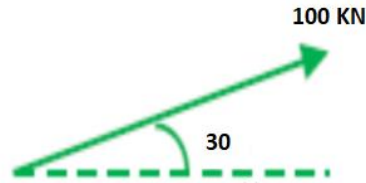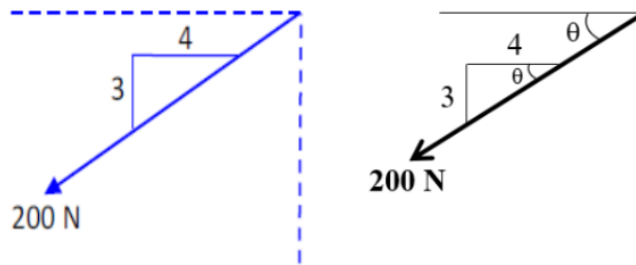# Practice problems in unit 1and 2

1. Resolve the given force, determine X &Y components (Find F_x & F_y)?

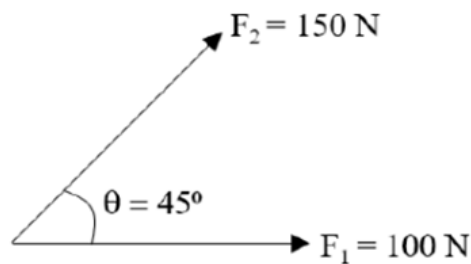100 KN

30

$$\left(\text{Ans: } F_x = 86.60 \text{ kN, } F_y = 50 \text{ kN}\right)$$

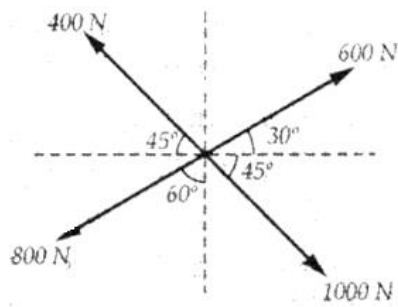2. Determine θ, X & Y components (F_x & F_y)?

4

3

200 N

4   θ

θ

3

200 N

(Ans: $\theta = 36.87°$, $F_x = -160°$, $F_y = -120$ N)

3. Two forces of 100 N and 150 N are acting simultaneously at a point. Find the resultant if the angle between them is 45°?

$F_2 = 150$ N

$\theta = 45°$

$F_1 = 100$ N

(Ans: R = 231.76 N)

4. Determine the resultant force in magnitude and direction for concurrent force system as shown in Fig?

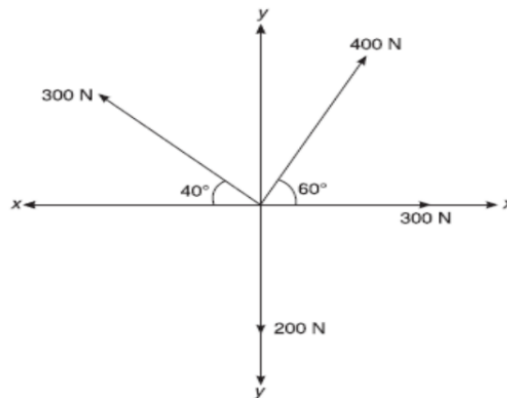5. The sum of the two concurrent forces P and Q is 500 N and their resultant is 400 N. If the resultant is perpendicular to "P", find P, Q and angle between P and Q?
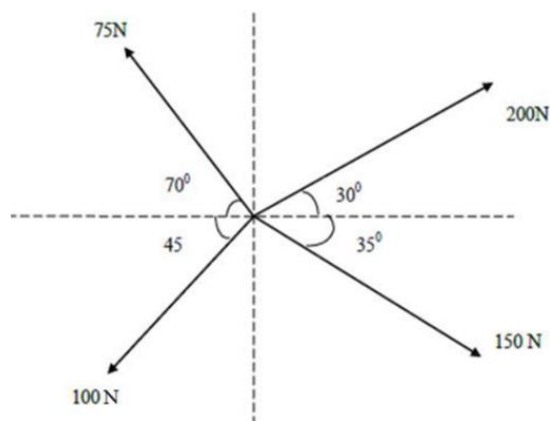
(Ans: $P = 90$ N, $Q = 410$ N and $\theta = 102°$)

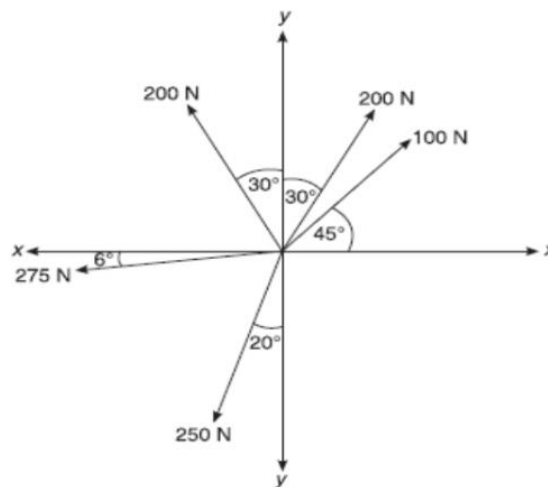6. Find the resultant of the coplanar concurrent force system shown in Fig.?

(Ans: $R = 433.70 \, N, \theta = 51.47$)

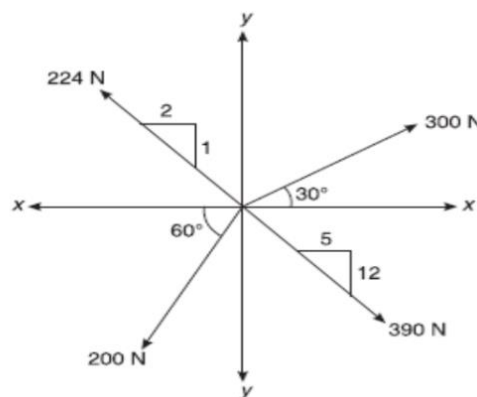7. Determine the magnitude & direction of the resultant of the coplanar concurrent force system shown in figure below?

(Ans: $R = 200.19 \, N, \theta = 3.93°$)

8. Five coplanar forces are acting at a point shown in figure. Determine the resultant in magnitude and direction?

(Ans: $R = 326.59\ N, \theta = -28.03°$)

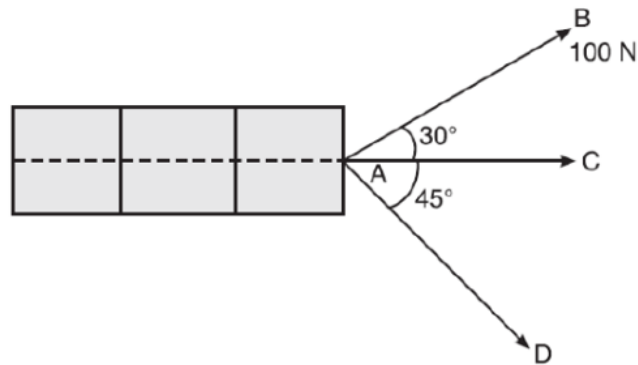9. Determine the resultant of the four forces acting on a particle as shown in Figure?

(Ans: $R = 303.44\ N, \theta = -68.85°$)

10. Four forces acting on a hook are shown in figure. Determine the direction of the force 150 N such that the hook is pulled in the X-direction. Determine the resultant force in X-direction?
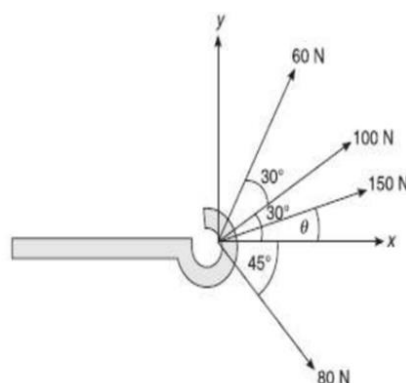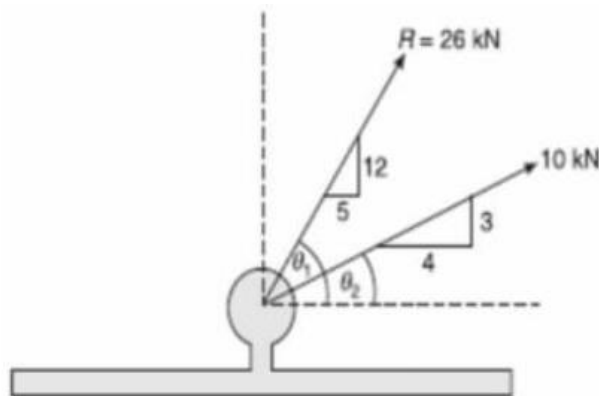

(Ans: $R = 316.14\ N, \theta = 17.61°$)

11. The top view of a car, pulled by two cables AB and AD. The car is moving along AC. If the force in cable AB is 100 N, calculate the force in AD and the resultant?
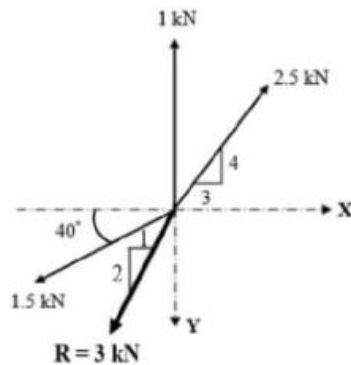

(Ans:$F_{AD} = 70.71\ N, R = 136.6\ N$)

12. 26 kN force is the resultant of two forces, one of which is shown in figure. Determine other force?

(Ans: F=18.11 N, θ=83.66°)

13. The Resultant of four forces acting at a point is 3 kN as shown in Figure, Find the magnitude and direction of fourth force if the first three forces are 2.5 kN, 1 KN and 1.5 kN as shown in Fig.?
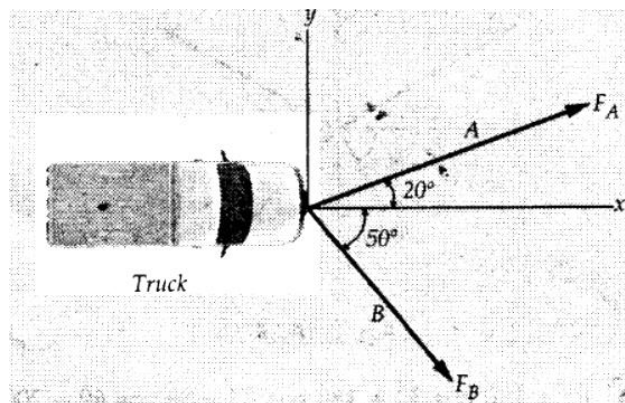

(Ans: F=-5kN, θ=70.28°)

14. Five forces act on a bolt 'B' as shown in Fig. Determine the resultant of the forces on the bolt?
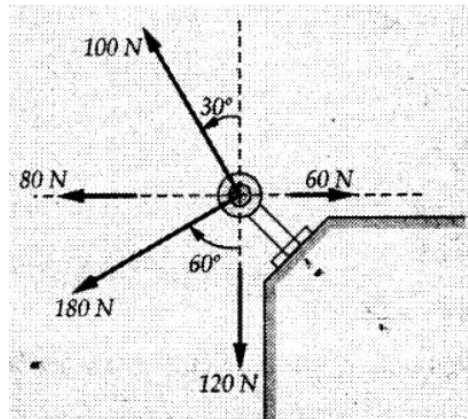
(Ans: F=257.4 N, θ=28.65°)

15. The truck is to be towed using two ropes. Determine the magnitudes of forces F_A and F_B acting on each rope in order to develop a resultant force of 950 N directed along the positive X-axis.?


(Ans: $F_A = 774.45\ N, F_A = 345.77\ N$)

16. The resultant of the forces system as shown in Fig. 2.10.42 is 520 N along the negative direction of y-axis. Determine 'P' and 'θ' ?
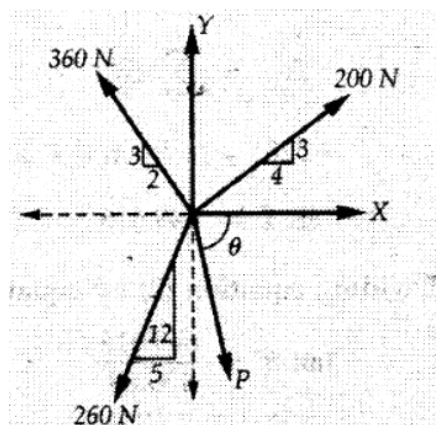
(Ans: $P = 664.24, \theta = 77.86\ °$)

17. A system of five forces of magnitude 4 kN, 5 kN, 6 kN, 7 kN and 8 kN acts at one of the angular points of a regular hexagon and the forces pass through the other angular points as shown in Fig. Find the magnitude and direction of the resultant of the system of forces.
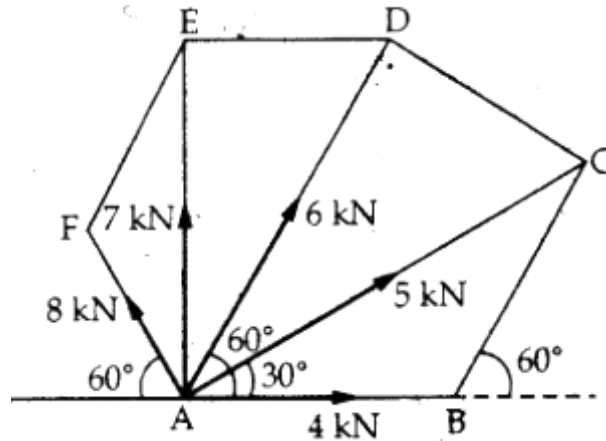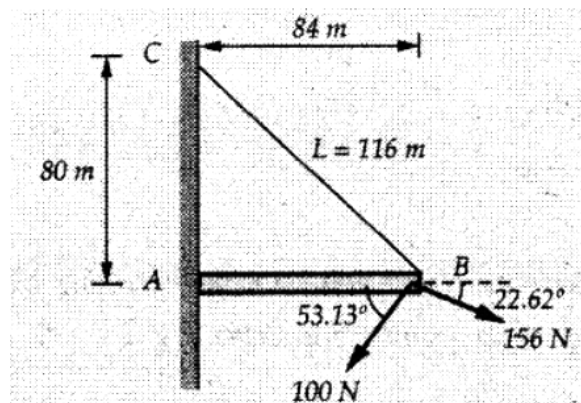

(Ans: $R = 22.832\ kN, \theta = 71.27\ °$)

18. Two forces P and Q of magnitude 40 N and 60 N respectively act on a bolt A. Determine their resultant if P and Q makes 20° and 40° respectively with horizontal?
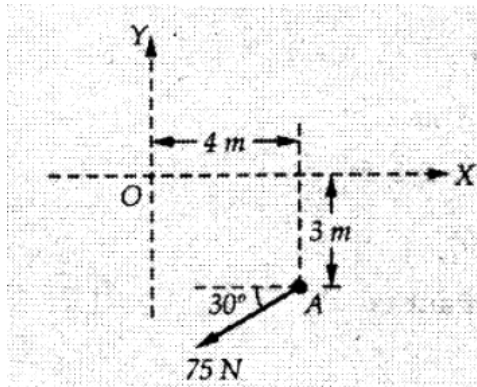
(Ans: $R = 97.725\ N, \theta = 35.038\ °$)

19. Knowing that the tension in the cable BC is 145 N, determine the resultant of the three forces exerted at point 'B' of beam AB?
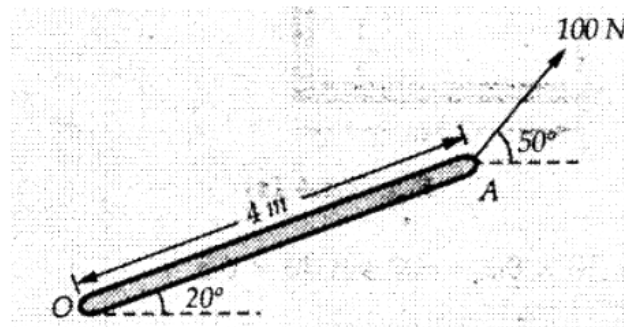

(Ans: R=45.18 N,θ=62.3°)

20. Determine the moment of the 75 N force shown in Fig. about O?

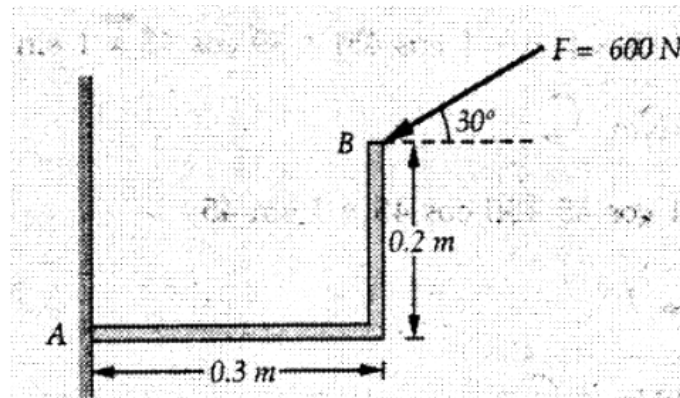21. Determine the moment of the 100 N force acting on the rod as shown in Fig. about O?

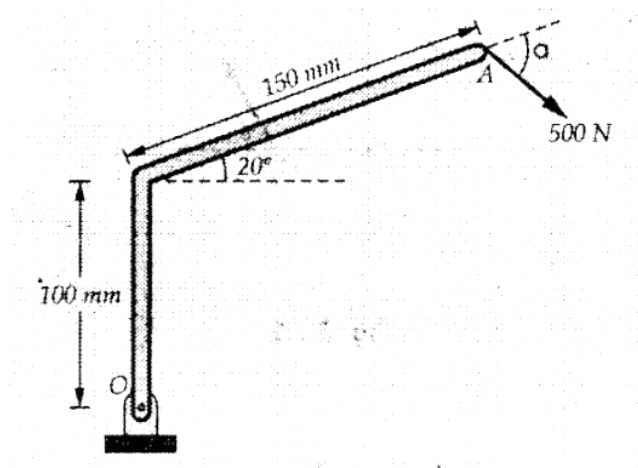22. Find the moment of force F = 600 N about A as shown in Fig.?

23. Determine the angle a for which the moment of the 500 N force shown in Fig. is maximum about O. Also find the maximum moment.?

150 mm

A

α

500 N

20°

100 mm

O

(Ans:M_{max}=103.395 Nm, α=62.97)