higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

APRIL EXAMINATION

PLUMBING THEORY N2

26 MARCH 2013

This marking guideline consists of 7 pages.

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QUESTION 1

1.1 1.1.1
- Temporary hardness is caused by the bicarbonates of
- calcium and/or magnesium
- held in solution by carbon dioxide (3)

1.1.2
- Permanent hardness is caused by the sulfates, chlorides and nitrates of
- calcium and/or magnesium.
- These salts are taken into solution without the presence of carbon dioxide. (3)

1.2
- Disease-causing organisms of enteric (intestinal) origin
- Toxic substances most frequently derived from industrial waste but also from the careless use of insecticides etc
- Biocides, even from lead pipes and -containers
- Colour, usually flushed from soil strata it passed through
- Turbidity generally caused by the erosion of clay deposits
- Organic matter that produces odours and tastes such as the odour of hydrogen sulphide upon decomposition
- Carbon dioxide that enables water to take up calcium, magnesium and lead
- Iron and manganese are taken into solution in the absence of dissolved oxygen
- Algae, which release characteristic odours and tastes
- Disinfecting chlorine, which may produce objectionable tastes unless chlorination is well managed (Any 5 × 1) (5)

1.3
- This system is more economical as far as installation costs, operating costs and maintenance costs are concerned.
- This system is more reliable and ensures a much more constant supply. A pump system must be interrupted to maintain or repair pumps.
- A more constant pressure is ensured. The only fluctuations of pressure at terminal fittings will occur at peak demands and changes of the water level in the service reservoir. (3 × 2) (6)

1.4
- The primary function of a fire hydrant is to provide the fire department access
- to an abundant supply of water
- at a reasonable pressure for firefighting purposes (3)

[20]

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QUESTION 2

2.1
- Where a constant supply of hot water is demanded: Hospitals, clinics, ablution facilities at hostels/factories/etc
- If a current geyser needs to be upgraded in terms of volume, the hot water supply could be augmented by interconnecting it with another geyser. (Instead of replacing the existing small geyser)
- When different heat sources are being considered as alternative energy supplies

(3)

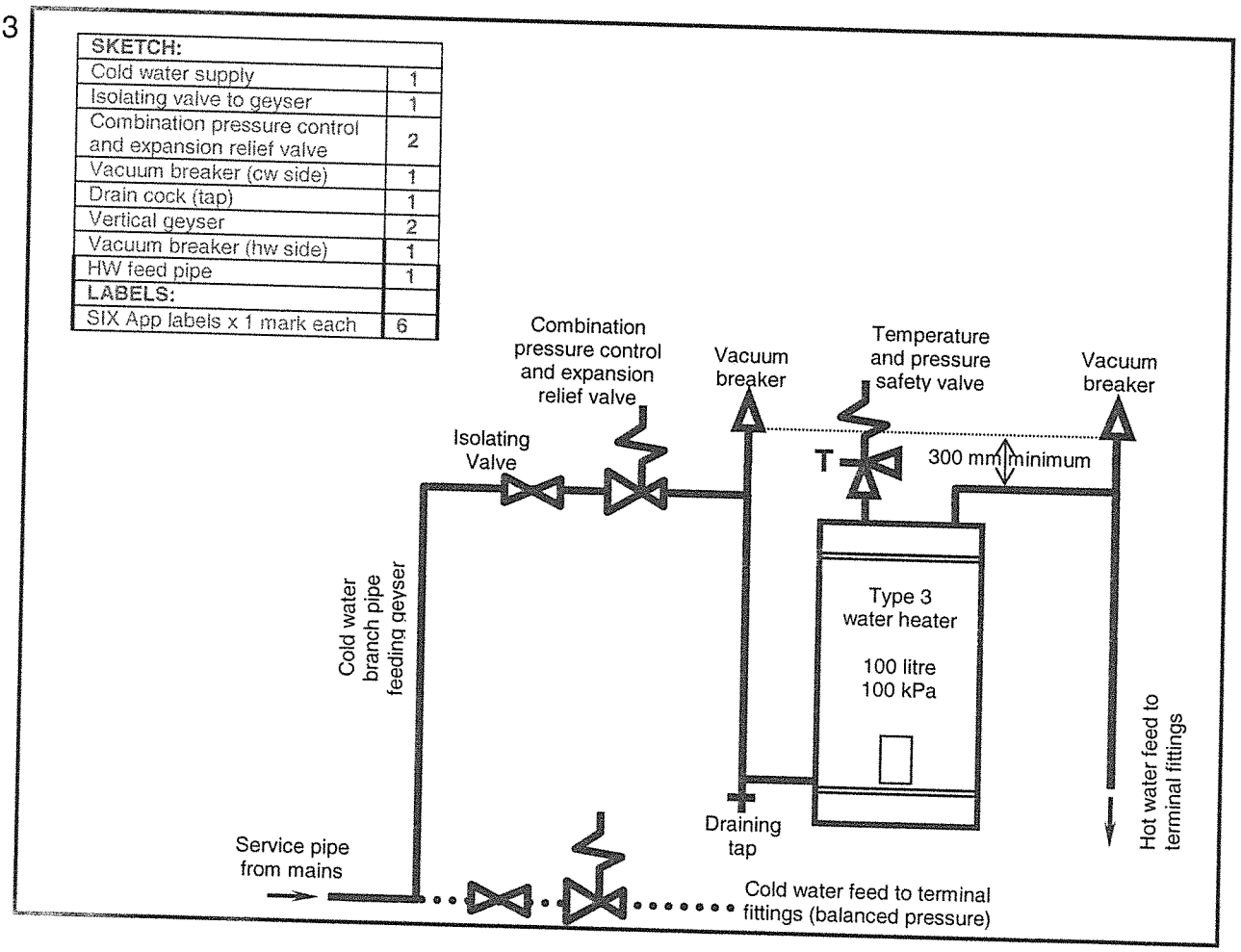
2.2 2.2.1 Blue (1)

2.2.2 Red (1)

2.2.3 Green (1)

2.3

SKETCH:	
Cold water supply	1
Isolating valve to geyser	1
Combination pressure control and expansion relief valve	2
Vacuum breaker (cw side)	1
Drain cock (tap)	1
Vertical geyser	2
Vacuum breaker (hw side)	1
HW feed pipe	1
LABELS:	
SIX App labels x 1 mark each	6



HOT-WATER INSTALLATION

(9)

2.4
- If the system heats up (boils)
- temporary hard water the carbon dioxide is driven off
- and the bicarbonates of calcium and/or magnesium
- is thus not held in solution any more.
- These salts then precipitate in the system and settle to form scaling.

(5)
[20]

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QUESTION 3

3.1
1. Drain is laid according to approved plan
2. Alignment is true
3. Invert depths are correct
4. Drain has effective self-cleansing gradient
5. Soil cover at least 600 mm
6. Sufficient access is provided
7. Drain is supported and protected with concrete where necessary
8. Drain is laid on solid base
9. Rodding eyes and gulley are properly compacted and supported
10. Installation is covered in accordance with regulations

(Any 5 × 1) (5)

3.2
- Absorption by pipes or joints
- Trapped air
- Sweating of pipes and joints
- Leakage from defective pipes or joints
- Leakage from stoppers

(Any 2 × 1) (2)

3.3
1. Pump air into the installation through the remaining branch of the T-piece until a pressure of 0,35kPa (35mm head of water) is recorded on the manometer.
2. Close the air inlet cock.
3. After 3 minutes, read the pressure in installation on the manometer.
4. If the pressure after said 3 minutes is not less than 0,25kPa (25 mm head of water), the installation shall be deemed to have passed the test.

(4)

3.4
- Becoming a source of nuisance
- Danger to health
- Should not endanger the structure of any building
- Should not endanger any services on the site

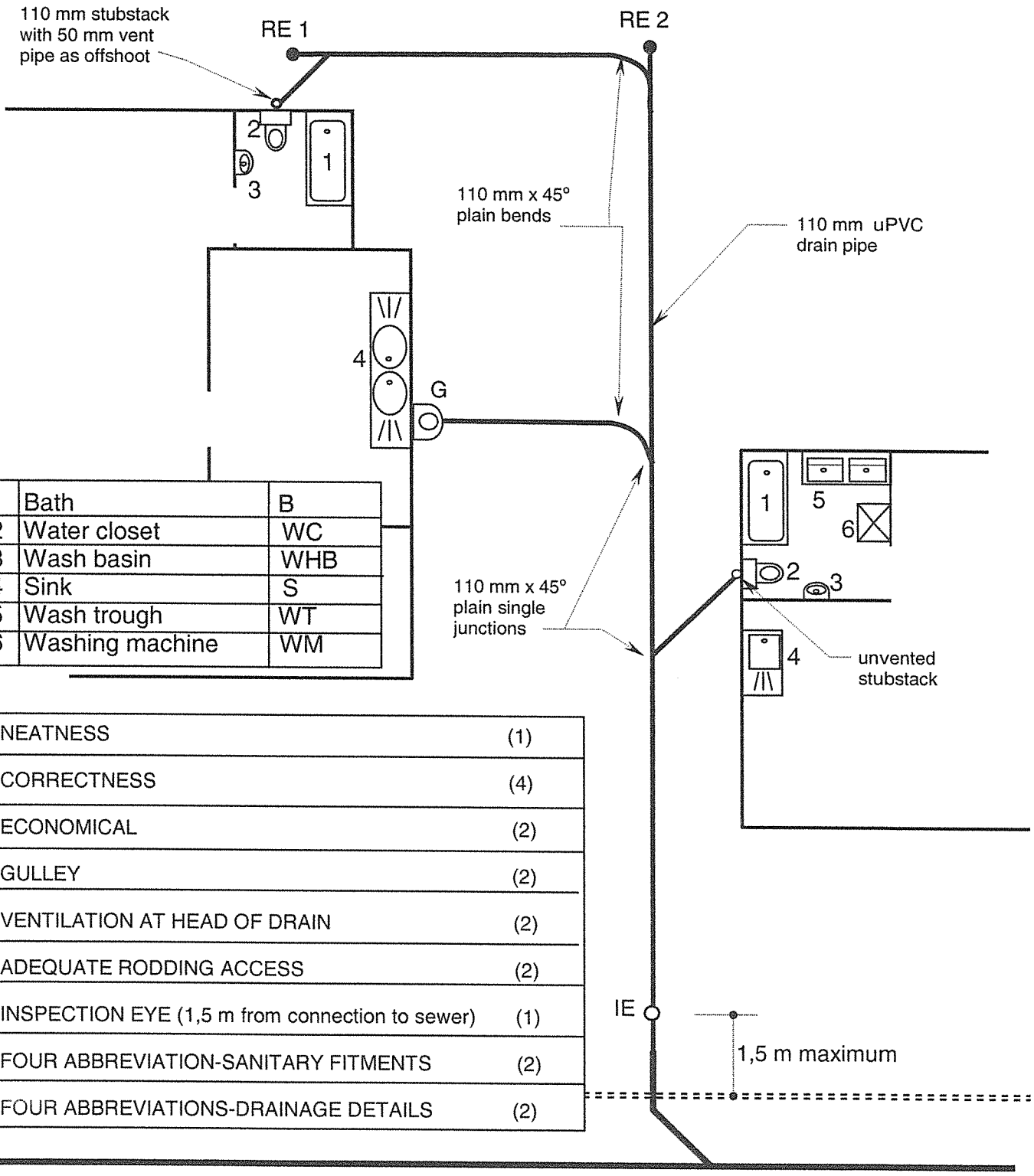
(4)

3.5
$$\frac{\text{Fall}}{\text{Length}} = \text{Gradient}$$
$$\frac{\text{Fall}}{11,5} = \frac{1}{24}$$
Fall = 479, 17 mm

(2)

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3.6



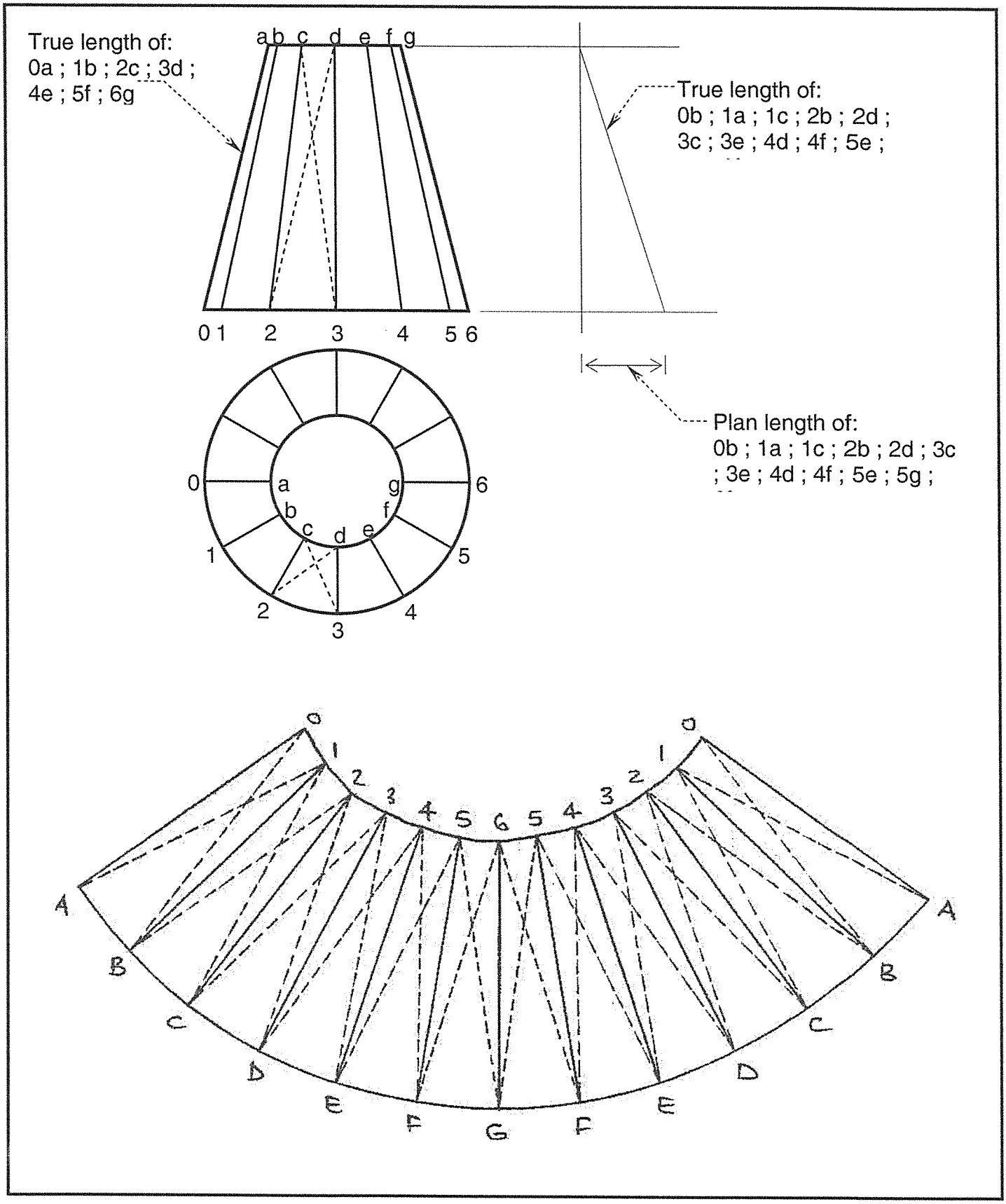
1	Bath	B
2	Water closet	WC
3	Wash basin	WHB
4	Sink	S
5	Wash trough	WT
6	Washing machine	WM

NEATNESS	(1)
CORRECTNESS	(4)
ECONOMICAL	(2)
GULLEY	(2)
VENTILATION AT HEAD OF DRAIN	(2)
ADEQUATE RODDING ACCESS	(2)
INSPECTION EYE (1,5 m from connection to sewer)	(1)
FOUR ABBREVIATION-SANITARY FITMENTS	(2)
FOUR ABBREVIATIONS-DRAINAGE DETAILS	(2)

UNDERGROUND DRAIN (18)

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QUESTION 4



TRANSITION PIECE **[15]**

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QUESTION 5

MATERIAL LIST			
DESCRIPTION	QUANTITY	UNIT PRICE	TOTAL
15 mm pipe class iii copper	36-40m		
22 mm pipe class iii copper	11-15m		
22 mm 100 kPa combination pressure control & relief valve	1		
100 litre x 100 kPa geyser complete with TP- valve & drain cock	1		
22 mm stopcock	1		
22 mm vacuum breakers	2		
22 mm fullway valve	1		
15 mm fullway valve	2		
22 mm equal T-piece	7		
22 x 22 x 15 T-piece	2		
22 x 15 x 15 T-piece	4		
22 x 15 x 22 T-piece	2		
		Vat @ 14 %	
		TOTAL	

[10]

TOTAL: 100

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