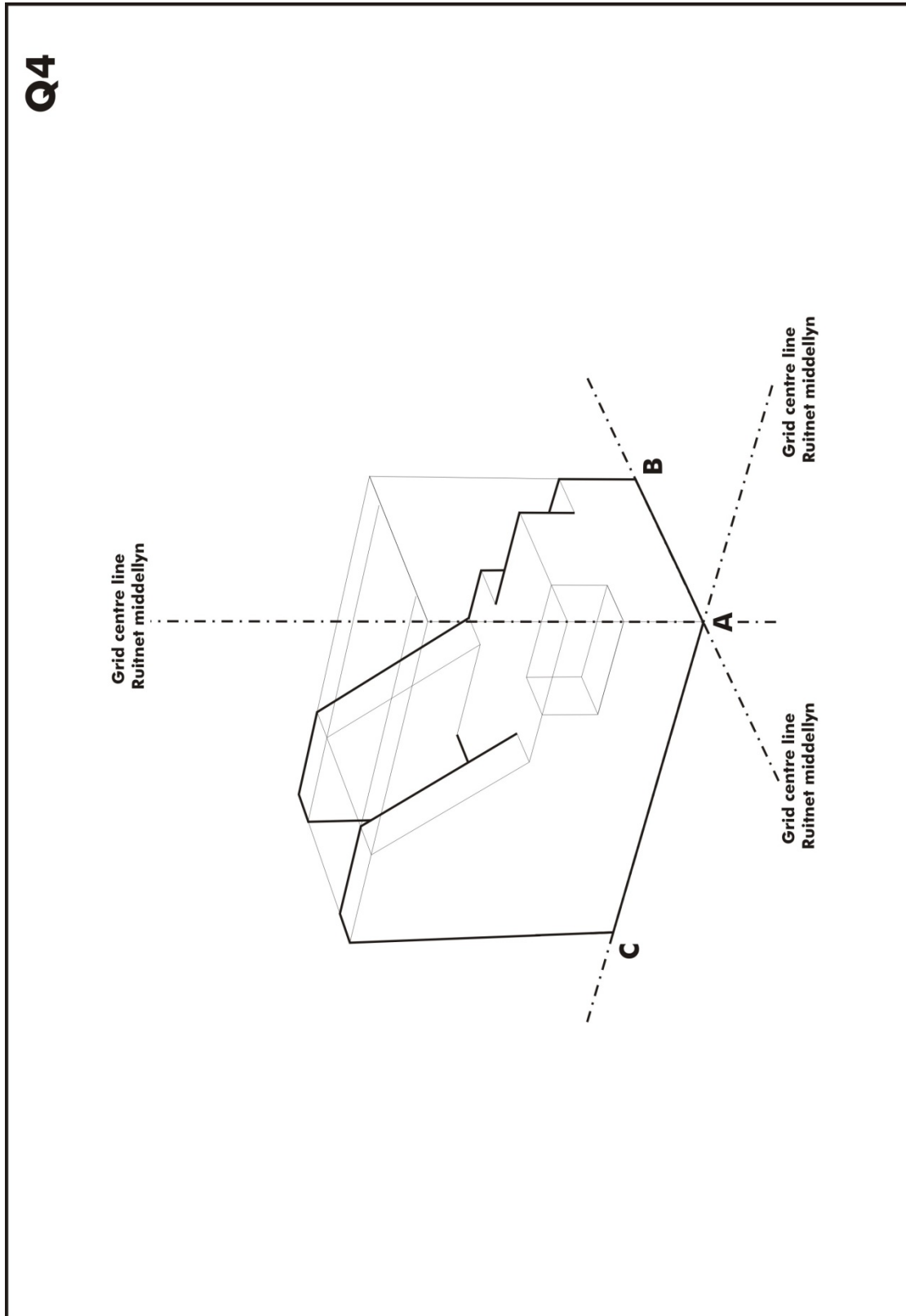
QUESTION 3: OBLIQUE PERSPECTIVE



[22]

NOVEMBER 2011

QUESTION 4: CONSTRUCTION OF OFF-PLANE ANGLES



[56]
/100/

Past Examination Papers



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

APRIL 2012

**NATIONAL CERTIFICATE: MULTI-DISCIPLINARY
DRAWING OFFICE PRACTICE**

TECHNICAL ILLUSTRATION N5

**(X-Paper)
09:00 – 12:00**

REQUIREMENTS: A3 drawing paper

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TIME: 3 HOURS
MARKS: 100

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3. Number the answers correctly according to the numbering system used in this question paper.
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5. Use only **ONE** side of the drawing and tracing paper.
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SECTION A**QUESTION 1****1.1 Fill in the missing words:**

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- 1.1.2 The gap in between the qualified engineer and the uninitiated operative is completely bridged by the technical
- 1.1.3 Important and often complicated information which cannot be imparted by any other means is clearly and quickly by the
Illustrator.

[6]**QUESTION 2: TWO-POINT PERSPECTIVE****2.1 Construct the following, using the information provided:**

Top view of situation:

A model with its sides vanishing to the left at an angle of 45° .

(Refer to **DIAGRAM SHEET 1** for dimensions)

All the measurements are given in millimetres.

Distance of the eye in front of P.P. is 120 mm.

Height of the eye above the G.L. is 90 mm.

The model lies on the G.L with its leading edge **point A** 30 mm to the right.

[16]

QUESTION 3: OBLIQUE PERSPECTIVE

- 3.1** An object with ascending planes (refer to **DIAGRAM SHEET 2** for dimensions).

Construct as per two point perspective with raised and lower vanishing points.

All measurements are given in millimetres.

Distance of the eye in front of the P.P. is 130 mm

Height of the eye above the G.L. is 100 mm

Point A is situated 30 mm to the right of the C.V (**a1**).

[22]

QUESTION 4: CONSTRUCTION OF OFF-PLANE ANGLES

- 4.1** Construct a model as shown on the attached **DIAGRAM SHEET 3**.

Scale: TWO grid units equal 10 millimetres.

NOTE: When the construction is complete, outline the object in bolder line treatment 0.5 mm thick.

DO NOT SHOW THE DIMENSIONS ON THE FINAL ILLUSTRATION.

[56]

GRAND TOTAL: 100

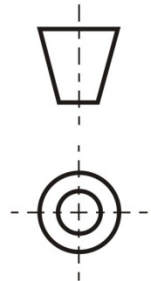
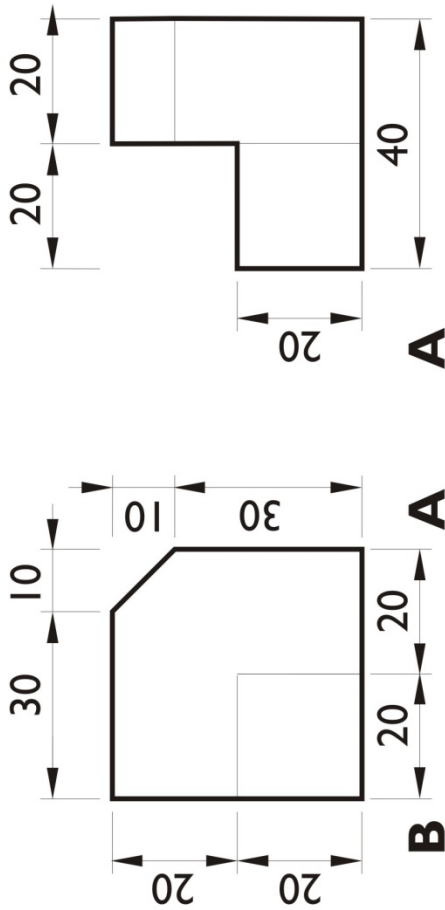
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DIAGRAM SHEET 1 FIGURE 1

MULTI-DISCIPLINARY DRAWING OFFICE PRACTICE (N4/N5) Technical Illustration N5
MULTIDISCIPLINÊRE TEKENKANTOORPRAKTYK Tegnieise Illustrasie N5

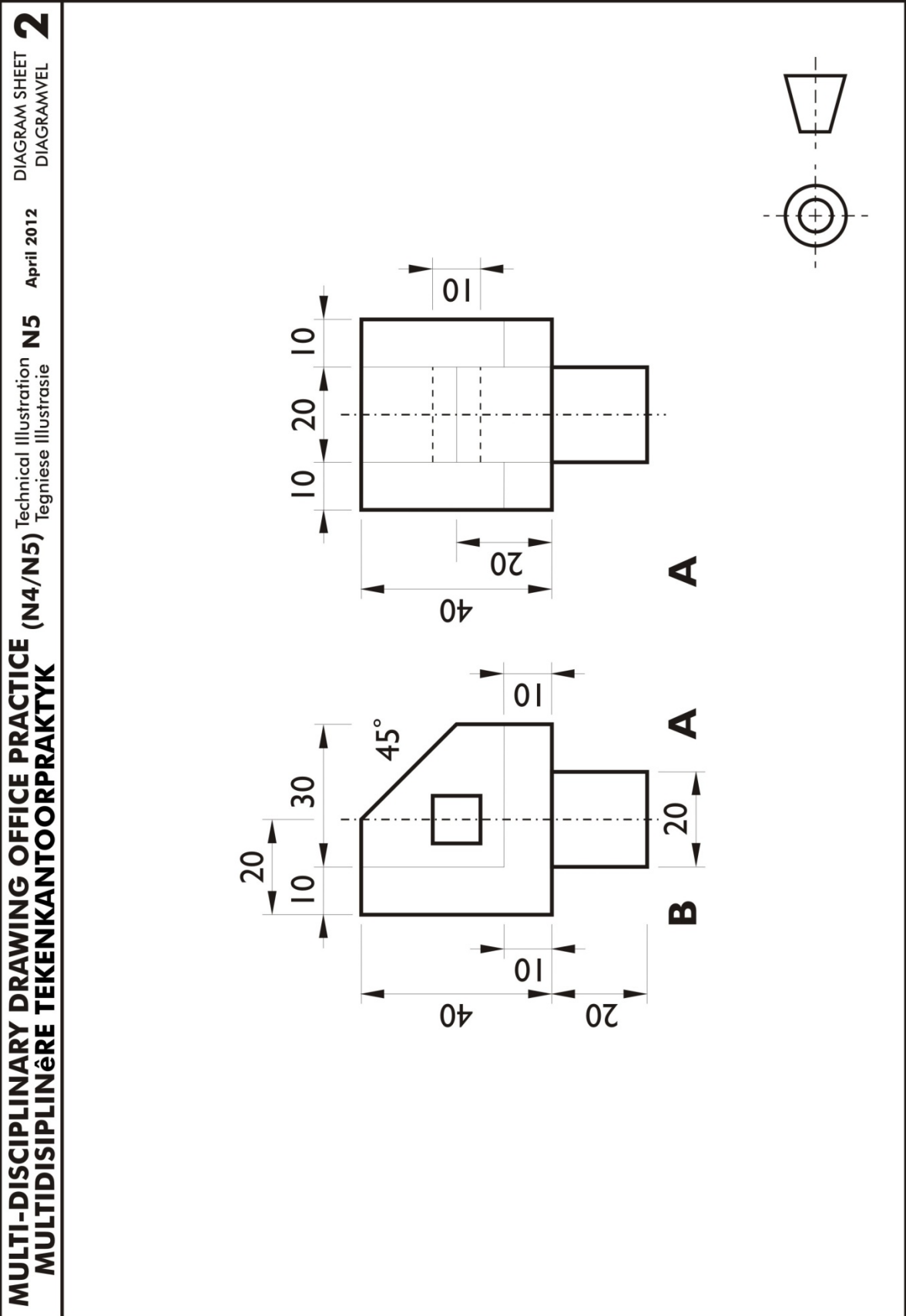
DIAGRAM SHEET 1
DIAGRAMMVEL 1

April 2012



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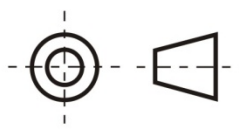
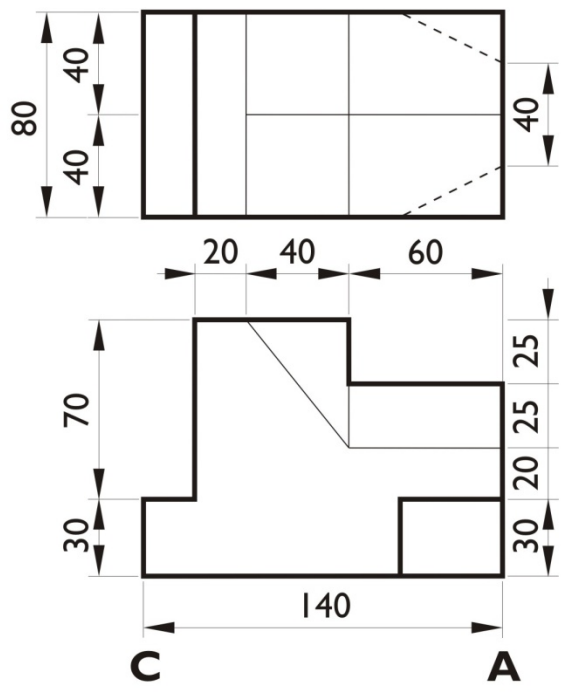
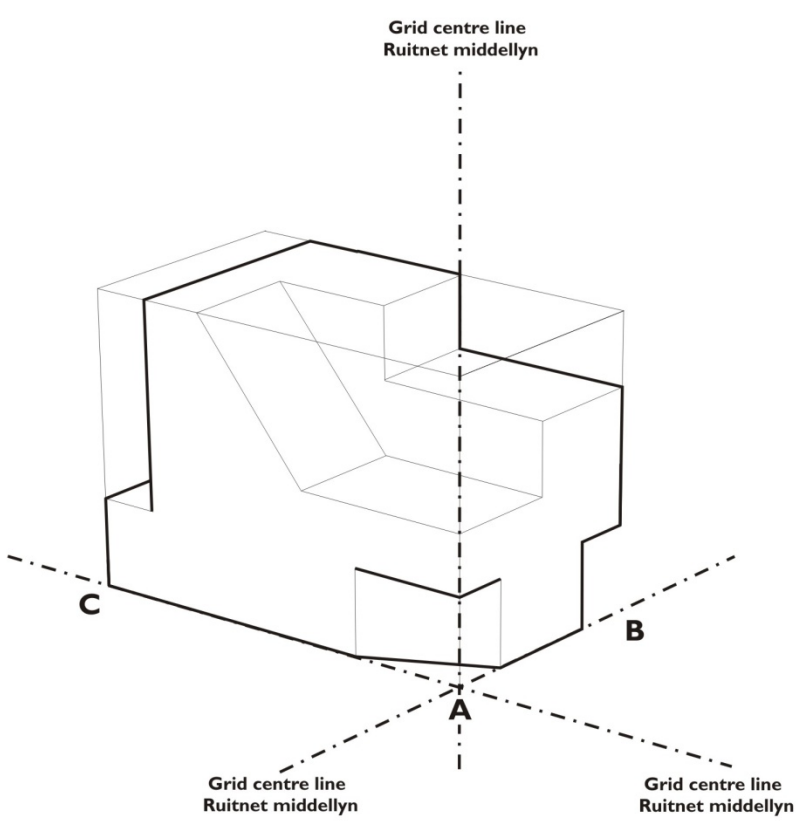
DIAGRAM SHEET 2 FIGURE 2



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DIAGRAM SHEET 3 FIGURE 3

3
 DIAGRAM SHEET
 DIAGRAMMVEL
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TECHNICAL ILLUSTRATION N5

(2050035)

**(X-Paper)
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QUESTION 1: WRITTEN QUESTIONS

1.1 Fill in the missing words:

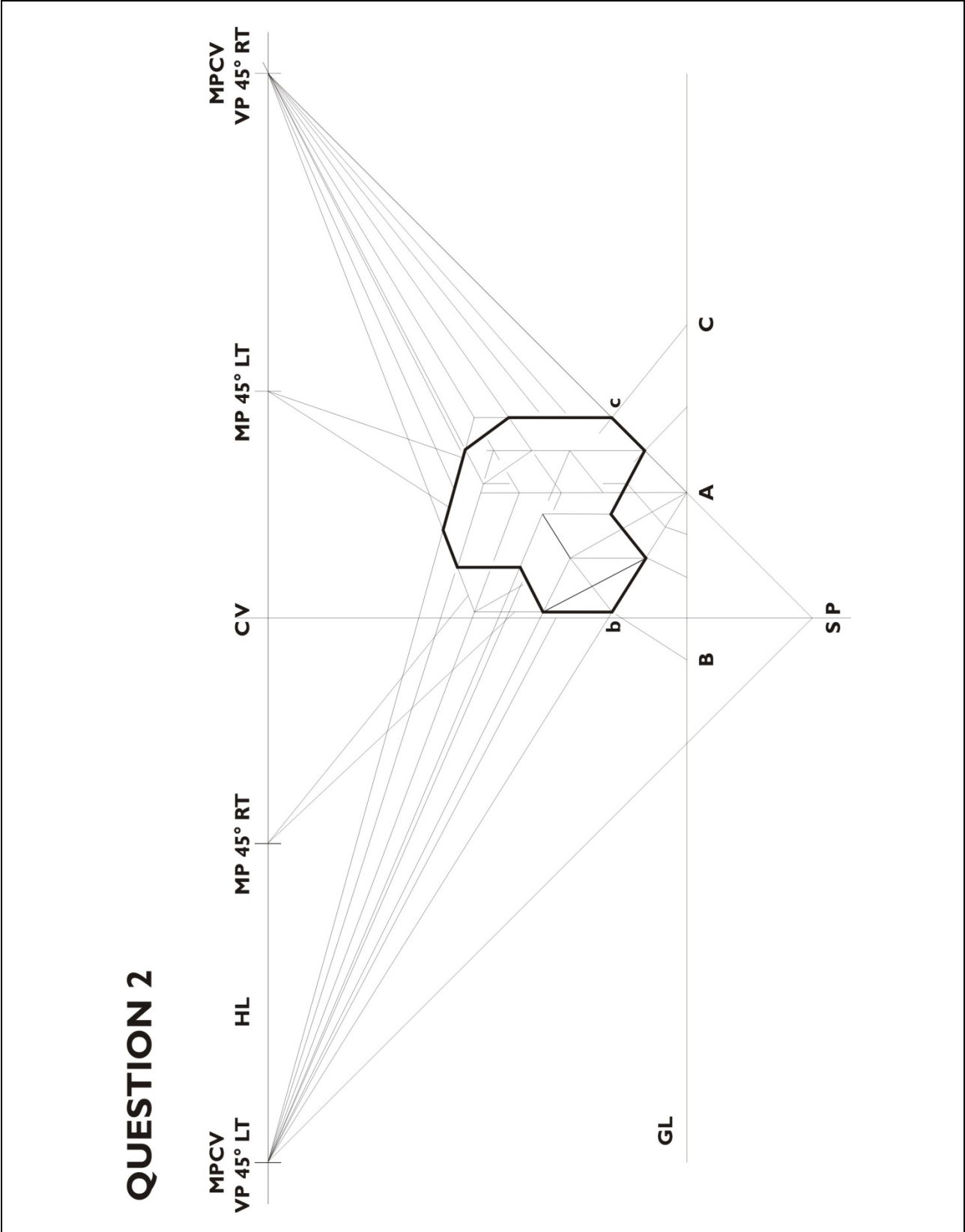
NUMBER	ANSWERS
1.1.1	TECHNICAL, ENGINEERS
1.1.2	UNDERSTANDING, ILLUSTRATOR
1.1.3	COMMUNICATED, TECHNICAL

(2 X 3 = 6) (6)

[6]

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QUESTION 2: TWO-POINT PERSPECTIVE

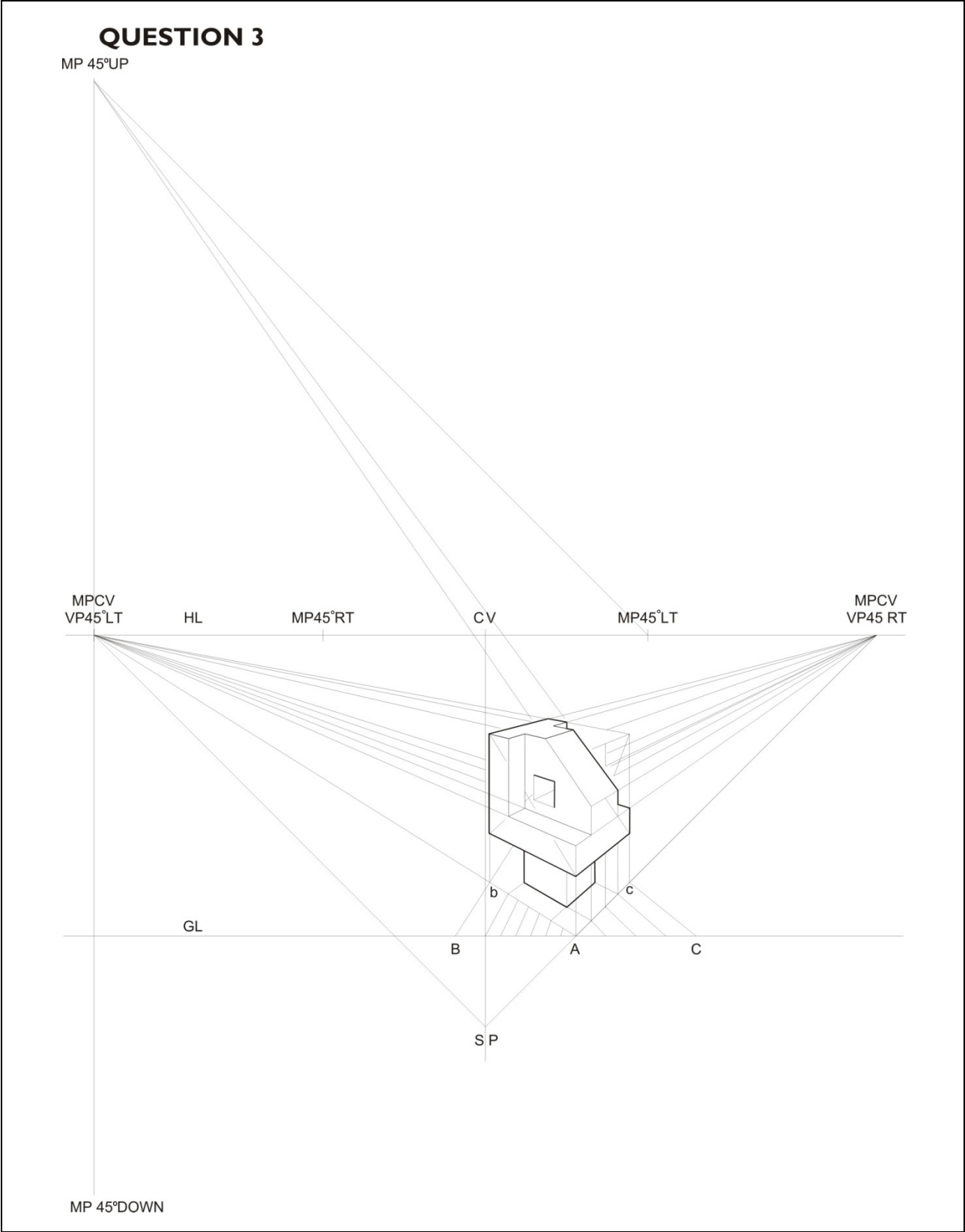


QUESTION 2

[16]

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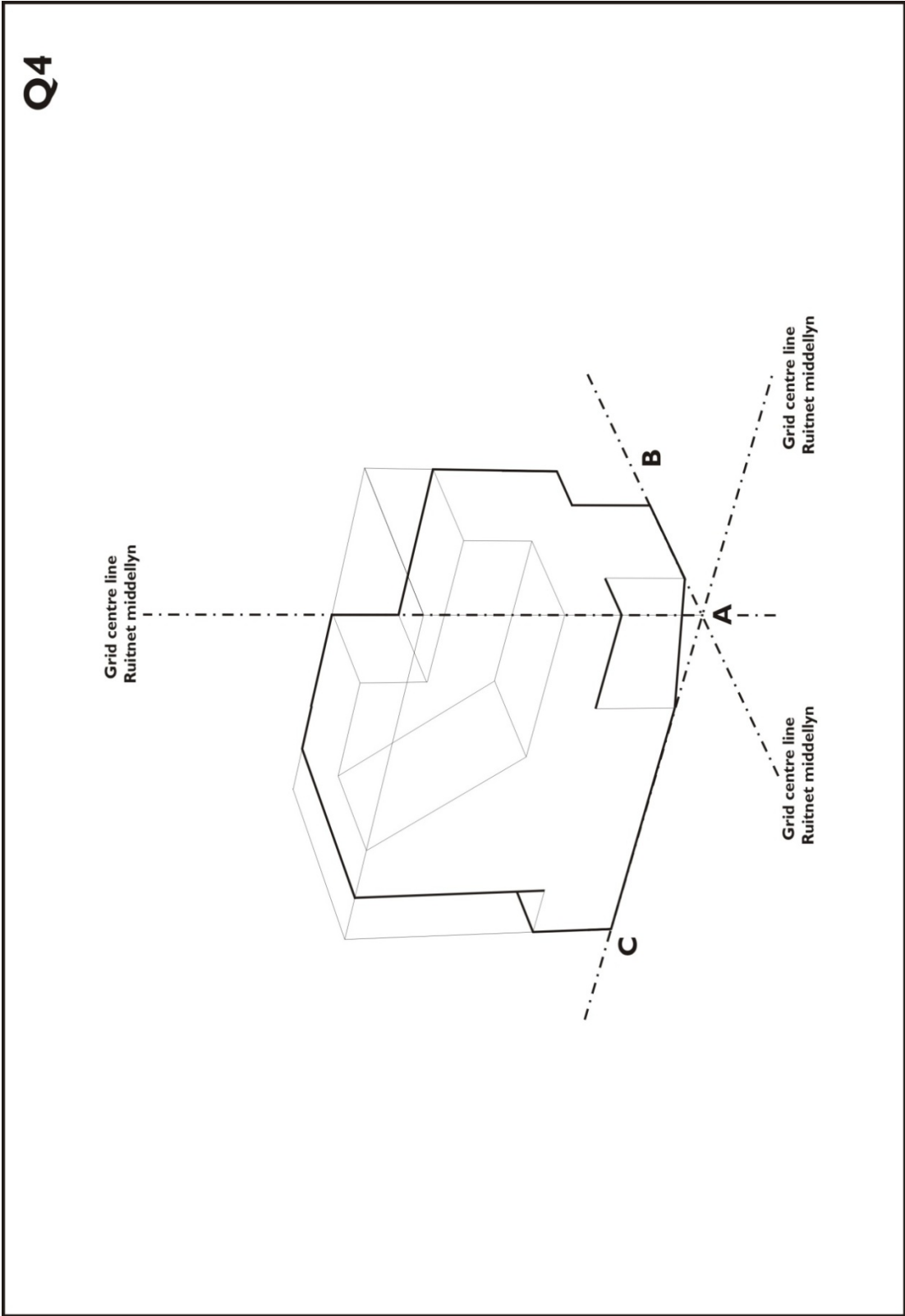
QUESTION 3: OBLIQUE PERSPECTIVE



[22]

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QUESTION 4: CONSTRUCTION OF OFF-PLANE ANGLES



[56]
/100/

N5 Technical Illustration is one of many publications introducing the gateways to Multi-Disciplinary Drawing Office Practice. This course is designed to develop the skills for learner draughtspersons to achieve their full potential in a draughting career.

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