## **N5 Structures**

## Moments

 $\Sigma CWM = \Sigma ACWM$  $F_1 x d_1 = F_2 x d_2$ 

A moment is a Force (N) x a distance (m).



ΣF个=ΣF↓

All of the forces going up added together equal all of the forces going down added together.

CW

500N

4m

5m

 $45250 = R_2 \times 5$ 

 $\frac{45250}{5} = R_2$ 

 $R_2 = 9050N$ 

ΣF↑=ΣF↓

 $R_1 = 7450N$ 

CW

6000N

R2

ACW





ccept distance between capies. rorces/position on its own. Do not accept: size/direction jescubrive response

ceiling is shown.							
i fruit i fish i soup	cable B						
o be d	drawn. hat should be included on a free body	1					
L	Size/direction/position of force(s).	(೪)					

## **N5** Properties of Materials

Strut
Members that are in compression, due to external forces trying to compress them, are known as Stru
FORCE
Tie
Members that are in tension, due to external forces trying to pull them apart, are known as Ties.
FORCE

		Corrocion		T		(b)	Calculate the force applie
	Metal	resistant	Durability				
	A	no	low				
	В	yes	high				
	с	yes	low				
	D	no	high				
(d) Select the support s Choice of Justificat	e most suitable metal tructure and justify y metal ion	(A–D) from th our choice.	e table above	to be used for the	2		
lection. Apply	se to based on selec FTE from metal selec	pə: os pi	it is durable ar ed to be replac	Metal B because parts will mot ne often.			t for transposition. t for correct answer from working with unit.
resistant <b>and</b> v with valid	1 mark for corrosion 1 durable. OR 1 mark for a property	si br ∬i∿ noi	sion resistant ar the structure v and it is corros	Metal B is corros (more) durable. Metal B because be used outside resistant.			, for substitution.
					(5)		
The sign hang Cable A has ar (b) Calculate (c) State the	s from the ceiling by n original length of 4. the strain in cable A nature of the force i	two cables. 5 m and is stri n cable A.	etched by 0.00	13 m.	2		
force/gravity.	Do not accept pulling				_		
	Accept tension/tie.	L		Fensile	(c)	1	
swer from	1 mərk for correct an given working. Ignore any units.		()	$\varepsilon = 0.000288889$ $\varepsilon = 0.0002888899$			
·ue	1 mark for substitutio					1	

The properties of the four metals considered for the support structure are shown in

the table below.

Stress	Stress is measured in Nmm <sup>-2</sup> .	Area of a circle	Strain	Strain has n
	Force is measured in N.	$A = \pi r^2$		Change in l
$Stress = \frac{Force}{Area}$	Area is measured in mm <sup>2</sup> .	- 12	$Strain = \frac{Change in Length}{Original Length}$	the same u the equatio
$\sigma = \frac{F}{A}$	Area - radius is r, diameter is d.	$A = \frac{\pi d^2}{4}$	$\varepsilon = \frac{\Delta L}{L}$	is in mm, th putting into

Most common properties to be considered include:

1. **STRENGTH** - the ability of a material to resist force, the bigger the force it can resist the stronger the material.

2. ELASTICITY - the ability of a material to return to its original shape or length once an applied load or force has been

removed.

3. **PLASTICITY** - the ability of a material to change its shape or length under a load and stay deformed even when the

load is removed.

4. DUCTILITY - the ability of a material to be stretched without fracturing and be formed into shapes such as very thin

sheets or very thin wire.

5. BRITTLENESS - the property of being easily cracked, snapped or broken.

6. MALLEABILITY - the ability of a material to be shaped, worked or formed without fracturing.



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no units.

length and original length need to be in inits before they are substituted into on. So if one is in metres but the other hey both need to be in mm before o the equation.

Mrs Gault