SHEET 1

PENANG SANGAM HIGH SCHOOL

P. O. BOX 44, RAKIRAKI

LESSON NOTES - 24

SCHOOL: PENANG SANGAM HIGH **SUBJECT: TECHNICAL DRAWING** **YEAR/ LEVEL: 11 C/D**

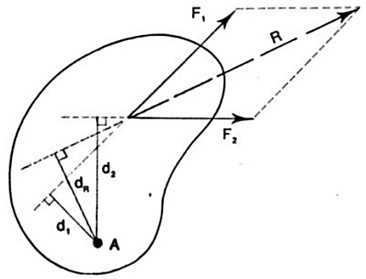
Strand	TD11.4 APPLIED MECHANICS
Sub - Strand	TD11.4.2 MOMENTS
Content Learning Outcome	TD11.4.2.1 Analyze and calculate moments on Coplanar, Non- concurrent force systems

MOMENTS

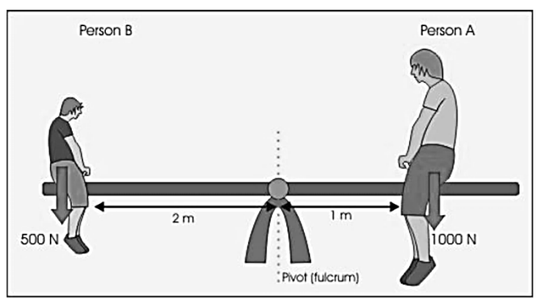
Moment
is a combination of a physical quantity and a distance. Moments are usually defined with respect to a fixed reference point; they deal with physical quantities as measured at some distance from that reference point. Commonly used quantities include forces, masses, and electric charge distributions.

TERMINOLOGIES

Varignon's Theorem states that the algebraic sum of the moments of a system of coplanar forces is equal to the moment of their resultant about the same point.

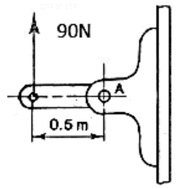


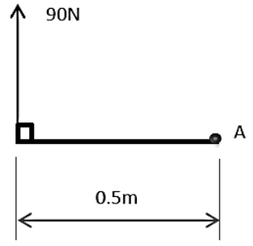
Moment of a force, with respect to a given point, in the same plane, is the product of the force and the perpendicular distance from the point to the line of action of the force. The unit of a moment of a force is the newton metre (Nm) and multiples of this unit i.e. kilonewton metre (KNm), etc.



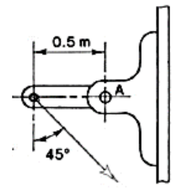
WORKED EXAMPLE 1

Calculate the moment of the force about point A in each case.

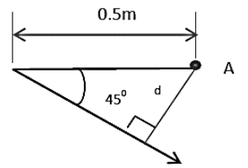




$M_A = F \times d$
$= -(90 \times 0.5)$



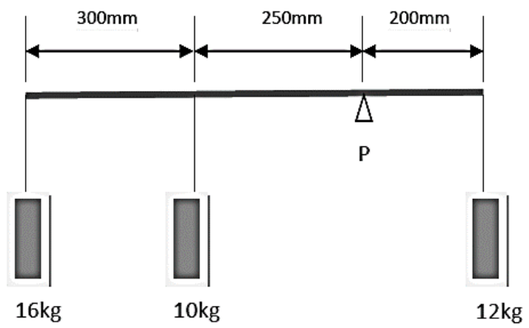
$M_A = F \times d$
$= +(90 \times 0.3536)$
$= \underline{31.8\ Nm}$



where F = 90 N
$\sin 45^0 = d / 0.5$
$d = 0.5 \times 0.7071$
$= \underline{0.3536\ m}$

WORKED EXAMPLE 2

A bar 750mm long, is pivoted as shown. Two loadings of 10 kg, 16 kg and 12 kg are attached to the bar as shown. Determine the moment of the forces about the pivot, P. (use $g = 10m/s^2$)



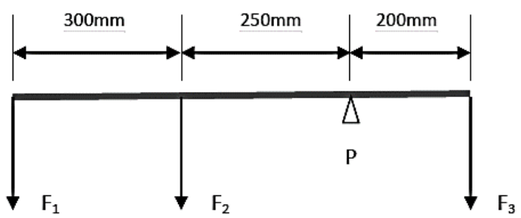
where **W = mg**

$F_1 = 16kg \times 10 = 160N$
$F_2 = 10kg \times 10 = 100N$
$F_3 = 12kg \times 10 = 120N$

$\sum M_P = (160 \times 0.55) + (100 \times 0.25) - (120 \times 0.2)$

$= 88 + 25 - 24$

$= \underline{89\ Nm}$



The conventional signs to indicate the sense of the moment are:

Anticlockwise is positive +
Clockwise is negative -

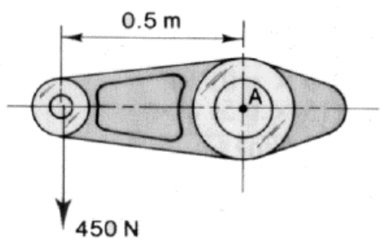
QUESTIONS

1. Define the moment of a force.

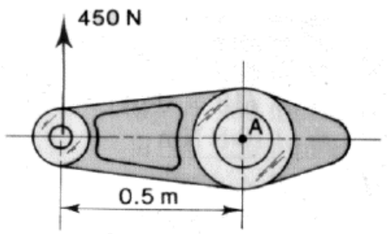
2. State Varignon's Theorem.

3. Compute the moment of the force about the point A in the

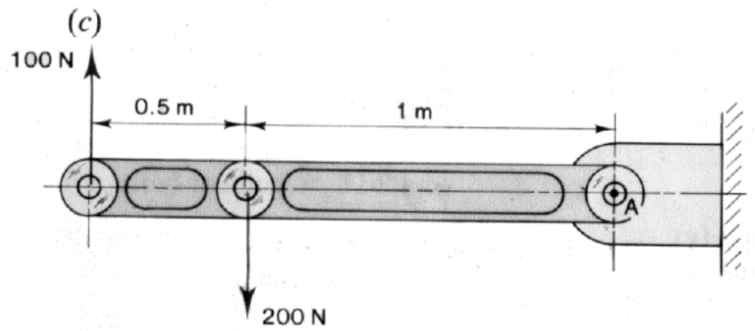
(a)



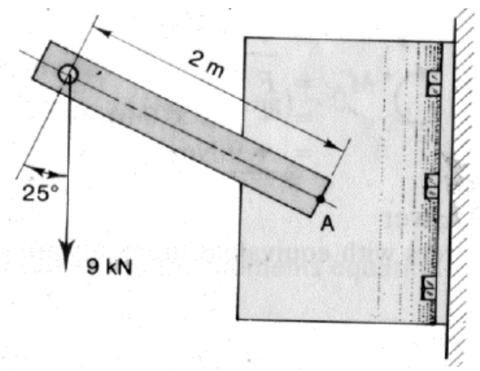
(b)



(c)



(d)



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