

higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

APRIL EXAMINATION

BUILDING SCIENCE N1

2 APRIL 2015

This marking guideline consists of 9 pages.

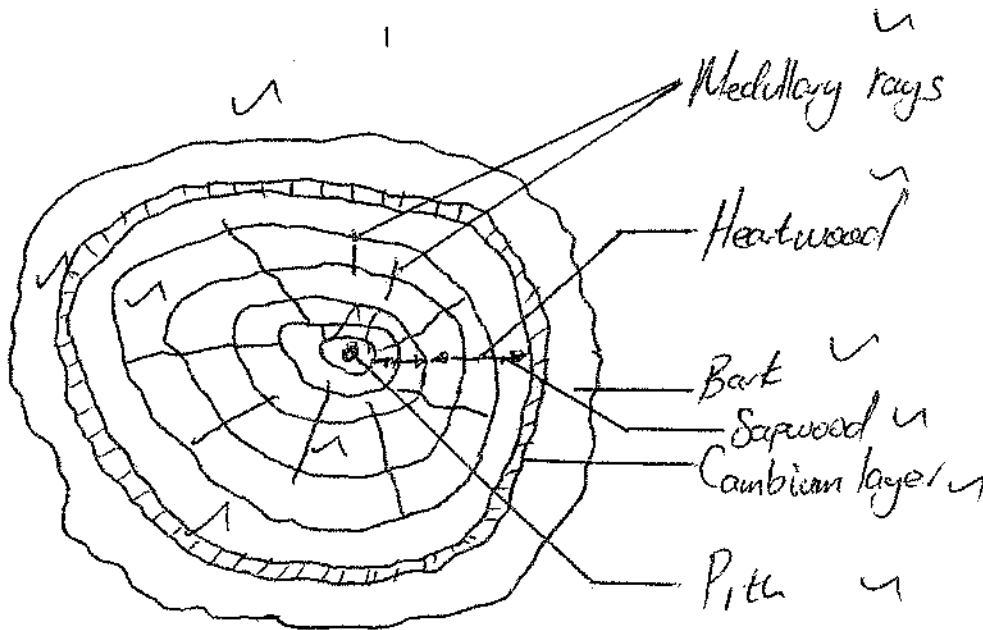
QUESTION 1

- 1.1 Kilogram kg ✓
- 1.2 Pascal Pa ✓
- 1.3 Newton N ✓
- 1.4 Pascal Pa ✓
- 1.5 Kilogram per cubic metre kg/m³ ✓

(5 x 1) [5]

QUESTION 2

2.1



(6)

- 2.2 2.2.1 Seasoning consists of the drying out of a certain amount of moisture from the cells and cell walls. ✓✓
- 2.2.2 The process of sawing logs into planks and boards. ✓✓
- 2.2.3 The poisoning of wood on which fungi and insects lives. ✓✓

(3 x 2) (6)

$$\begin{aligned}
 2.3 \quad \text{Volume} &= l \times b \times h \quad \checkmark \\
 &= 5,6 \times 0,095 \times 0,125 \text{ m} \quad \checkmark \\
 &= 0,07 \text{ m}^3 \quad \checkmark
 \end{aligned}$$

$$\begin{aligned}
 \text{Density} &= \frac{\text{mass}}{\text{volume}} \quad \checkmark \\
 &= \frac{54,5}{0,07} \quad \checkmark \quad \text{or} \quad \frac{54,5}{0,067}
 \end{aligned}$$

$$\checkmark \\
 778,57 \text{ kg / m}^3 \quad \text{or} \quad 813,43 \text{ kg / m}^3$$

(6)
[18]**QUESTION 3**

3.1 The volume of a gas varies \checkmark directly as its absolute temperature changes \checkmark if the pressure is kept constant. \checkmark (3)

$$3.2 \quad P_1 V_1 = P_2 V_2$$

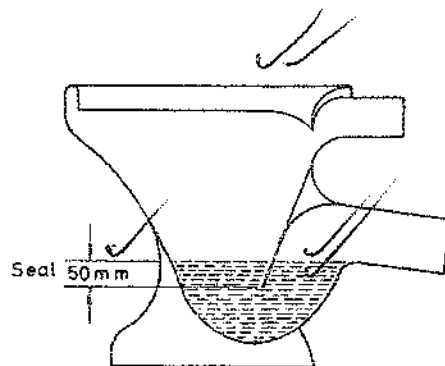
$$300 \text{ kPa} \times 5 \text{ m}^3 = P_2 \times 3 \text{ m}^3 \quad \checkmark$$

$$P_2 = \frac{300 \text{ kPa} \times 5 \text{ m}^3}{3 \text{ m}^3} \quad \checkmark$$

$$= 500 \text{ kPa} \quad \checkmark$$

(3)

3.3

(5)
[11]

QUESTION 4

4.1
$$W.S.V. \frac{M.W.}{M.S.} / W.C.R. = \frac{M.W.}{M.C.}$$

✓

$$M.W. = W.C.R. \times M.C. \quad \checkmark$$

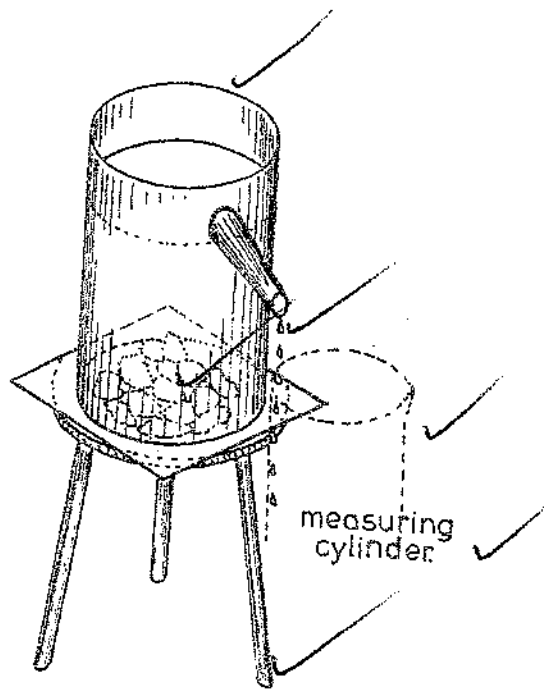
$$= 0,04 \times 100 \text{ kg} \quad \checkmark$$

$$= 4 \text{ kg} \quad \checkmark$$

$$= 4 \text{ litres / liters} \quad \checkmark$$

(4)

4.2



AIM

To find the volume of granite chips, applying the displacement of liquid method.

Apparatus

Eureka can

Measuring cylinder

Measuring scale

Granite chips

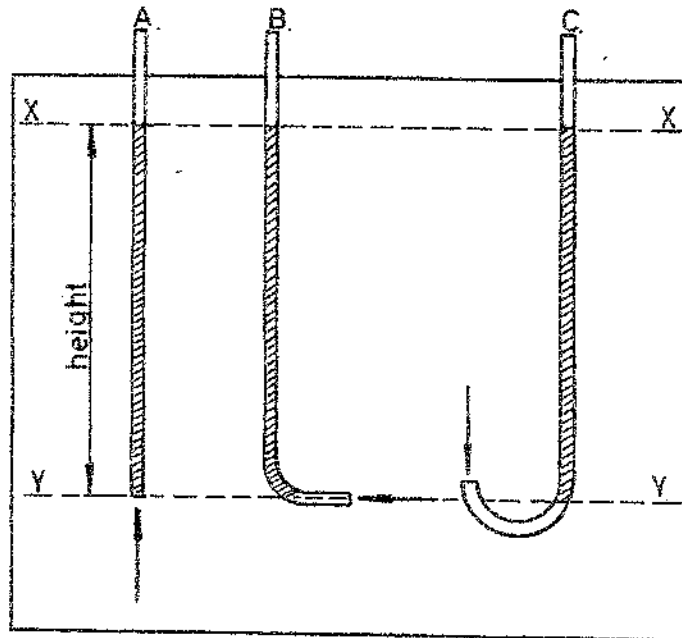
METHOD

Place the Eureka can on a tripod and fill it with water up to the spout. Place the measuring cylinder under the spout of the Eureka can and gently lower the granite chips into the water.

It will be noticed that the displaced water begins to run down the spout into the measuring cylinder. The quantity of displaced water is measured in the cylinder and noted down. This measurement will be volume of the chips.

(6)

4.3



(2)

AIM

To prove that fluid pressure is the same in all directions

(1)

APPARATUS

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

(1)

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 opening are all the same depth.

If the different height between X and Y is measured for each tubes, 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.

(2)
[16]

QUESTION 5

5.1 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 allocation of the force. ✓ (3)

5.2 5.2.1 Magnitude = $(4,5 \times 1\,000\text{ N}) - 2\,450\text{ N}$ ✓
= $2\,050\text{ N}$ ✓

Direction = left

5.2.2 Magnitude = $2\,050\text{ N}$ ✓

Direction = right ✓

(2 x 2) (4)

5.3

$$R^2 = VC^2 + HC^2$$

$$= (100)^2 + (80)^2$$

$$= \sqrt{10\,000 + 6\,400}$$

$$= 128,06\text{ N}$$

DIRECTION: $\tan \theta = \frac{VC}{HC}$ ✓

$$= \frac{100}{80}$$

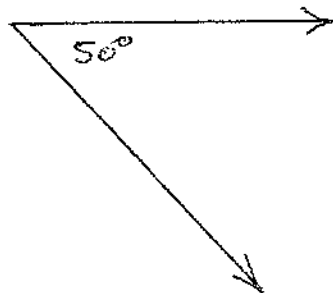
$$= 1,25$$

$$\theta = \tan^{-1} 1,25$$

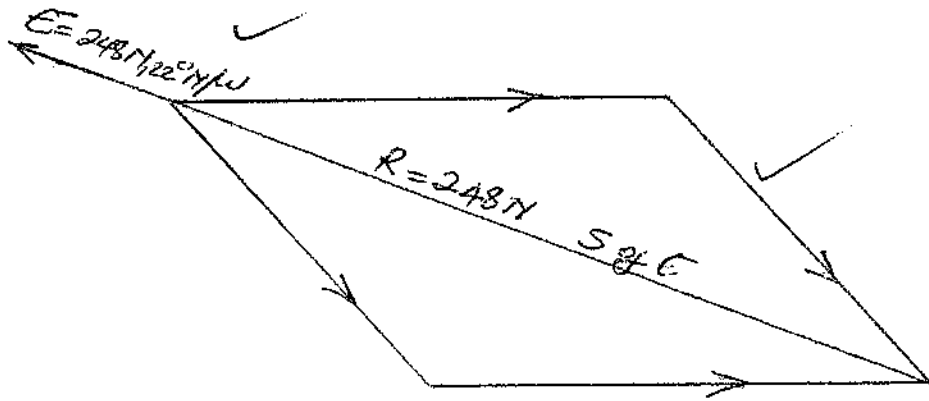
$$= 51,34^\circ \text{ N of E}$$

(8)

5.4



✓
Space diagram



Equilibrant
Magnitude = 248 N ✓
Direction = 22° N of W ✓

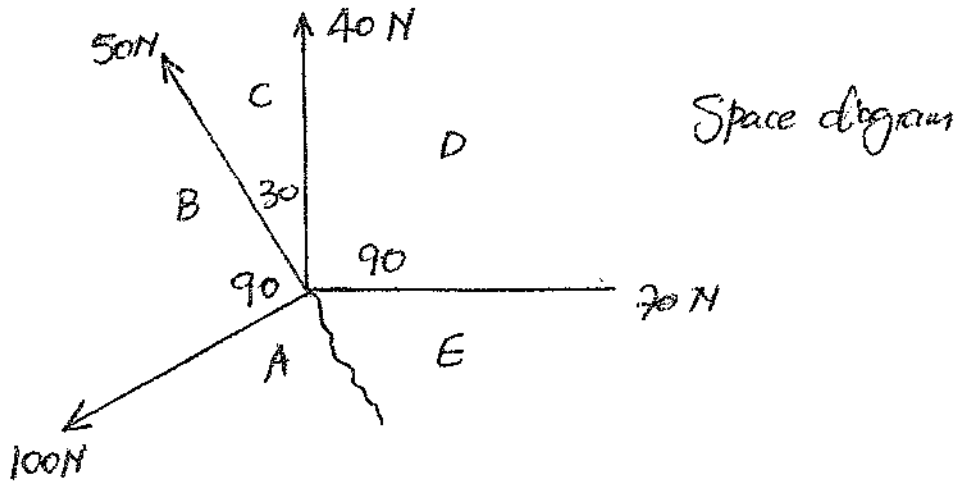
Force diagram ✓
Scale: 10mm = 20N

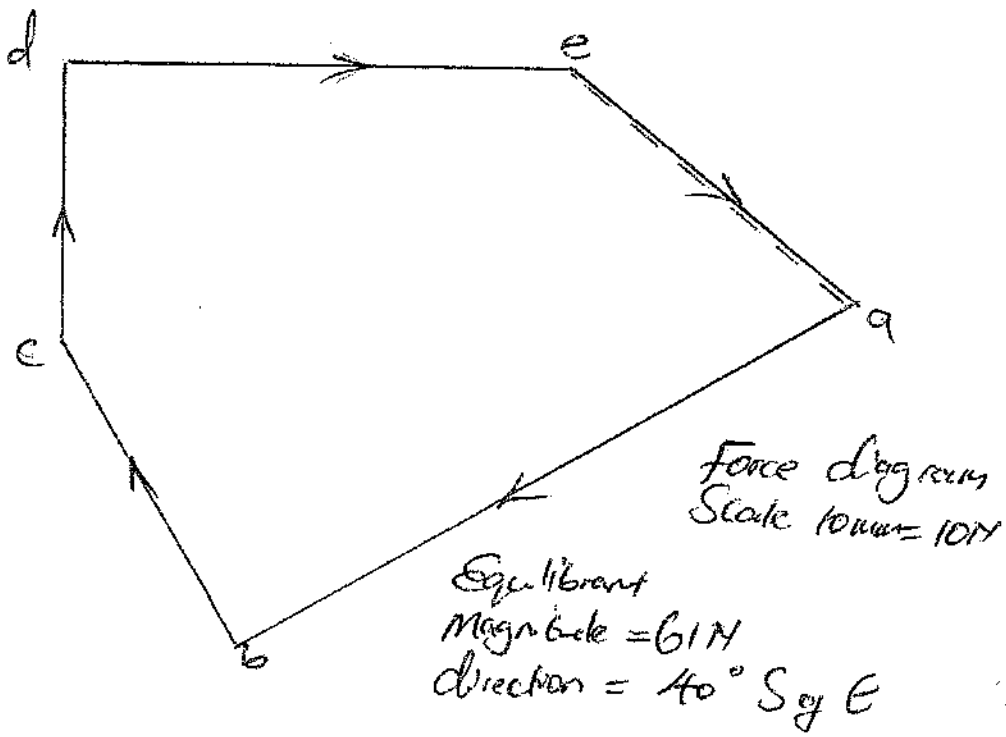
(6)
[21]

QUESTION 6

6.1 A number of forces lying on the same plane are called coplanar forces. (2)

6.2





(12)
[14]

QUESTION 7

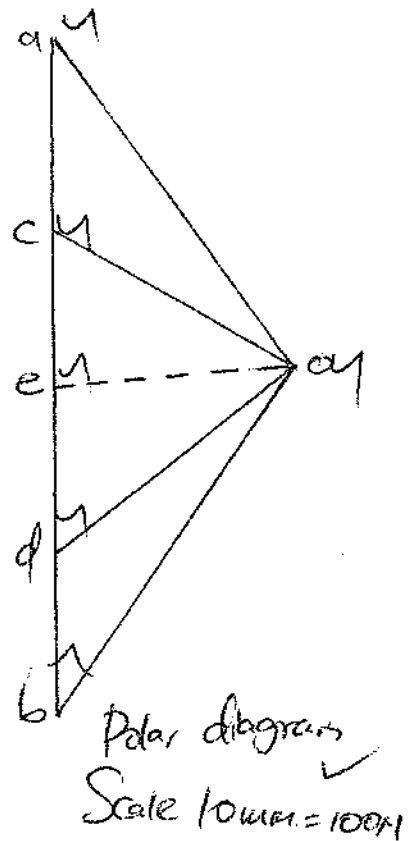
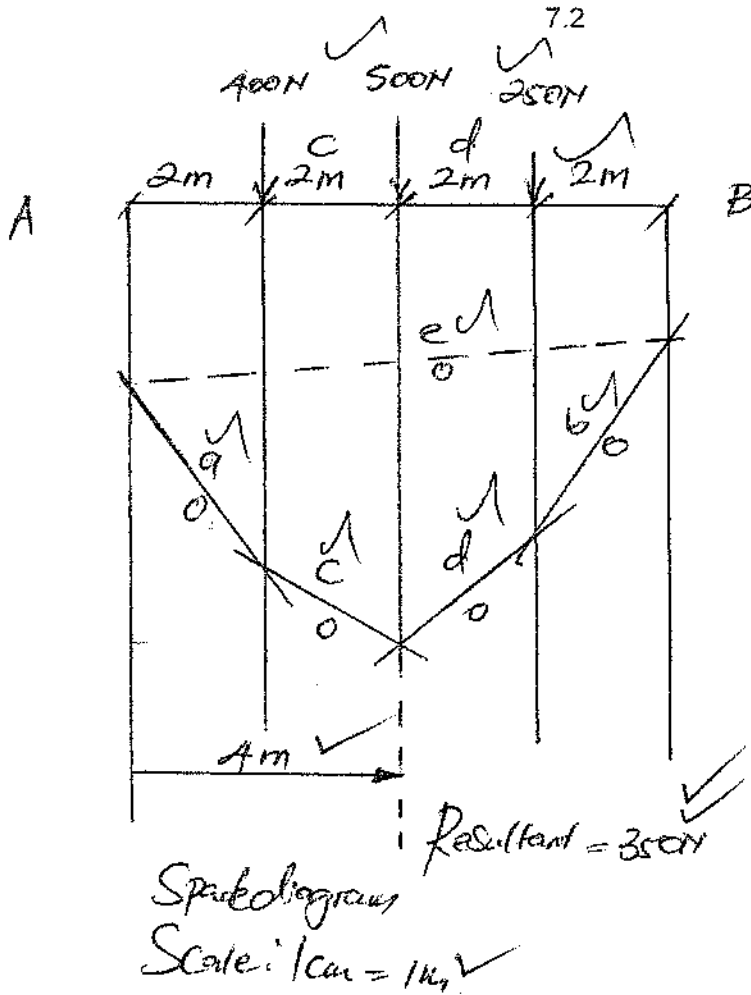
7.1 $2\ 400\ \text{kg} \times 10 = 24\ 000\ \text{N}$

Reaction force = $\frac{24\ 000}{2}$ (concept of divide by 2)

= 12 000 N

(3)

7.2



(12)
[15]

TOTAL: 100