1. (a) Find the forces carried in bar AB and BC of the hinged equilateral triangle when loaded as shown in figure 1.

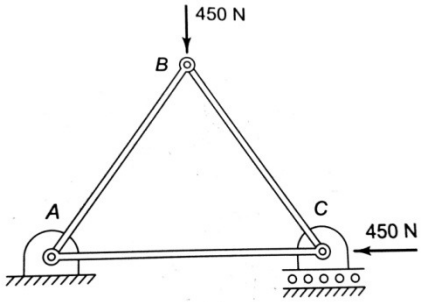


Figure 1

(a) F(AB) = 260 N , F(BC) = 260N
(b) F(AB) = 280 N , F(BC) = 280N
(c) F(AB) = 280 N , F(BC) = 260N
(d) F(AB) = 300 N , F(BC) = 300N
Correct – (a)

1. (b) In the above problem find the force in the bar AC.
   (a) F(AC) = 260 N (Compression)
   (b) F(AC) = 260 N (Tension)
   (c) F(AC) = 320 N (Compression)
   (d) F(AC) = 320 N (Tension)
   Correct – (c)

2. It is desired to lift the wheelbarrow shown in figure 2 with one hand at the handle A by applying at A, a vertical force F and a twisting moment M about the axis of the handle. Estimate the magnitudes of F and M.

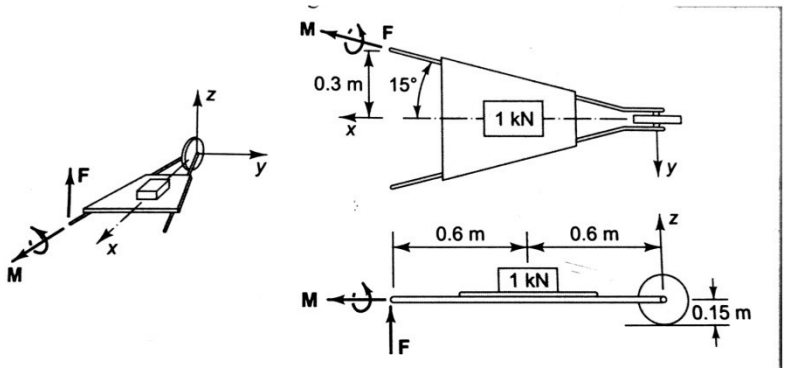


Figure 2

(a) M = 145 N-m, F = 428 N
(b) M = 145 N-m, F = 468 N
(c) M = 175 N-m, F = 428 N
(d) M = 175 N-m, F = 468 N

Correct – (b)

3. (a) Determine the forces in the members (DC, CB, ED and DB) of the truss shown in figure 3.

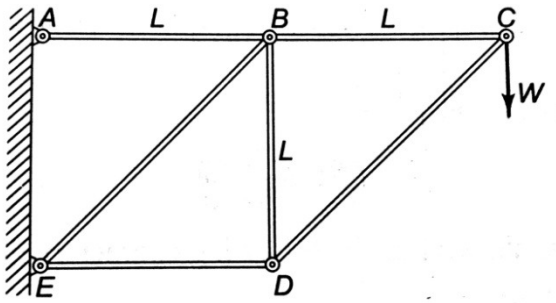


Figure 3

(a) F(DC) = 1.41 W, F(CB) = W, F(ED) = Wand F(DB) = W
(b) F(DC) = 1.41 W, F(CB) = 1.41 W, F(ED) = Wand F(DB) = W
(c) F(DC) = W, F(CB) = W, F(ED) = Wand F(DB) = W
(d) F(DC) = 1.41 W, F(CB) = W, F(ED) = 1.41 Wand F(DB) = W

Correct – (a)

3. (b) In the above figure determine the forces in the members EB and BA.
   (a) F(EB) = 1.41 W, F(BA) = W
   (b) F(EB) = 1.41 W, F(BA) = 1.41 W
   (c) F(EB) = 1.41 W, F(BA) = 3 W
   (d) F(EB) = 1.41 W, F(BA) = 2 W

   Correct – (d)

4. A block of weight W rests on an inclined plane which makes an angle $\theta = \tan^{-1}\frac{3}{4}$ as shown in figure 4. A force P, parallel to the x axis, is applied to the block and gradually increased from zero; when P reached the value 0.4W the block begins to slide. What is the coefficient of friction between the block and the inclined plane?

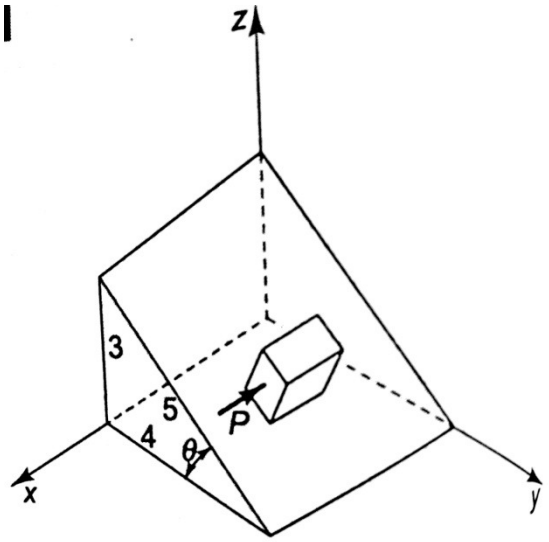


Figure 4

(a) f = 0.6
(b) f = 0.7
(c) f = 0.8
(d) f = 0.9
Correct – (d)

5. A folding camp stool rests upon a horizontal floor (neglect friction) and is loaded as shown in the figure 5. Determine the magnitude of the shear force on the pin A, and the position of the load on the bar BC to make this force a maximum.

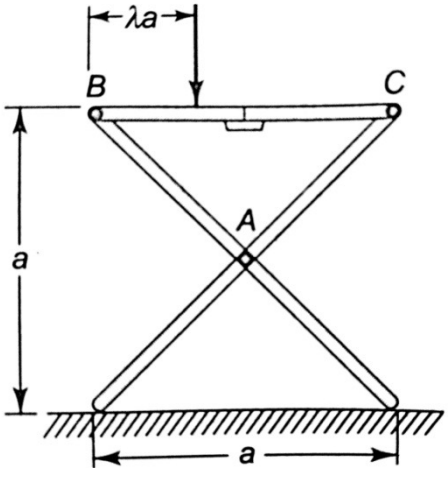


Figure 5

(a) F = 1 P , $\lambda$ = (0,1)
(b) F = 2 P , $\lambda$ = (0,1)
(c) F = 1.41 P , $\lambda$ = (0,1)
(d) F = 1.41 P , $\lambda$ = (0,0.5)
Correct – (c)

6. A longshoreman can barely start pushing a trunk up a 30° concrete ramp. He can barely hold it from sliding back when the slope is 60°. What is the coefficient of static friction between the trunk and the concrete? Assume force required is same for both cases.
(a) f = 0.17
(b) f = 0.27
(c) f = 0.37
(d) f = 0.47

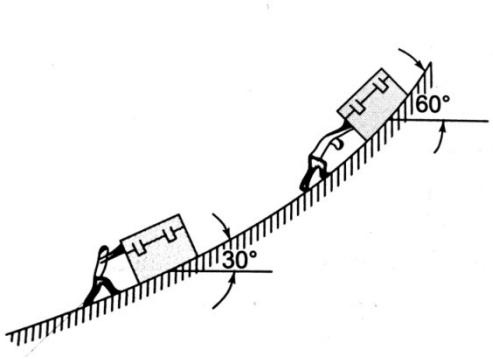


Figure 6

Correct – (b)