higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

AUGUST EXAMINATION

BUILDING SCIENCE N1

28 JULY 2014

This marking guideline consists of 8 pages.

QUESTION 1

1.1 The volume✓ of a gas varies directly✓ as its absolute temperature changes, if the pressure is kept constant.✓ (3)

1.2 $P_1 V_1 = P_2 V_2$

$300\ kPa \times 5\ m^3 = P_2 \times 3\ m^3$ √

√ √

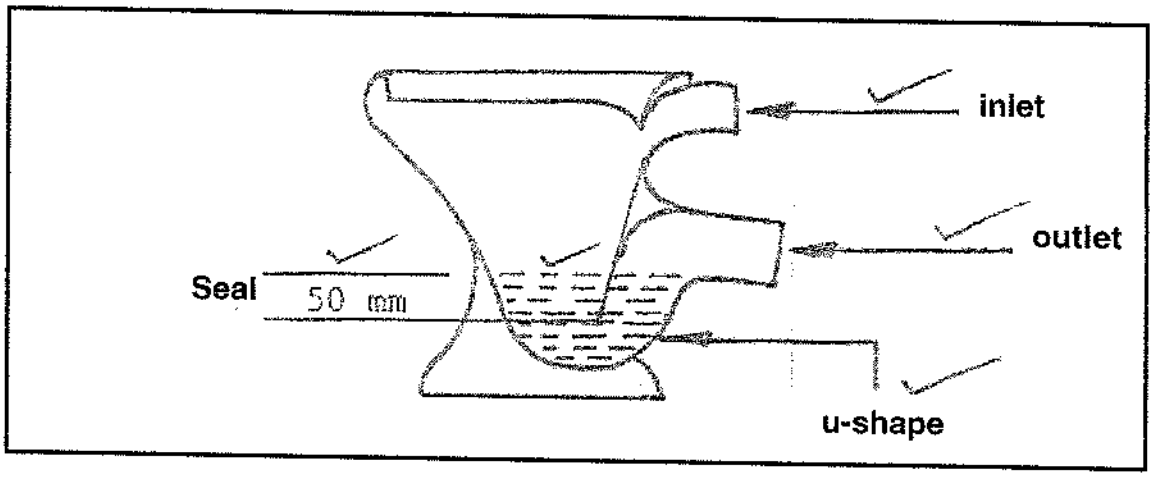
$P_2 = \frac{300\ kPa \times 5\ m^3}{3\ m^3}$ √

√ √

$= 500\ kPa$

(6 × ½) (3)

1.3



(5)
[11]

QUESTION 2

2.1 $W.S.V. = \frac{M.W.}{M.S.} / W.C.R. = \frac{M.W.}{M.C.}$

$M.W. = W.C.R. \times M.C.$✓

√ √

$= 0{,}04 \times 100\ kg$

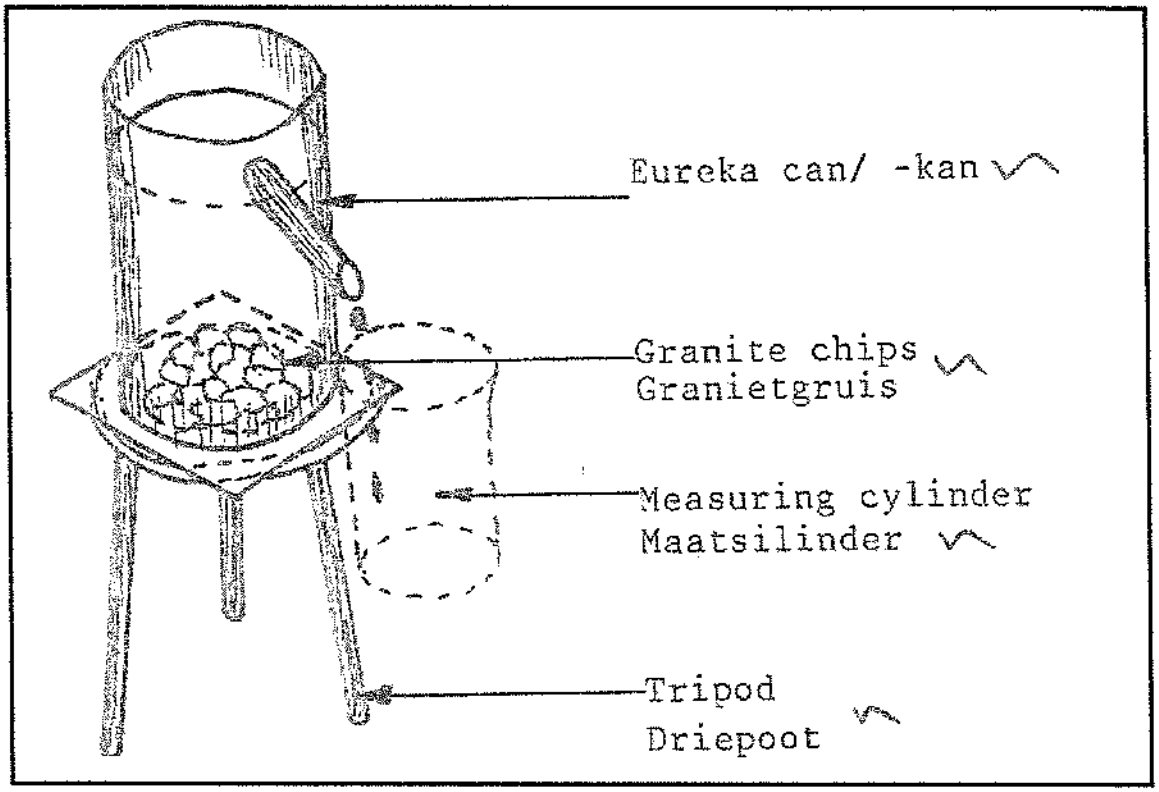
√√

$= 4\ kg$

√√

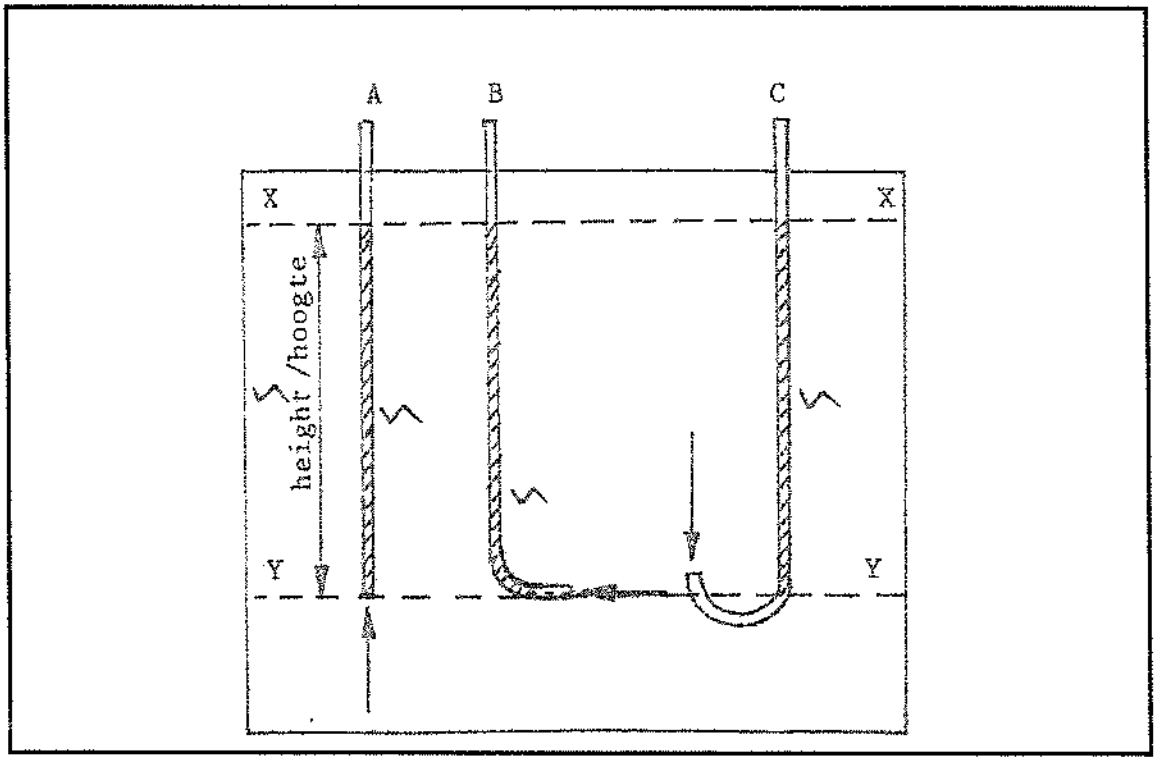
$= 4$ litres/liter (4)

2.2



(6)

2.3



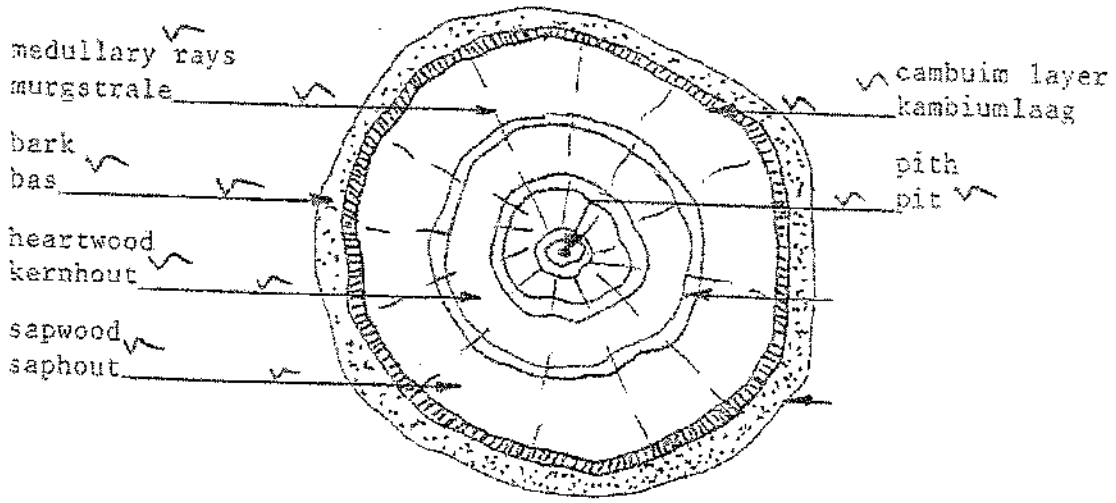
AIM
To prove that fluid pressure is the same in all directions.√

APPARATUS√
Three differently formed glass tubes open at both ends (manometers)
A large glass container filled with water√

METHOD
Pour coloured liquid into the three glass tubes√ until the liquid is the same height in all three. Then place the tubes in the large glass container with water, so that their openings are all the same depth.√
If the difference in height between X and Y is measured for each tube,√ it will be found that it is the same in all three tubes√. This proves that the upward, downward and sideways pressure in a liquid is the same at the same depth.√ (6)
[16]

QUESTION 3

3.1



(6)

3.2 3.2.1 Seasoning consists of the drying out√ of a certain amount of moisture from√ the cells and cell walls√.

3.2.2 The process of sawing logs√ into planks√ and boards√.

3.2.3 Poisoning√ of wood√ on which fungi√ and insects√ live

(3 × 2) (6)

3.3 Volume = $l \times b \times h$√
= 5,6√ × 0,095√ × 0,125 m√
= 0,07√ m^3√

Density = $\frac{\text{mass}}{\text{volume}}$√
= $\frac{54,5}{0,07}$√ or $\frac{54,5}{0,067}$
= 778,57√ kg/m^3√ or 813,43 kg/m^3

(12 × ½) (6)
[18]

QUESTION 4

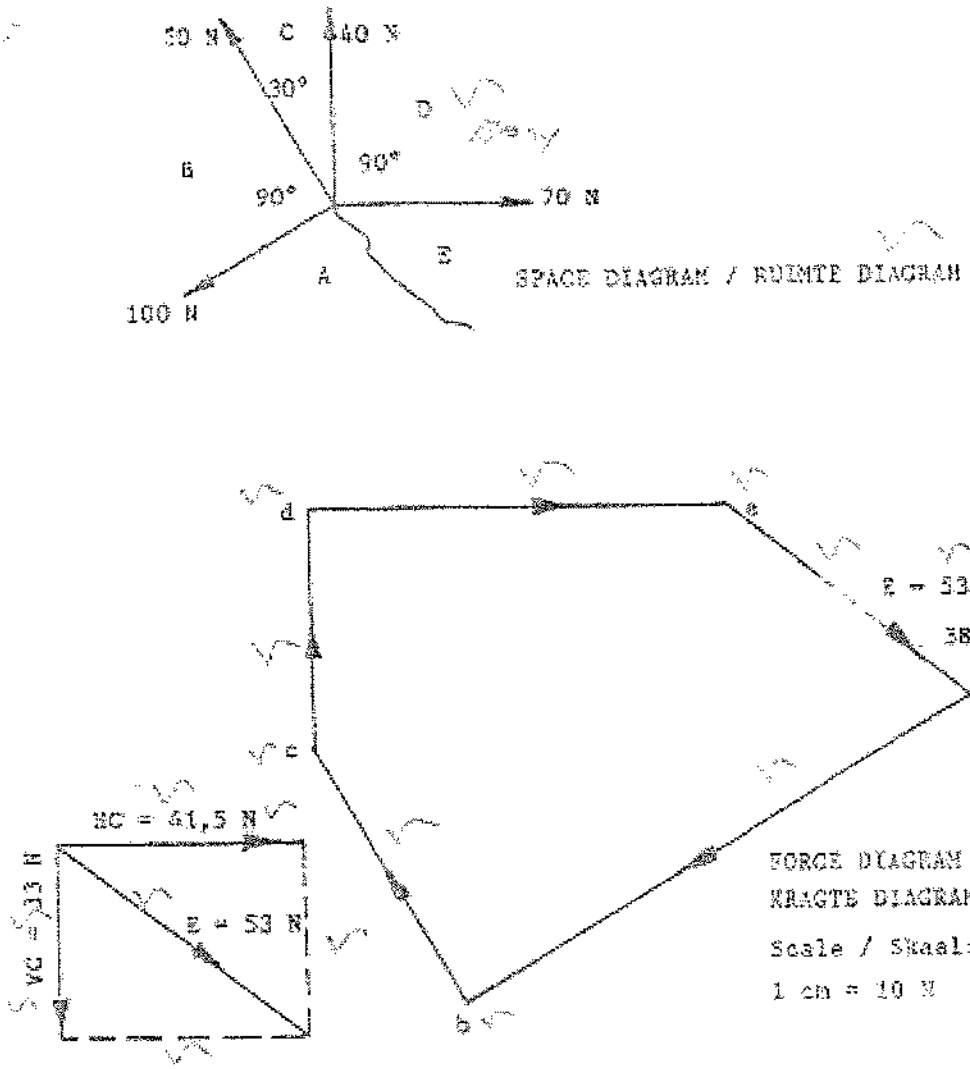
4.1 kilogram kg
4.2 pascal Pa
4.3 newton N
4.4 pascal Pa
4.5 kilogram per cubic metre kg/m^3

(5 × 1) **[5]**

QUESTION 5

5.1 A number of forces✓ lying on the same plane✓ are called coplanar forces (2)

5.2



(12)
[14]

QUESTION 6

6.1 The numbering√ of the spaces√ between the lines of action in a system of forces√. The numbering may be done clockwise√ or anti-clockwise√ around the point of application√ of the force. (6 × ½) (3)

6.2 6.2.1 Magnitude = (4,5 x 1 000 N)√ – 2 450 N√ OR 4,5 – (2 450 ÷ 1 000)
= 2 050 N√ = 2,05 kN

Direction = left✓

6.2.2 Magnitude = 2 050 N√ or 2,05 kN
Direction = right✓

(4)

6.3 $R^2 = VC^2 + HC^2$√

$= (100)^2$ √ $+ (80)^2$√

$= \sqrt{10\,000 + 6\,400}$ √√

$= 128{,}06$ N√√

DIRECTION: $\text{Tan}\,\Theta = \frac{VC}{HC}$√

$= \frac{100}{80}$√

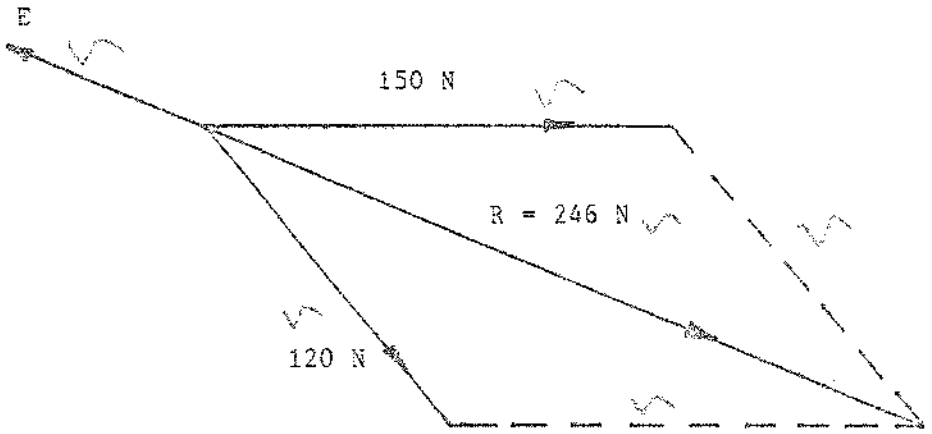
$= 1{,}25$√

$\Theta = \text{Tan}^{-1}$ 1,25√

$= 51{,}34°$√ N√ or E√

(16 × ½) (8)

6.4



Scale / Skaal: √ FORCE DIAGRAM / KRAGTE DIAGRAM √

1 cm = 20 N

Equilibrant / Ewewigskrag = ± 246 N / ± 22° N of W

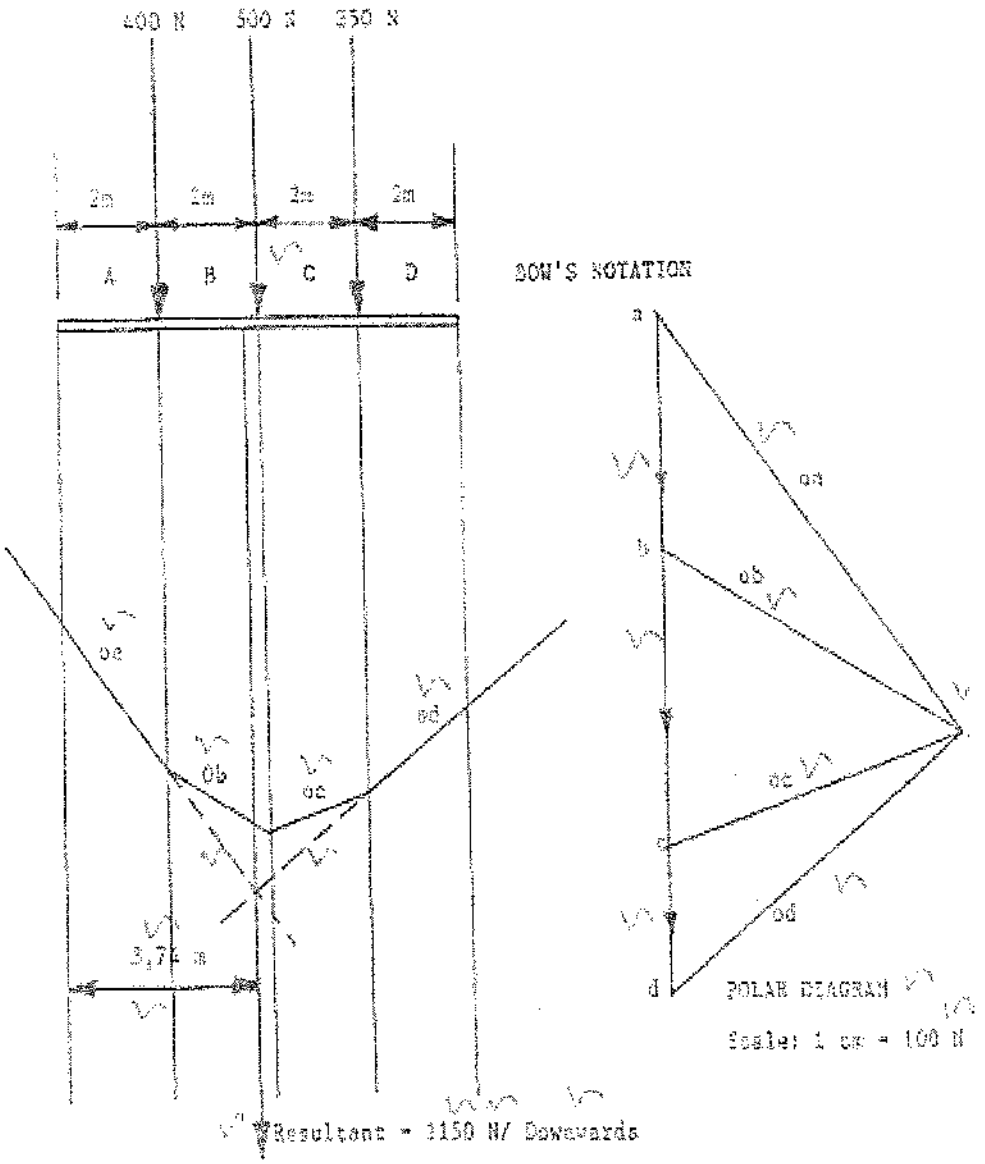
√√ √ √

(6)
[21]

QUESTION 7

7.1 2 400 kg x 10 = 24 000 N✓
Reaction force = 24 000√
2√ (concept of divide by 2)
√ √
= 12 000 N (3)

7.2



(12)
[15]

TOTAL: 100