

EC - LEARNER SUPPORT MATERIAL: CIVIL TECHNOLOGY

WOODWORKING: GRADE 11

CONTENT TO BE COVERED:

TOPICS:

1. CENTERING (Specific)

Sketches showing methods of construction and erection of centres for the following types of arches with spans not exceeding 1 200 mm:

- Segmental arch
- Semi-circular arch
- Sketches showing closed and open laggings

2. FORMWORK (Specific)

Properties of materials used for formwork

Drawing of formwork and methods of erecting and supporting the following:

- Beam with attached floor slab
- Straight flight of stairs with a landing
- Square, round and rectangular
- columns

3. SHORING (Specific) and IRONMONGERY (Specific)

Single line diagrams showing the components of the following shores for a three-storey building:

- Dead shore
- Double flying shore

Identification and use of the following fittings:

- Mortise lock
- Rim lock
- Night latch
- Straight cupboard lock
- Cut cupboard lock
- Drawer or till lock

4. SUSPENDED TIMBER FLOOR (Specific)

Detailed drawing of the vertical cross-section through a suspended timber floor showing all supports, floor boards, skirting and quadrant including brick pier showing the bearer, floor joist, ant guard and DPC

Draw a plan of the layout of a room with a suspended timber floor showing all supports and part of the tongue and groove floorboards

EXAMPLE 1: QUESTION 1: CENTERING, FORMWORK, SHORING

- 1.1 Explain the term **centre**, as used in civil technology. (1)
- 1.2 Use drawing instruments and draw, a neat, labelled sketch to differentiate between **open lagging on one end** and **closed lagging on the other end** that are fixed to the rib of the centre of a flat arch. Label any TWO parts of the drawing. (5)
- 1.3 State **ONE** safety precaution that must be observed by a worker using electric tools. (1)
- 1.4 Recommend **ONE** electrical tool that may be used to cut the rib of a semi-circular centre to shape. (1)
- 1.5 Define the term **formwork**. (2)
- 1.6 Name ONE material that may be used in the construction of formwork. (1)
- 1.7 Motivate why it is not necessary to drive home nails when joining formwork members. (1)
- 1.8 **FIGURE 1.8** shows a part of the vertical section through the formwork of a concrete floor slab. Complete the drawing to show the following:

- TWO props
- Sole plate
- Wedges
- Bearers
- Joist
- Label the props and wedges. (10)

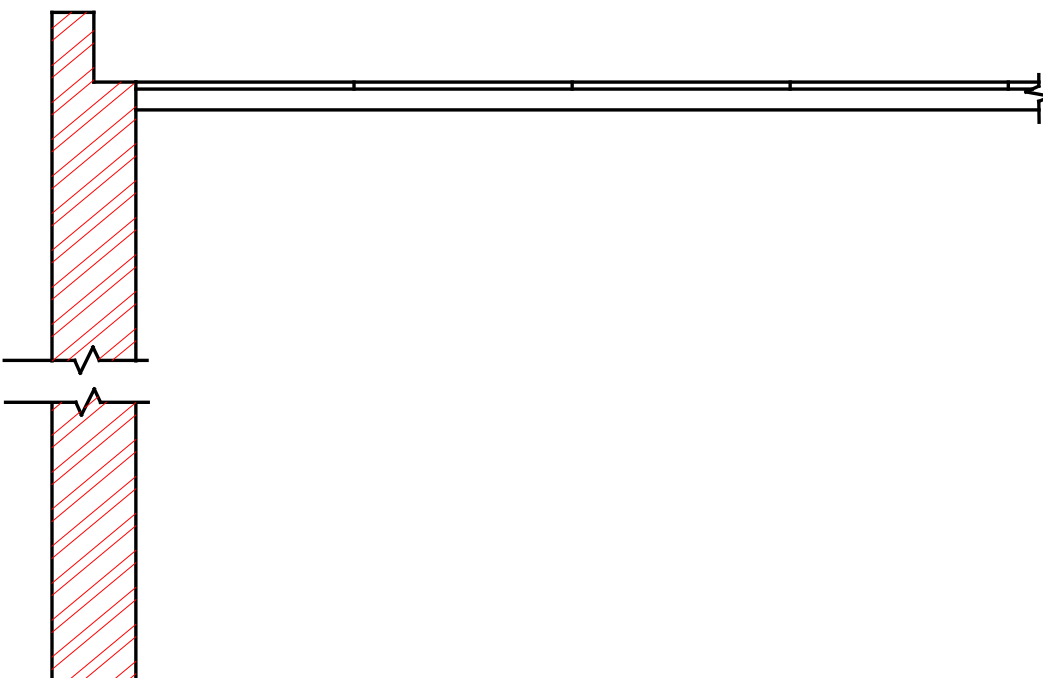


FIGURE 1.8

ASSESSMENT CRITERIA	MARKS	LEARNER'S MARK
Props	2	
Sole plate	2	
Wedges	2	
Bearers	1	
Joist	1	
Label: Prop	1	
Label: Wedges	1	
TOTAL	10	

1.9 Explain **TWO** instances when it would be necessary to install raking shore in a building. (2)

1.10 **FIGURE 1.10** shows the external walls of two bindings. Flying shores must be installed between the two walls. Complete the drawing to show the horizontal shore, wall plate, wedges, needle, cleat and straining sill. Ignore the strut. (6)

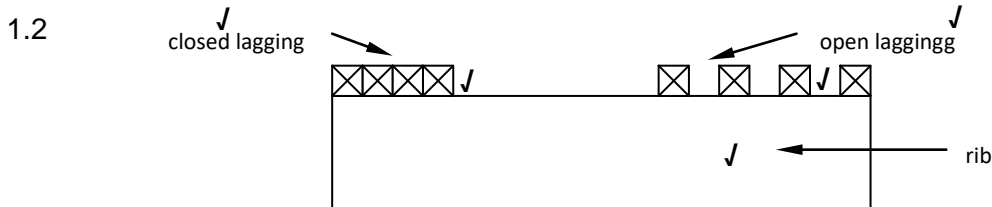


FIGURE 1.10

ASSESSMENT CRITERIA	MARKS	LEARNER'S MARK
Wall plate	1	
Cleat	1	
Needle	1	
Horizontal shore	1	
Wedges	1	
Straining sill/beam	1	
TOTAL	6	

ANSWER: EXAMPLE 1: QUESTION 1: CENTERING, FORMWORK, SHORING

1.1 A centre is a temporary framework to support the voussoirs (bricks) of an arch while the arch is being built and is removed when the mortar joints have hardened. ✓
(1)



ASSESSMENT CRITERIA	MARKS	LEARNER'S MARK
Rib	1	
Closed lagging	1	
Open lagging	1	
Two labels	2	
TOTAL	5	

(5)

- 1.3
- Wear the appropriate safety apparel. ✓
 - Concentrate at the point of operation.
 - Do not let the cable come into contact with moving parts of the tool
 - Grip the tool with both hands.
 - Maintain a sturdy stance.

ANY ONE OF THE ABOVE (1)

1.4 Band saw/Jig saw ✓ (1)

1.5 Formwork is a temporary support ✓ for concrete while it is being cast and is removed when the concrete has set or hardened. ✓

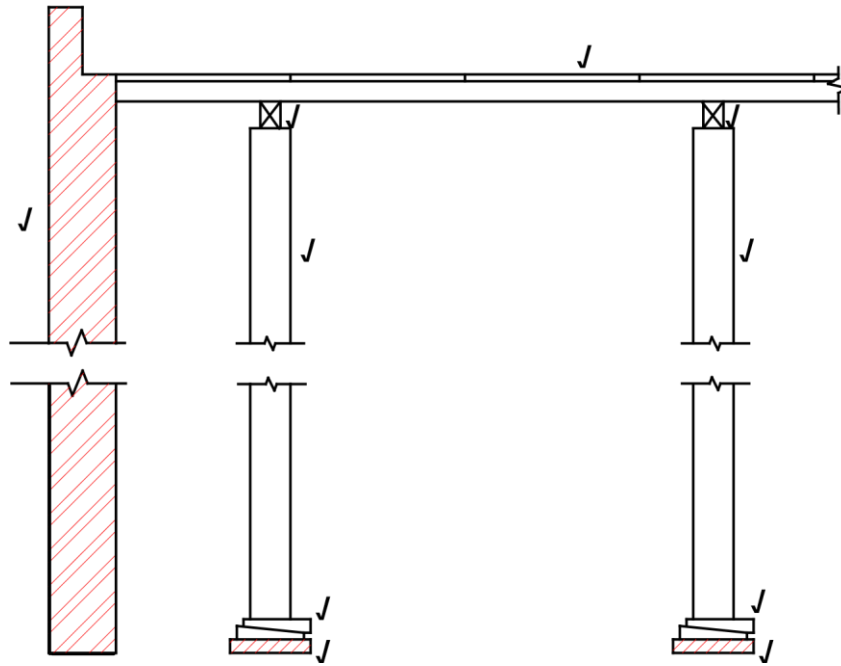
OR ANY OTHER ACCEPTABLE ANSWER (2)

- 1.6
- Steel ✓
 - Marine plywood
 - Laminated board
 - Block board timber
- ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER**

(1)

1.7 It is desirable because it makes the striking of formwork easier. (1)

11.8



ASSESSMENT CRITERIA	MARKS	LEARNER'S MARK
Props	2	
Sole plate	2	
Wedges	2	
Bearers	1	
Joist	1	
Label: Props	1	
Label: Wedges	1	
TOTAL	10	

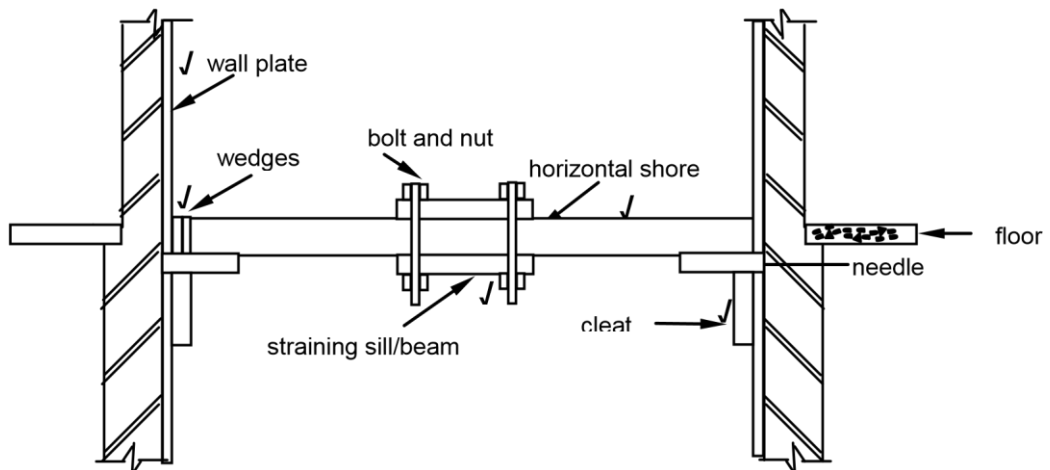
(10)

1.9

- Raking shores are installed when it is necessary to provide temporary lateral support to a building. ✓
- Raking shores are installed to support leaning or unstable walls and columns by transferring the weight to the raking strut/raker which then transfers the weight onto the sole piece embedded in the ground. ✓

(2)

1.10



ASSESSMENT CRITERIA	MARKS	LEARNER'S MARK
Wall plate	1	
Cleat	1	
Needle	1	
Horizontal shore	1	
Wedges	1	
Straining sill/beam	1	
TOTAL	6	

(6)

[30]

EXAMPLE 2: QUESTION 2: CENTRING, FORMWORK, SHORING, IRONMONGERY AND SUSPENDED FLOORS (SPECIFIC)

- 2.1 Discuss **FOUR** requirements for the construction of centring. (4 x 1) (4)
- 2.2 What type of centring will you use for the construction of a flat arch? (1)
- 2.3 Name the different parts **2.3.A to 2.3.E** of the centre in **FIGURE 2.3**. (5)

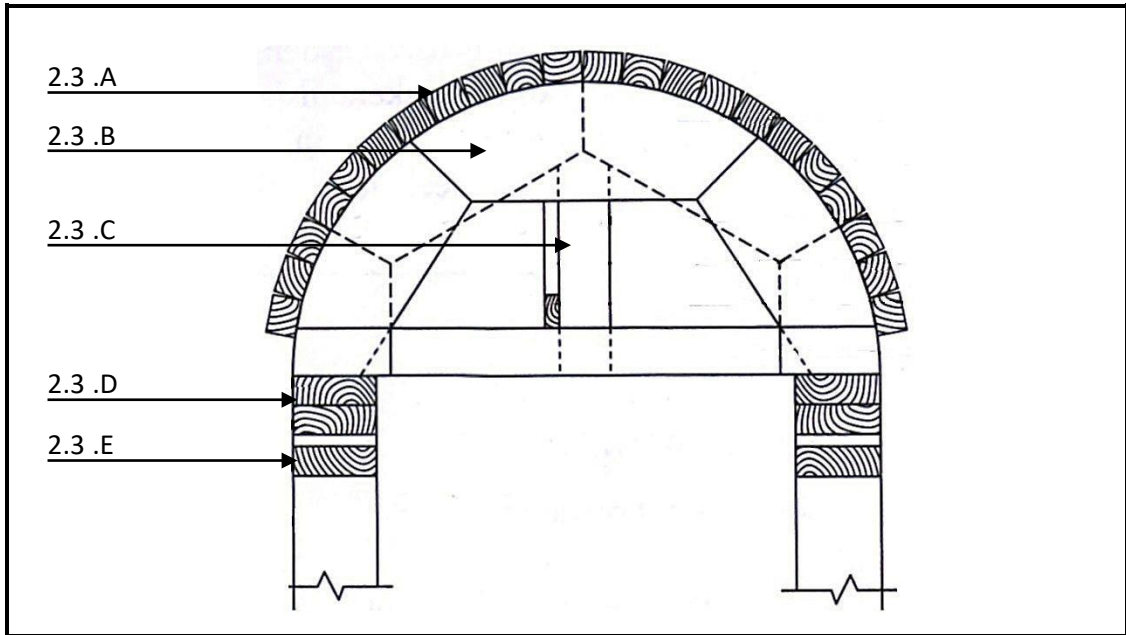
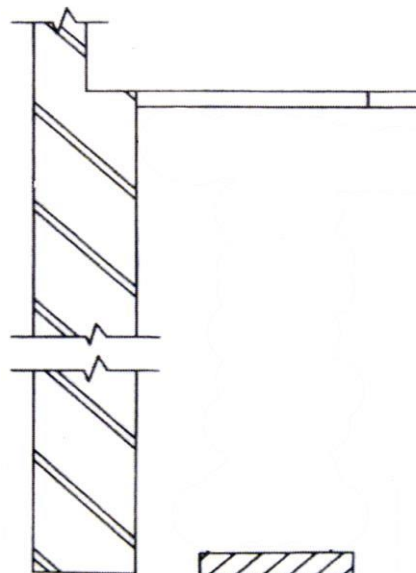


FIGURE 2.3

- 2.4 Name **TWO** advantages of board products that you can use for the sides of formwork. (2 x 1) (2)
- 2.5 Describe the purpose of the following requirements for the parts of formwork:
- 2.5.1 The inside faces of timber should be treated with mould oil. (2)
- 2.5.2 The thickness of matching members of the formwork should be uniform. (2)
- 2.5.3 Bolts should be greased. (2)
- 2.6 **FIGURE 2.6** shows the vertical view of a wall, sole plate and soffit shutter board for a floor slab. Complete the drawing and show all the different parts on a scale of 1: 20. (10)



Wedges	2	
Props	2	
Cross-bearers	2	
Bearer	2	
Scale	2	
TOTAL	10	

- 2.7 Describe what the purpose of folding wedges are in the erection process of a floor slab. (2)
- 2.8 Explain the purpose of yokes in the formwork process for a square column. (2)
- 2.9 Indicate whether the following statements are **TRUE or FALSE**. Write only the word 'true' or 'false' next to the number.
- 2.9.1 Shoring is a permanent construction that can be used to support a wall. (1)
- 2.9.2 Raking shores are used on top of foundation excavations to support them. (1)
- 2.9.3 Flying shores are used to provide support between two walls next to adjacent buildings. (1)
- 2.9.4 The wall plate provides a supporting surface for the shore and bracing, and is fixed to the wall. (1)
- 2.10 Identify the different types of hinges in **FIGURES 2.10.A to 2.10.C**. (3)

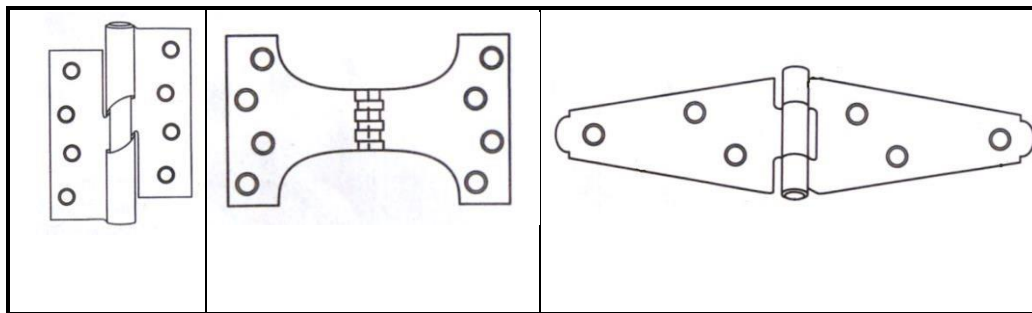


FIGURE 2.10.A

FIGURE 2.10.B

FIGURE 2.10.C

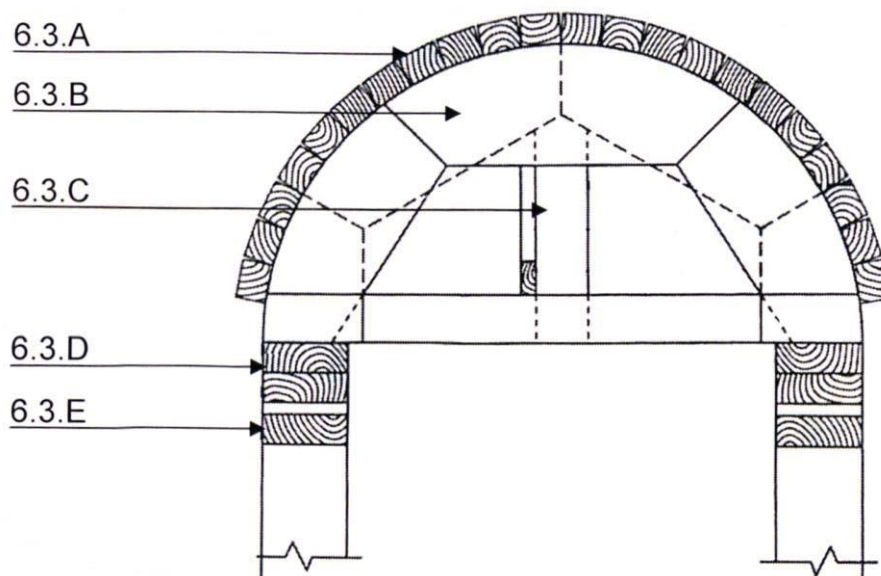
- 2.11 What is the purpose of the open space underneath the suspended timber floor? (1)

ANSWER: EXAMPLE 2: QUESTION 2: CENTRING, FORMWORK, SHORING, IRONMONGERY AND SUSPENDED FLOORS (SPECIFIC)

2.1 The top shape of the framework must be the same as the underside of the arch
 Centre must support the weight of the wet masonry/brickwork until the cement between the arc stones has set
 Centres must be rigid and strong in order to support the masonry of the arch
 Must easily be removed
 Must be secured with round wire nails
 Size of members is determined by the design and construction of the centre (4 x 1) (4)

2.2 Two solid timber strips 25 mm thick (1)

- 2.3 A. Laggings
 B. Rib
 C. Strut
 D. Bearer
 E. Folding wedges



(5)

2.4 Any **TWO**.

- The boards are economical
- Used where a smooth or quality finish is not needed

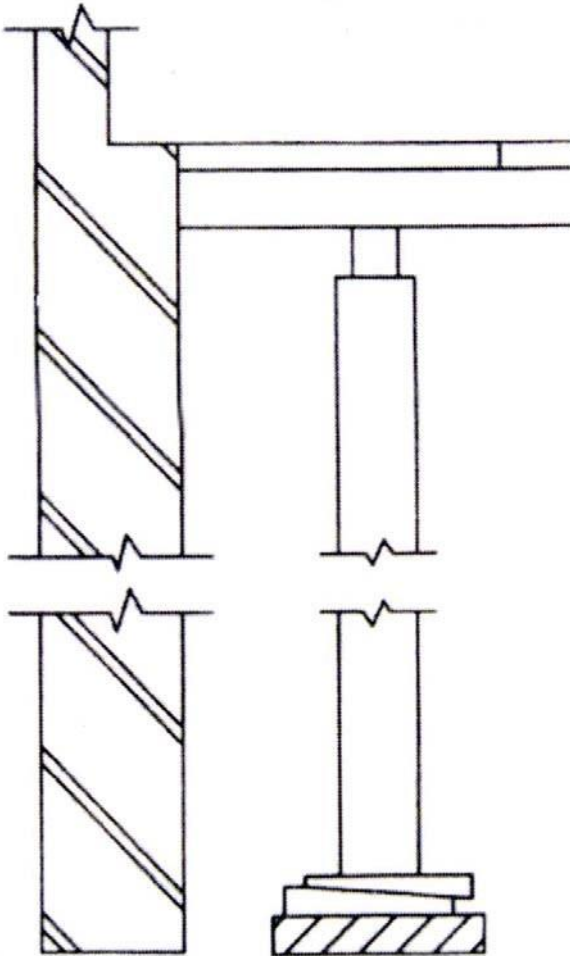
- Big sheets available (2 x 1) (2)

2.5 2.5.1 To prevent the concrete from sticking to surfaces of the timber (2)

2.5.2 To ensure that the surface of the column is even (2)

2.5.3 To ease assembling and dismantling of formwork (2)

2.6 (10)



Wedges	2	
Prop	2	
Cross-bearer	2	
Bearer	2	
Scale	2	
TOTAL	10	

2.7 Make provision for raising or lowering the formwork to the required height Ease the removal of the formwork after completion of lintel (2)

2.8 Made of wood and metal and used to pull together the box of a square column by means of nuts and bolts (2)

2.9 2.9.1 False (1)

2.9.2 False (1)

2.9.3 False (1)

2.9.4 True (1)

2.10

- A Rising butt
- B Parliament
- C Strap

(3)

2.11 For ventilation of timber floor

(1)

[40]

EXAMPLE 3: QUESTION 3: CENTRING, FORMWORK, SHORING SUSPENDED FLOORS AND IRONMONGERY (SPECIFIC)

3.1 **FIGURE 3.1** below shows a pictorial view of closed laggings. Study the picture and answer the questions that follow.

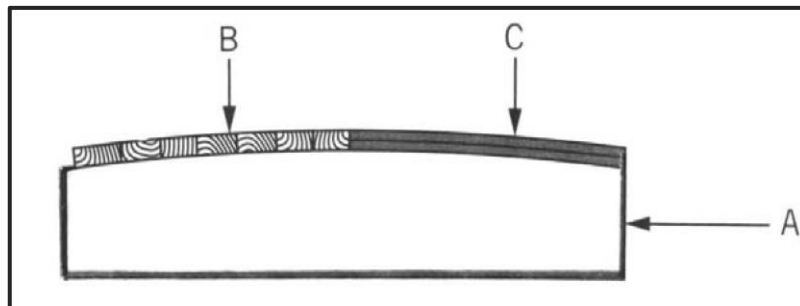


FIGURE 3.1

3.1.1 Identify parts **A** to **C**.

(3)

3.1.2 Explain ONE use of **B** if it is used in a closed position, as shown in **FIGURE 3.1**.

(1)

3.2 **FIGURE 3.2** below shows the top view of the yokes and laggings for a round column. Study the picture and answer the questions that follow.

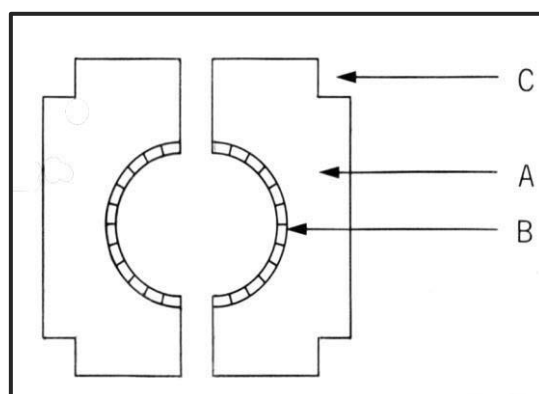


FIGURE 3.2

3.2.1 Explain, in your own words, how to achieve a smooth finish for the column.

(2)

3.2.2 Identify the parts marked **A**, **B** and **C**.

(3)

3.2.3 Explain the difference between *formwork* and *striking*. (4)

3.3 **FIGURE 3.3** is an example of shoring. Study the drawing and answer the questions that follow.

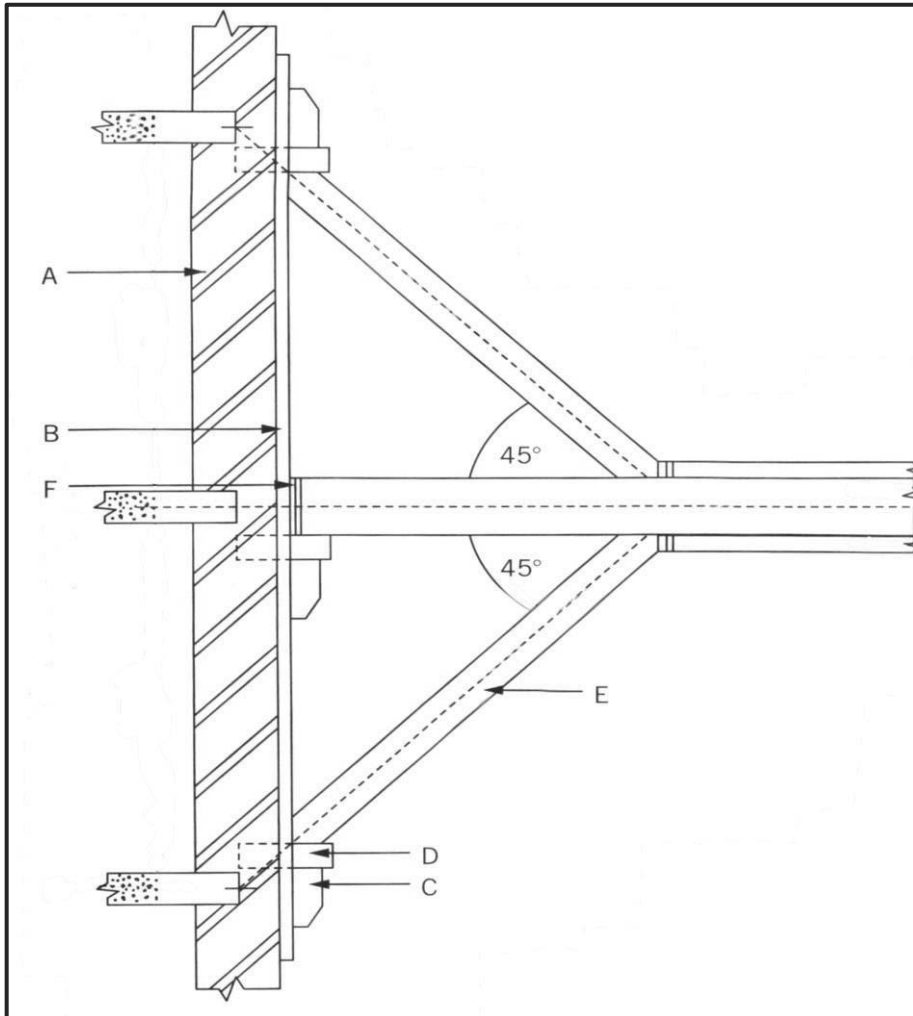


FIGURE 3.3

3.3.1 Identify the shoring. (1)

3.3.2 Name the function of **E**. (2)

3.3.3 Identify the parts **A**, **B**, **C**, **D** and **F**. (5)

3.3.4 In your own words, describe the difference between a *raking shore* and a *single flying shore*. (4)

3.4 **FIGURE 3.4** below shows a hinge. Study the drawing and answer the questions that follow.

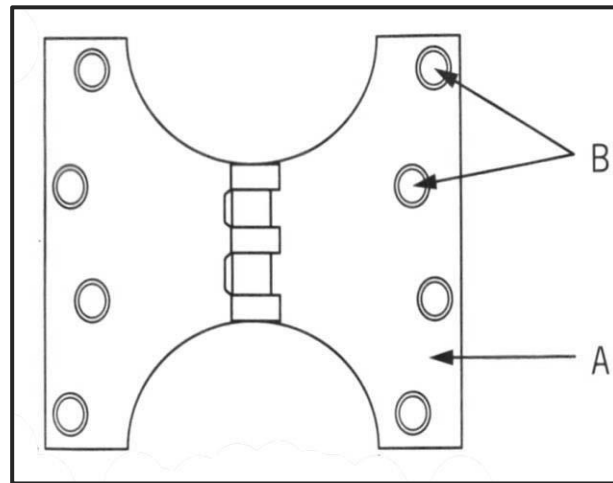


FIGURE 3.4

- 3.4.1 Give the name of the hinge. (1)
- 3.4.2 Identify parts **A** and **B**. (2)
- 3.4.3 Explain the purpose of the type of hinge in **FIGURE 3.4**. (2)

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ANSWER: EXAMPLE 3: QUESTION 3: CENTRING, FORMWORK, SHORING SUSPENDED FLOORS AND IRONMONGERY (SPECIFIC)

- 3.1 3.1.1 A – Rib (3)
- B – Close lagging
- C – Plywood or hardboard
- 3.1.2 Nailed under the ends of the ribs to keep the ribs together. (1)
- 3.2 3.2.1 By lining the laggings with plywood or hardboard. (2)
- 3.2.2 A – Half round collar or yokes (3)
- B – Laggings
- C – Indent for vertical clamps or cleats
- 3.2.3 Formwork refers to a temporary framework made out of timber or steel, which is ideal for the in-situ casting of concrete. (4)
- It provides support until the concrete has set.
 - Striking can be defined as the dismantling of formwork once the concrete has cured and sufficiently hardened.

3.3 3.3.1 Single flying shore (1)

3.3.2 Raker / raking strut is inclined timber pieces.
The raker transfers the horizontal and vertical load exerted on the wall to the sole plate. (2)

3.3.3 A – Wall
B - Wall plate
C - Needle
D - Cleat
F – Folding wedges (5)

3.3.4 To support leaning or unstable walls and columns by transferring additional weight

- From the raking strut / raker to the ground or other supporting members, away from the wall
- Flying shores are used to provide temporary horizontal support to two parallel walls
- Where one of the walls tends to lean or show signs of failure (4)

3.4 3.4.1 Parliament hinge (1)

3.4.2 A – Leaf
B – Staggered countersunk hole for screw (2)

3.4.3 The hinges protrude toward the outside face of the walls, allowing doors to open up to 180° past the reveal or other obstructions against a wall. (2)

[30]

