Province of the
EASTERN CAPE
EDUCATION

[redacted]

GRADE 11

NOVEMBER 2010

CIVIL TECHNOLOGY
MEMORANDUM

MARKS: 200

TIME: 3 hours

This memorandum consists of 10 pages.

QUESTION 1

1.1
- Not working without authorization
- Only work with machines when conversant with safety rules
- One operator at a time
- Concentrate on point of action
- Not adjust whilst machine is in motion
- Machine guards in good condition
- Even pressure to blades
- Adequate lighting
- Adhere manufacturer's manual
- Hands away from revolving blades
- Protective clothing
- Electric cables checked
- Safety rules displayed
- Machines and surrounding clean (10)

1.2
1.2.1 Ladder (1)
1.2.2 Deeper than 1,5 m (1)

1.3
~~1.3.1 Poles which are not straight, must be repaired~~ (4)
1.3.2 Poles must be straight
~~1.3.3 Scaffolds must be tied to the building at 20 meter intervals~~
~~1.3.4 Scaffolds must be tied to the building at 15 meter intervals~~
1.3.5 Independent scaffolding must have alternate diagonal braces
1.3.6 The span between standards must not be less than 2,4 m
1.3.7 Only trained people should erect scaffolds
~~1.3.8 Scaffolds on hard soil do not need base plates~~

1.4 Name FOUR causes of fires in the building environment.
- Faulty electricity
- Open flames
- Heated surfaces
- Spontaneous ignition
- Chemical reaction
- Static electricity
- Friction
- Lightning (4)

1.5 Copper
Any TWO properties
- Do not rust
- Resistance to oxidation
- Good malleable property (3)

1.6 Any THREE properties of armoured glass
- 5 times stronger than ordinary glass
- Disintegrates into small cubes that minimize injuries (3)

1.7 Any TWO advantages of concrete hollow bricks
- Cheaper
- Faster to build with
- Different strengths/sizes (2)

1.8 Any FOUR properties of aluminium
- Light
- Silvery in colour
- Ductile
- Malleable
- Resistance to corrosion
- Easy to cut / drill
- Conduct electricity / heat (4)

1.9 Identify the following description as TRUE or FALSE:
1.9.1 TRUE (1)
1.9.2 TRUE (1)
1.9.3 FALSE (1)
1.9.4 FALSE (1)
1.9.5 TRUE (1)
1.9.6 TRUE (1)
1.9.7 TRUE (1)
1.9.8 VALSE (1)
[40]

QUESTION 2

2.1 Identify the tools in FIGURES 2.1.1 to 2.1.6 and name ONE use of each: (12)

2.1.1 Level - Test surface for horizontal / vertical - Use as a straight edge	2.1.2 Plaster trowel - Smear plaster onto wall
2.1.3 Portable belt sander - Rough sanding	2.1.4 Portable electric planer - Plane wood/edges/chamfer /etc.
2.1.5 Circular saw - Saw wood/with or against grain - Rebates - Mitres - At angle	2.1.6 Radial arm saw - Cross cutting - Rip - Metre - At angle

2.2 Prevent rust (1)
2.3 Upwards (1)
2.4 Downwards (1)

2.5 Any FIVE safety measures for the band saw
- Stand in front of blade
- ands away from line of cut
- Blunt blades replace
- Not the work force
- Blade guides in position
- Not backing out in the cut
- Correct blade tension
- Correct blade alignment
- Plan cuts (5)

2.6.1 Door at 2.6 A (2)
2.6.2 Window at by 2.6 B (3)
2.6.3 Shower at 2.6 C (2)
2.6.4 Toilet by 2.6 D (2)
2.6.5 Gully and abbreviation at 2.6 E (2)
2.6.6 Rodding eye and abbreviation at 2.6 F (2)

Answer the following questions with regard to the floor plan in FIGURE 2.6 on SHEET A.

2.6.7 What is the TABLE 2.6 G on the drawing sheet called? (1)
2.6.8 What is the TABLE 2.6 H on the drawing sheet called? (1)
2.6.9 Use the information on SHEET A and do the measurement writing of the west elevation according to standard building drawing practice. (5)

[40]

QUESTION 3

3.1 Any FIVE requirements to which a brick wall must comply.
- Resistance to loads from floor to roof
- Insulation to rain
- Insulation to heat
- Insulation to cold
- Insulation to noise
- Security
- Stability in fire
- Minimum openings for ventilation
- Minimum openings for light (5)

3.2 Keep building lines straight (1)

3.3 10 mm (1)

3.4.1 - Reinforcement 3.4.2 - Bed joint
3.4.3 - Galvanised 3.4.4 - 4th (4)

3.5 (1) Spread loads/ forces (2) evenly on brick wall
- Prevent trusses to damage brickwork/wrapping loose (2)

3.6 (1) Gap between top of wall and (2) roof covering (3) built up / filled (3)

3.7 Insulation

3.8 270 mm (280)

3.9 (1) High standard of workmanship (2) constant supervision (3) more labour intensive

3.9 (1) Steel wires pre-tensioned (2) concrete is cast (3) wires are released

3.10 3.10.1 Frame head
3.10.2 Frame stile
3.10.3 Sash stile
3.10.4 Muntin
3.10.5 Sash rail
3.10.6 Window sill

3.11 114x75 mm (2)

3.12 3.12.1 Plywood
3.12.2 Lock block
3.12.3 Frame
3.12.4 Edge strip (4)

3.13 3.13.1 Dado rail – Against wall to protect against furniture damage (1)
3.13.2 Architrave –Between wall and timber door frame (1)
3.13.3 Cornice – Between ceiling and wall (1)
3.13.4 Half round – Open joints (1)

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QUESTION 4

4.1 4.1.1 the stress (6)

$A = \pi r^2 = \pi (0{,}004^2) = 0{,}000\ 050\ 3\ m^2$

$\sigma = \frac{F}{A} = \frac{600}{0{,}000\ 050\ 3} = 11\ 936\ 620{,}73\ Pa$

4.1.2 the strain

$\in = \frac{x}{L_o} = \frac{0{,}000\ 3}{4{,}5} = 0{,}000\ 067$ (3)

4.1.3 the elasticity

$E = \frac{\sigma}{\varepsilon} = \frac{11\ 936\ 620{,}73\ Pa}{0{,}000\ 067} = 1{,}79^{11}\ Pa$ (3)

4.2 Use the information on answer SHEET A and calculate on answer SHEET A, by completing the table, the centroid of FIGURE 4.2. Calculate the centroid from point P and show all calculations and formula. (10)

4.3 Calculate the reaction forces in supports A and B in the beam in FIGURE 4.3. (8)

Around A

L.O.M. = R.O.M

(Bx6)+(15x2) = (30x4)+(15x6)

B6 + 30 = 120 + 90

B = 210 - 30

= $\frac{180}{6}$

= 30 N

Around B

R.O.M. = L.O.M.

(Ax6) = (30x2)+(10x6)+(15x8)

A6 = 60 + 60 + 120

A = $\frac{240}{6}$

= 40 N

4.4 FIGURE 4.4 on answer SHEET C shows the space diagram of a frame structure. Construct the force diagram to scale on answer SHEET C and calculate the sizes and nature of the forces in the parts of the structure. (10)

[40]

QUESTION 5

5.1 5.1.1 preservative with a water-soluble base (1)

5.1.2 Any FIVE properties of the chosen preservative.

- Colourless
- Odourless
- Wood be painted / glued afterwards
- Not inflammable
- Not poisonous for humans
- Salts may leach out
- May cause metals to corrode
- May change dimensions (5)

5.2 5.2.1 TRUE

5.2.2 TRUE

5.2.3 FALSE (3)

5.3 5.3.1 Costs - Cheaper (1)

5.3.2 Weight – Light in weight (1)

5.3.3 Insulation – (1) Good conductivity gives (2) weak insulation (2)

5.3.4 Corrosion – (1) Near see / damaged parts (2) corrosion developed (2)

5.4 5.4.1 **±420 x 330 mm** (1)

5.4.2 **battens** (1)

5.4.3 **expansive** (1)

5.4.4 **low** (1)

5.5 (1) Avoid last row of tiles slopes (2) not more than counterparts (2)

5.6 Any FOUR factors when timbering for temporary supports are designed.
- Nature of soil
- Weather conditions
- Soil water
- Costs
- Depth of excavation
- Duration of project
- Available material
- Preference (4)

5.7 5.7.1 **vary** (1)
5.7.2 **valves** (1)
5.7.3 **200 mm** (1)
5.7.4 **300 mm** (1)
5.7.5 **inner pressure** (1)

5.8  P-trap (2)

5.9 Any THREE positions where access openings must be provided.
- Change in direction
- Pipes connected
- Each 25 m
- 1,5 m from site boundary
- Beginning of drain system (3)

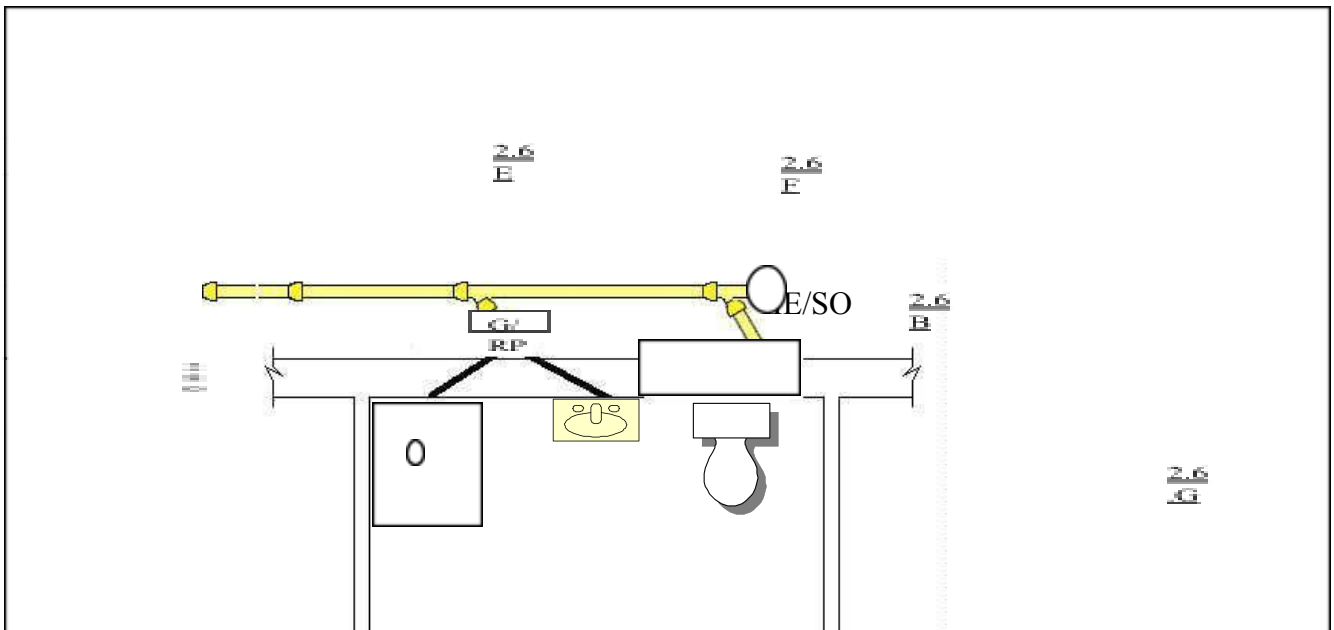
5.1 Any ONE purpose of the air pipe in a drain system
0 - Foul air out of system - Prevent sucking/pressure in system (1)

5.11 A - Multiplication column B - Measurement column
C - Result column D - Description column (4)
[40]

TOTAL: 200

ANSWER SHEET A **QUESTION 2.6 (20)**

NAME: _____ GRADE: 11 _____



2100 1700

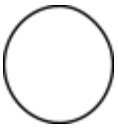
2.6 D

2.6 C

2.6 A

BATHROOM FLOORPLAN

SCALE 1:50

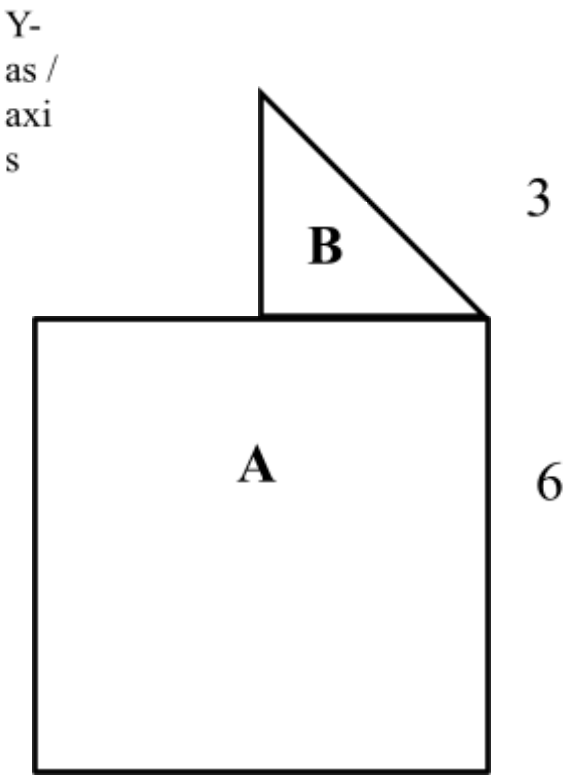


BATHROOM INNER MEASUREMENTS: 3 m x 1,7 m
OUTER WALL THICKNESS: 280 mm
INNER WALL THICKNESS: 120 mm

2.6 H

ANSWER SHEET B **QUESTION 4.2 (10)**

NAME: _____ GRADE: 11 _____



P

X-as / axis

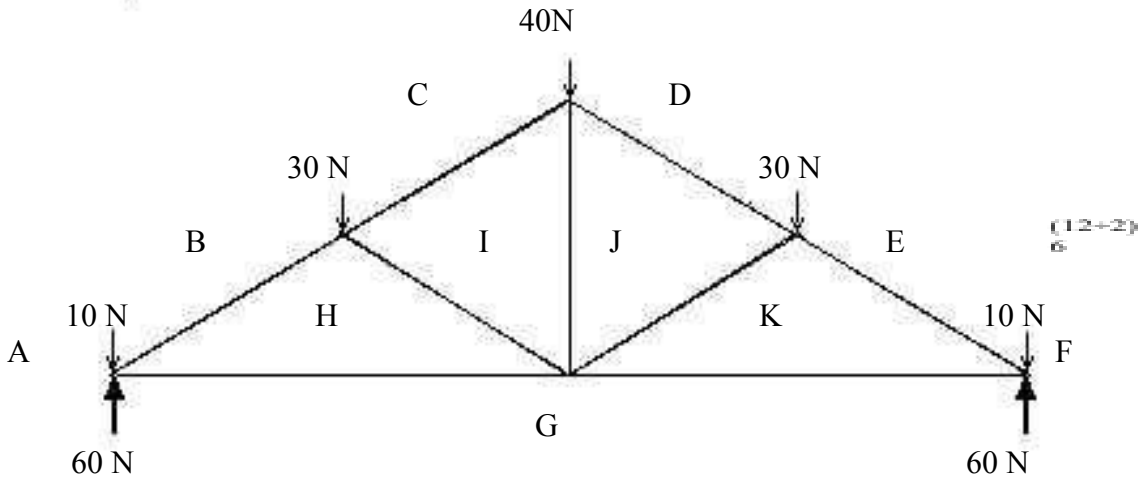
3 3

Shape	Area	X	AX	Y	AY
A 	lxb ^ 6x6 = 36 ^ (1)	b 6 2 = 2 = 3 ^ (½)	108 ^ (½)	h 6 2 = 2 = 3 ^ (½)	= 108 ^ (½)
B 	½bh ^ ½3x3 = 4.5 ^ (1)	b 3 3 = 3 = 1 + 3 = 4 ^ (½)	18 ^ (½)	h 3 3 = 3 ^ = 1 + 6 = 7 (½)	= 31.5 ^ (½)
Totaal	40.5 ✓ (1)		126 ^ (½)		139.5 ^ (½)

X = $\frac{126}{40.5}$ ^ (½) = ...(½) Y = $\frac{139.5}{40.5}$ ^ (½) = 3,44 ^ .....(½)

ANSWER SHEET C **QUESTION 4.4 (10)**

NAME: _____ GRADE: 11 _____



j

k

g

h b

Kragte diagram/Force diagram
Skaal/Scale: 1mm = 1N

i d

Deel Part	Grootte Size	Stut/Strut	Stang/Tie
BH	98 N		
CI	69 N		
DJ	69 N	**X**	
EK	98 N	**X**	
GH	84 N		**X**
GK	84 N		**X**
HI	29 N	**X**	
IJ	31 N		**X**
JK	29 N	**X**	

c

e

f

$\frac{(8+2)}{4}$