higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

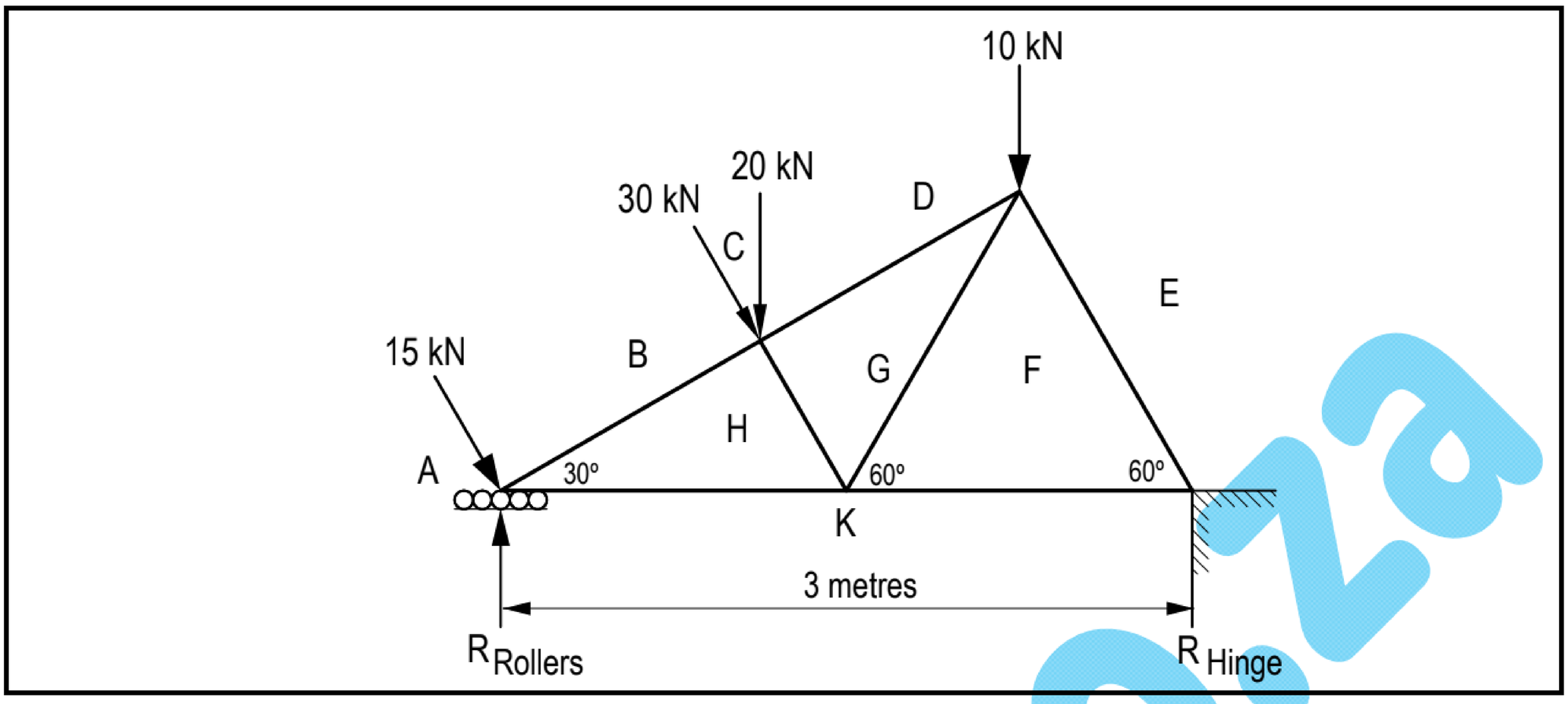
NATIONAL CERTIFICATE

BUILDING AND STRUCTURAL CONSTRUCTION N5

30 NOVEMBER 2022

This marking guideline consists of 12 pages.

QUESTION 1



Calculate the Reactions

Take moment around RR
(RH × 3) = (30 Cos 60° × 1,125) + (10 × 2 ,25) + (20 × 1,125) + (30 Cos 60° × 0,65)

RH = 27,993 kN✓

Take moment around RH
(RR × 3) + (30 Cos° 60 × 0,65) = (20 × 1,875) + (30 Cos° 60 × 1,875) + (10 × 0,75) +

(15 Cos 60° × 3)

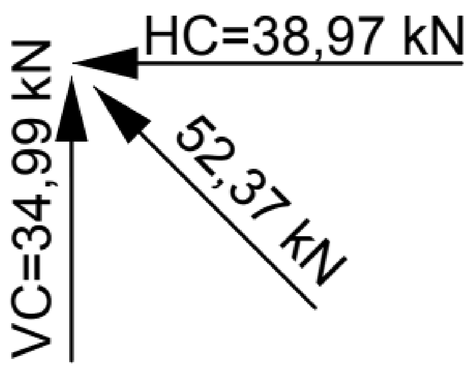
RR = 40,978 kN ✓ (2)

RR is on rollers, thus the force is vertical up = 40,978 kN
But RL is fixed; thus we use Pythagoras to find the Resultant or Equilibrium
F

$RL = \sqrt{\Sigma\, VC^2 + \Sigma\, HC^2}$

$RL = \sqrt{\Sigma\, 27{,}993^2 + \Sigma\, 22{,}5^2}$

Horizontal Comp
30 Cos 60° + 15 Cos 60° = F
F= 22,5 kN



Direction:
$Tan\ \theta\ = \frac{27{,}993}{22{,}5}$

θ = **51,208°**✓ (4)

Calculate the force in each member

Find member BH

40,978 + BH Sin 30° = 15 Sin 60°

BH = 15 sin 60° – 40,978 / Sin 30°

BH = 55,98 KN (Strut)✓✓

Find member HK

BH Cos 30° = 15 Cos 60° + HK

55,98 Cos 30° = 15 Cos 60° + HK

HK = 55,98 Cos 30° – 15 Cos 60°

HK = 40,98KN (Tie)✓✓

Find member EF

EF Sin 60° = 36 Sin 51°

EF = 28 / Sin 60°

EF =32,33 KN (Strut)✓✓

Find member FK

FK + FE Cos 60° = 36 Cos 51°

FK + 32,33 Cos 60° = 36 Cos 51°

FK = 32,33 Cos 60° + 36 Cos 51°

FK = 6,7 KN (Strut)✓✓

Find member DG

DG Cos 30° + HG Cos 60° = 30 Cos 60° + 56 Cos30°

DG Cos 30° = 63, 497 – HG Cos 60°

DG = 73,32 – 0,577 HG……{1}

DG Sin 30° + 20 + 30 Sin 60° = 56 Sin 30° + HG Sin 60°

DG Sin30 + 45,98 = 28 + 0,866 HG

0,5 (73,32 – 0,577HG) + 45,98 = 28 + 0,866 HG

36,66 – 0,289 HG + 45,98 = 28 + 0,866 HG

82,64 – 0,289 HG = 28 + 0,866 HG

82,64 – 28 = 0,866 HG + 0,289 HG

54,64 = 1,155 HG

HG = 47 kN (Strut)✓✓

And:

DG = 73,32 – 0,577 HG……{1}

DG = 73,32 – 0,577 (47)

DG = 46 kN (Strut)✓✓

