



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE**

GRADE 11

NOVEMBER 2016

**CIVIL TECHNOLOGY
MEMORANDUM**

MARKS: 200

This memorandum consists of 12 pages.

QUESTION 1: CONSTRUCTION PROCESSES

- 1.1 FIGURE 1.1 A and FIGURE 1.1 B on Sheet A show wall constructions without dampproofing.

Draw on Sheet A the damp proofing underneath the floors and in the walls by means of clear lines. (8)

- 1.2 Any FOUR requirements to which wall constructions must comply.

- Resist crushing
 - Insolation/Stability against rain
 - Insolation/Stability against heat
 - Insolation/Stability against cold
 - Insolation/Stability against noise
 - Insolation/Stability against fire
 - Contain minimum openings
- (Any 4 x 1) (4)

- 1.3 (1) Gap between wall and roof covering (2) be filled/sealed of
OR

Prevent wind/cold/small animals from entering the ceiling (2)

- 1.4 Indicate whether the following statements are TRUE or FALSE.

- 1.4.1 True (1)
1.4.2 True (1)
1.4.3 False (1)
1.4.4 True (1)
1.4.5 False (1)

- 1.5

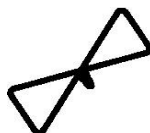


FIGURE 1.5

- 1.5.1 Wall tie (1)
1.5.2 Cavity wall (1)
1.5.3 Binding wall leaves (1)

- 1.6 Binding roof truss parts (1)

- 1.7 Any FOUR general safety measures for hand tools.

- Cutting tool must be sharp
 - Safety rules for specific tool must be applied
 - Use for purpose they are designed for
 - Tools must be complete
 - Do not place on edge of bench
 - Do not test blades with fingers
 - Report defects
 - Keep hands away from cutting surfaces
- (Any 4 x 1) (4)

- 1.8 1.8.1 Portable jig-saw (1)
1.8.2 Circular saw (1)
1.8.3 Thicknesser (1)

[30]

QUESTION 2: ADVANCED CONSTRUCTION PROCESSES

2.1 (1) Tensile force (2) Compressive force (3) Shear force. (3 x 1) (3)

2.2

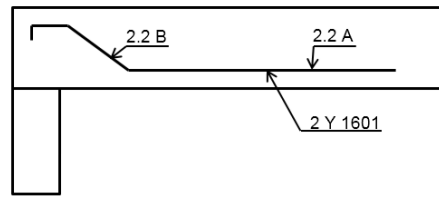


FIGURE 2.2

2.2.1 Main bar/Shear bar (1)

2.2.2 Act against shear forces (1)

2.2.3 45° (1)

2.2.4 Tensile stress (1)

2.2.5 High tensile/yield steel (1)

2.2.6 16 mm (1)

2.3 (1) Tends to make column shorter/fatter, (2) to shear/bends/buckle/burst of the concrete. (2)

2.4 Any THREE erecting requirements for concrete formwork.

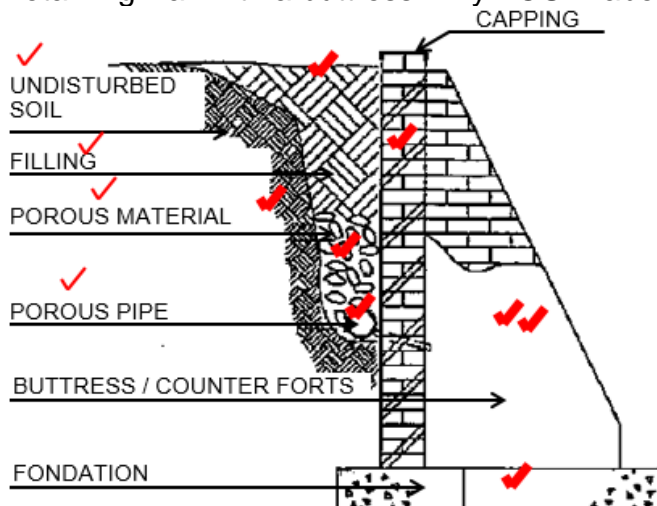
- (1) Strong enough to (2) support loads/fresh concrete
 - (1) Strong enough to (2) provide adequate support/without excessive deflection
 - (1) Easily erected (2) and removed
 - (1) Be made (2) accurately
 - (1) Be sealed off to (2) prevent loss of concrete
 - (1) Clean from (2) dirt/sawdust
- (Any 3 x 2) (6)

2.5 Any TWO factors which determine the cover depth of steel reinforcement.

- Thickness of reinforcement steel
 - Exposure conditions.
- (2 x 1) (2)

2.6 (1) Compressive stress is created inside the concrete (2) to balance/withstand tensile stress. (2)

2.7 Retaining wall with a buttress. Any FOUR labels of the retaining wall parts



(12)

- 2.8 Any FOUR factors which must be considered when retaining walls are designed.
- Pressure exerted by soil
 - Type of soil on which it must be build
 - Material available
 - Degree of sliding response
 - Landscape
 - Water filtering through.
- (Any 4 x 1) (4)

2.9

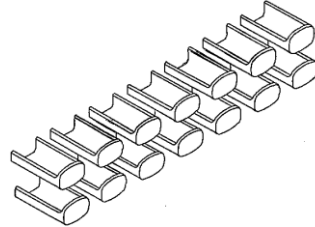


FIGURE 2.9

- (1) Mass (2) Interlocking ability (3) Friction (3 x 1) (3)
- [40]**

QUESTION 3: CIVIL SERVICES

- 3.1 Drainage structure in FIGURE 3.1:

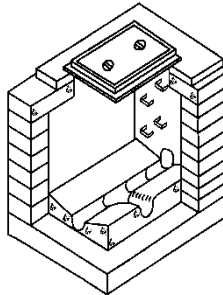
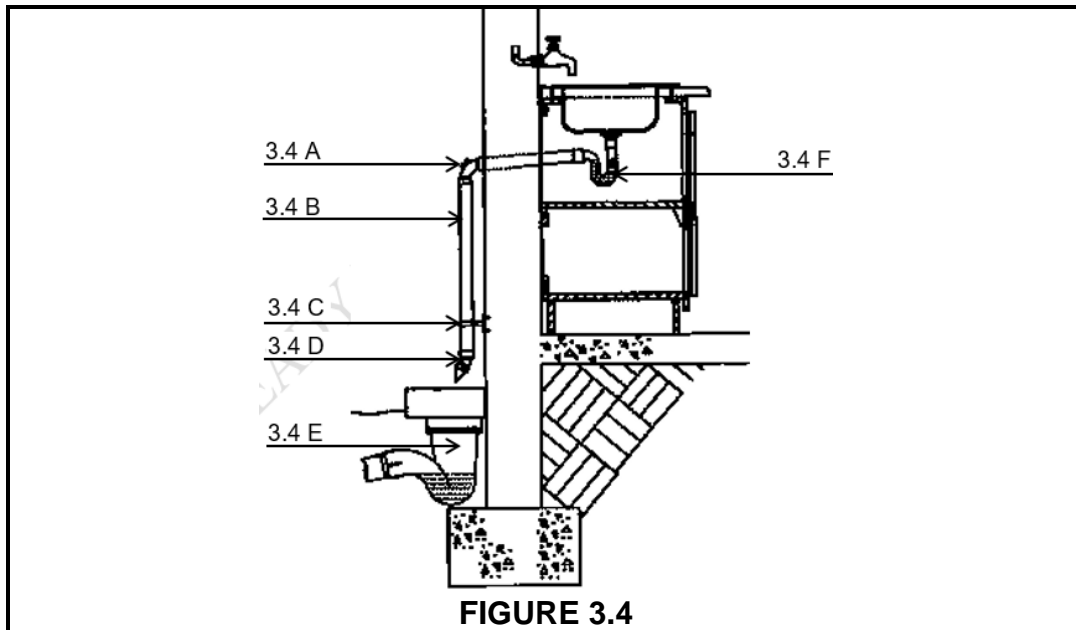


FIGURE 3.1

- 3.1.1 Manhole/Inspection chamber (1)
- 3.1.2 Any TWO purposes of the structure in a drain system.
- Checking drainage system
 - Cleaning drainage system
 - Where two or more drain lines are joining.
- (Any 2 x 1) (2)
- 3.1.3 (1) Depth and (2) size of system. (2 x 1) (2)
- 3.2 (1) Mirror is fixed at one end (2) and a torch is shined from the other end (2)
- 3.3 Any TWO test methods to test the closeness of drains.
- Hydraulic test
 - Air test
 - Smoke test
- (Any 2 x 1) (2)

3.4



- | | | |
|-------|--|-----|
| 3.4.1 | Inspection eye | (1) |
| 3.4.2 | 50 mm | (1) |
| 3.4.3 | Holderbat | (1) |
| 3.4.4 | 135° | (1) |
| 3.4.5 | Gully | (1) |
| 3.4.6 | P-trap | (1) |
| 3.4.7 | (1) Avoid odours (2) returning from the drain system | (2) |

- | | | | |
|-----|-------|-------|-----|
| 3.5 | 3.5.1 | False | (1) |
| | 3.5.2 | True | (1) |
| | 3.5.3 | False | (1) |
| | 3.5.4 | False | (1) |
| | 3.5.5 | False | (1) |
| | 3.5.6 | True | (1) |
| | 3.5.7 | True | (1) |
| | 3.5.8 | True | (1) |

- | | | |
|-----|--|-----------------|
| 3.6 | Any THREE advantages of the kick pipe in an electrical system. | |
| | - Safer | |
| | - Open cable cannot be seen | |
| | - Cable not exposed to weather | |
| | - Less exposed to damage | |
| | - Looks tidier | |
| | | (Any 3 x 1) (3) |

- | | | |
|-----|----------|-----|
| 3.7 | 1 500 mm | (1) |
|-----|----------|-----|

- | | | |
|-----|---------------------|-----|
| 3.8 | Building contractor | (1) |
|-----|---------------------|-----|

[30]

QUESTION 4: MATERIALS AND QUANTITIES

4.1 (1) Two pieces of glass are (2) joined together by a poly-vinyl interlayer that is bonded under (3) heat and (4) pressure. (4)

4.2 Any THREE properties of stainless steel.
 - Resistance to corrosion
 - Very strong
 - High aesthetical appearance
 - Durable
 - Hygienic (Any 3 x 1) (3)

4.3 Any FOUR properties of aluminium.
 - Light
 - Ductile
 - Malleable
 - Resistant to corrosion
 - Easy workable
 - Conduct heat/electricity (Any 4 x 1) (4)

4.4 (1) Threaded joints (2) Flange joint (2 x 1) (2)

4.5

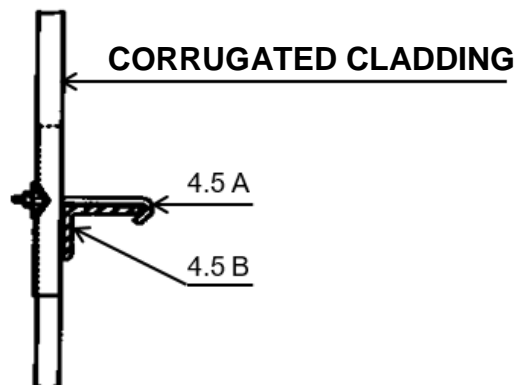


FIGURE 4.5

4.5.1 Part 4.5 A– Hook bolt Part 4.5 B – Angle iron (2)

4.5.2 Too thin material (1) can lead to elastic deformation or (2) creep/gradual compression (2)

4.5.3 Any THREE advantages of the use of steel cladding.
 - Variety of shapes
 - Variety of sizes
 - Prepared beforehand
 - In controlled environment prepared
 - Light in weight
 - Can be cut into any size (Any 3 x 1) (3)

4.5.4 (1) Cladding expand and contract (2) in consequence of heat or cold. (2)

4.6

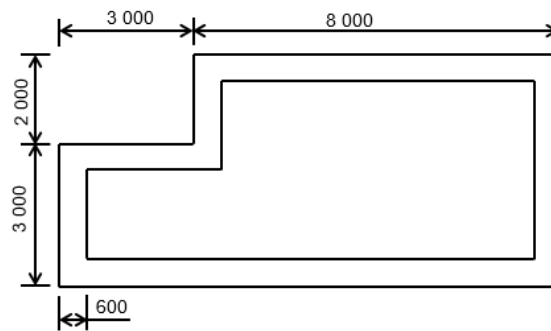


FIGURE 4.6

Determine the centre line of the strip foundation in FIGURE 4.6.

$$\begin{array}{r}
 11\,000 \times 2 \\
 + \quad 5\,000 \times 2 \quad \checkmark \checkmark \\
 \hline
 32\,000 \quad \checkmark \\
 - \quad 600 \times 4 \quad \checkmark \checkmark \\
 \hline
 29\,600 \quad \checkmark
 \end{array}$$

(8)
[30]

QUESTION 5: APPLIED MECHANICS

5.1 FIGURE 5.1 on Sheet B shows a frame structure with pointed loads. Complete the following on Sheet B:

5.1.1 The force diagram on scale 1 N = 2 mm (7)

5.1.2 The table by indicating the size and nature of the forces in the parts (9)

5.2 FIGURE 5.2 shows a beam with point loads. Use the information on Sheet C and calculate on Sheet C the shear force values from point **a** to **c** and draw the shear force diagram on scale 1 mm = 1 N.

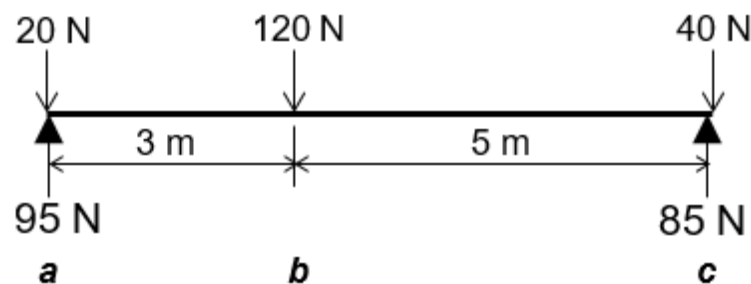


FIGURE 5.2

(9)

- 5.3 FIGURE 5.3 shows a beam with point loads. Calculate the reaction force of Support B.

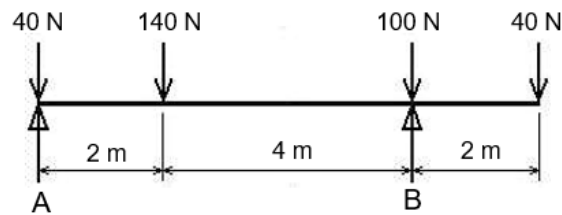


FIGURE 5.3

Om A

LOM = ROM

$$(B \times 6) = (140 \times 2) + (100 \times 6) + (40 \times 8)$$

$$B6 = 280 + 600 + 320$$

$$B = \frac{1200}{6}$$

$$= 200 \text{ N}$$

(5)

[30]

QUESTION 6: GRAPHICS AND COMMUNICATION

- | | | | |
|-----|--------|---|------|
| 6.1 | 6.1.1 | Outer door at D1 | (2) |
| | 6.1.2 | Window at W1 | (2) |
| | 6.1.3 | Inner door at D2 | (1) |
| | 6.1.4 | Water closet at WC | (2) |
| | 6.1.5 | Shower at SH | (2) |
| | 6.1.6 | Sink at S | (2) |
| | 6.1.7 | Stove at STV | (2) |
| | 6.1.8 | Light switch at the outer door | (2) |
| | 6.1.9 | Single fluorescent light in the middle of the living area | (2) |
| | 6.1.10 | Joining line between the light switch and the fluorescent light | (1) |
| | 6.1.11 | Complete measurements for the West elevation | (12) |

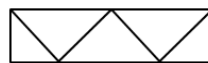
- 6.2 Make neat sketches to illustrate each of the following symbols:

- 6.2.1 Concrete



(2)

- 6.2.2 Hardcore filling



(2)

- 6.2.3 Power point



(2)

- 6.2.4 Distribution board



(2)

- 6.2.5 Vent pipe



(2)

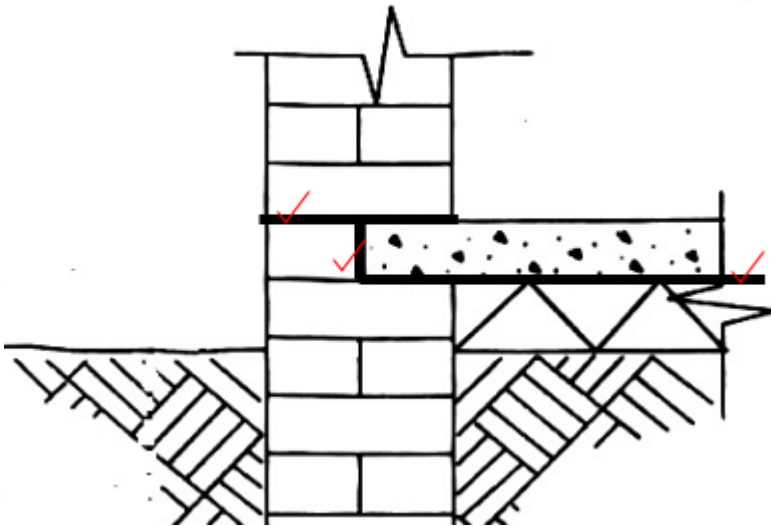
[40]

TOTAL: 200

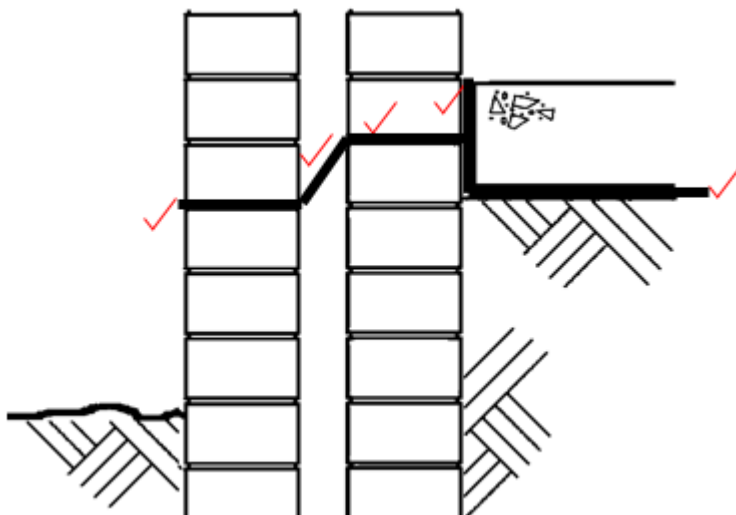
ANSWER SHEET ANTWOORDBLAD	A	CIVIL TECHNOLOGY SIVIELE TEGNOLOGIE	NAME: _____ NAAM: _____
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QUESTION/VRAAG 1.1 A

(3)

**QUESTION/VRAAG 1.1 B**

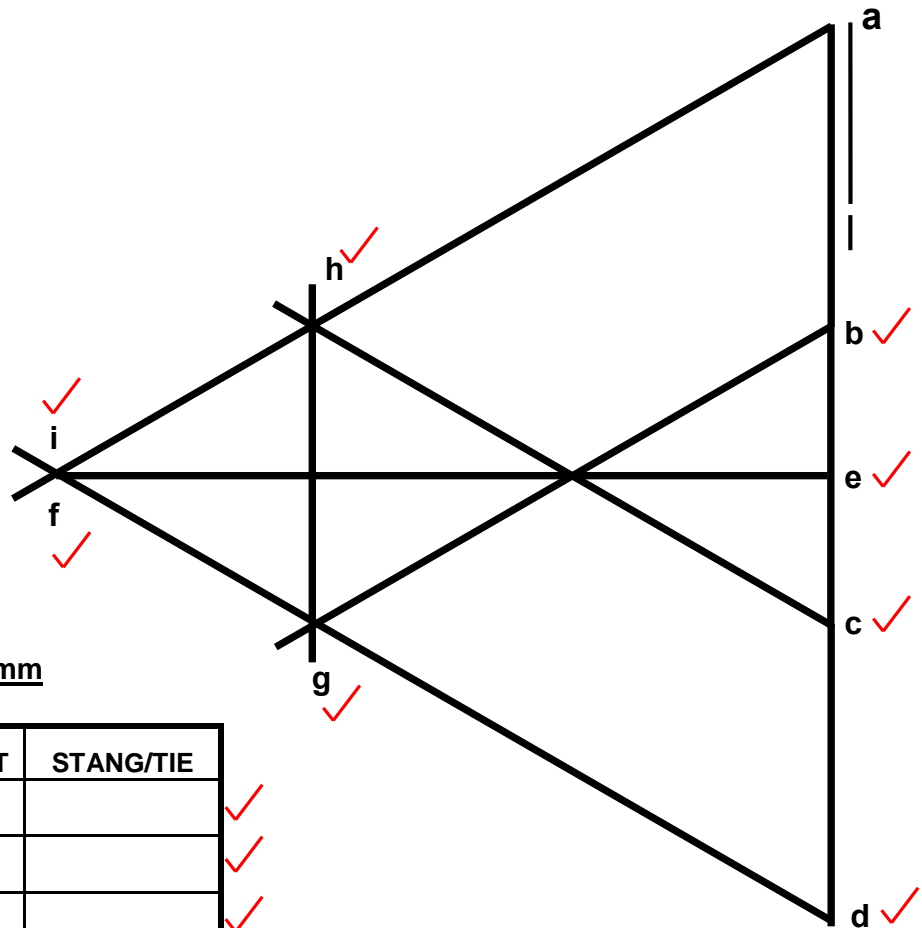
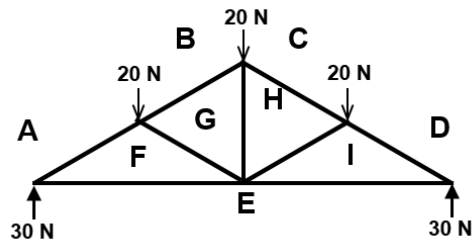
(5)



ANSWER SHEET ANTWOORDBLAD	B	CIVIL TECHNOLOGY SIVIELE TEGNOLOGIE	NAME: _____ NAAM: _____

QUESTION/VRAAG 5.1

(16)

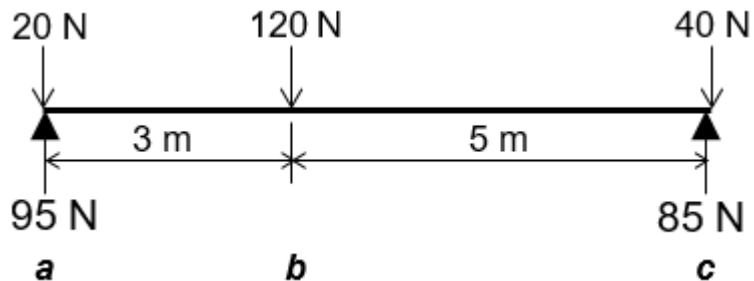
**SKAAL / SCALE: 1 N = 2 mm**

DEEL/PART	STUT/STRUT	STANG/TIE
AF	59 N	
BG	40 N	
CH	40 N	
DI	59 N	
EI		51 N
EF		51 N
FG	20 N	
GH		20 N
HI	20 N	

ANSWER SHEET ANTWOORDBLAD	C CIVIL TECHNOLOGY SIVIELE TEGNOLOGIE	NAME: _____
		NAAM: _____

QUESTION/VRAAG 5.2

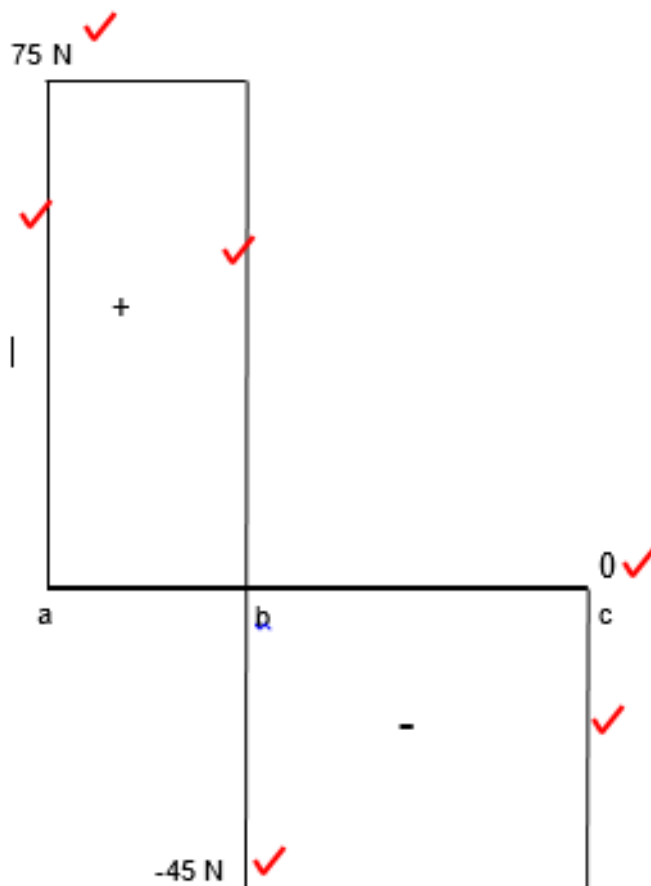
(9)

Skuifkragwaardes/Shearforce values

$$a = 95 \text{ N} - 20 \text{ N} = 75 \text{ N} \quad \checkmark$$

$$b = 75 \text{ N} - 120 \text{ N} = -45 \text{ N} \quad \checkmark$$

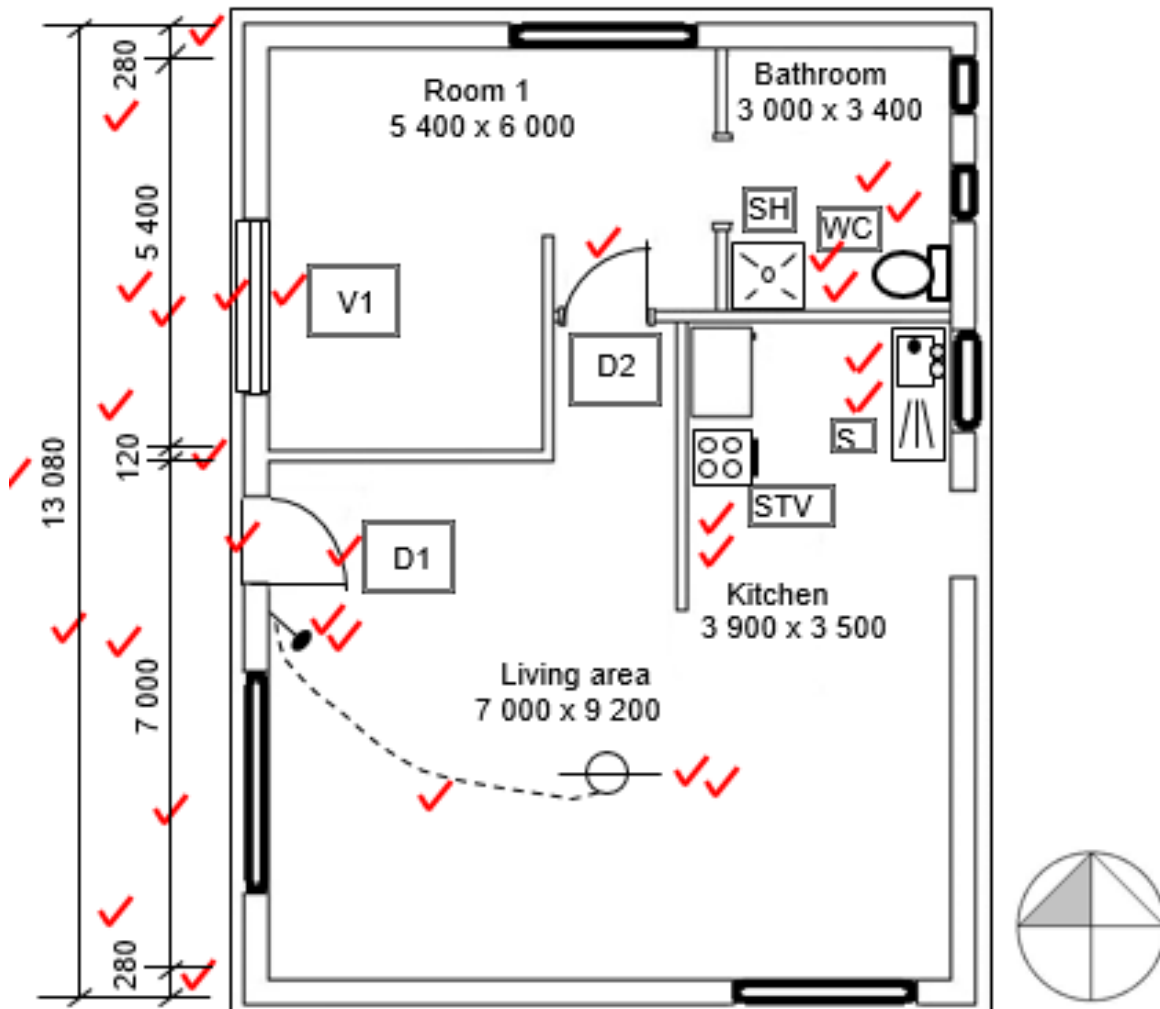
$$c = -45 \text{ N} - 40 \text{ N} + 85 \text{ N} = 0 \quad \checkmark$$

Skuifkragdiagram/Shearforce diagramSkaal/Scale: 1 mm = 1 N

ANTWOORDBLAD ANSWER SHEET	D	SIVIELE TEGNOLOGIE CIVIL TECHNOLOGY	NAAM: _____ NAME: _____
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QUESTION/VRAAG 6.1

(30)

**FLOORPLAN**

Outer door	2	
Window	2	
Inner door	1	
Water closet	2	
Shower	2	
Sink	2	
Stove	2	
Measurements	12	
Light switch and light	5	
TOTAL	30	