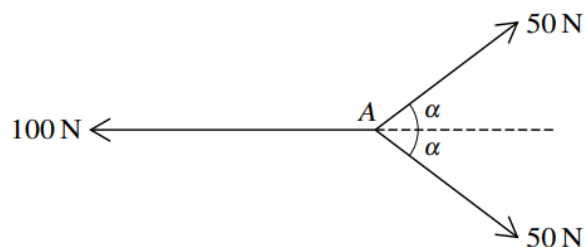


CIE A'LEVEL MECHANICS (M1) TOPIC WISE QUESTIONS PAPERS
Forces in Two Dimensions

1.

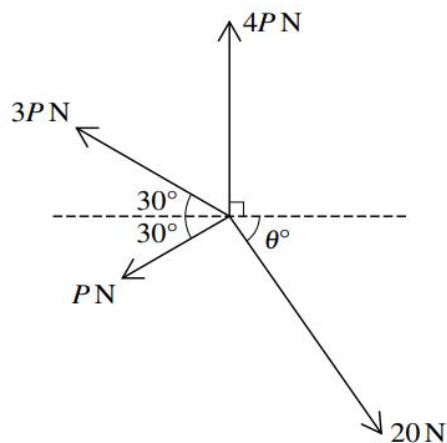


Three coplanar forces of magnitudes 100 N, 50 N and 50 N act at a point A, as shown in the diagram. The value of $\cos \alpha$ is $\frac{4}{5}$.

Find the magnitude of the resultant of the three forces and state its direction. [3]

June2020/Q1/41

2.

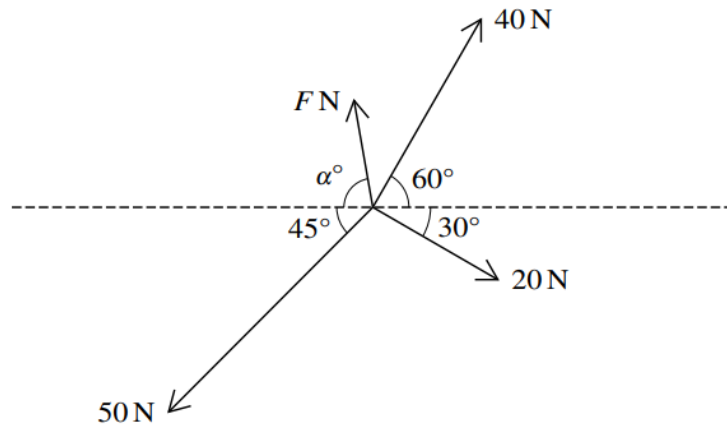


Coplanar forces of magnitudes 20 N, P N, $3P$ N and $4P$ N act at a point in the directions shown in the diagram. The system is in equilibrium.

Find P and θ . [6]

June2020/Q2/42

3.



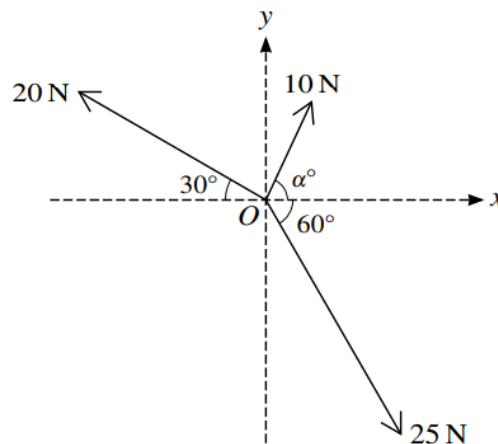
Four coplanar forces of magnitudes 40 N, 20 N, 50 N and F N act at a point in the directions shown in the diagram. The four forces are in equilibrium.

Find F and α .

[6]

June2020/Q3/43

4.



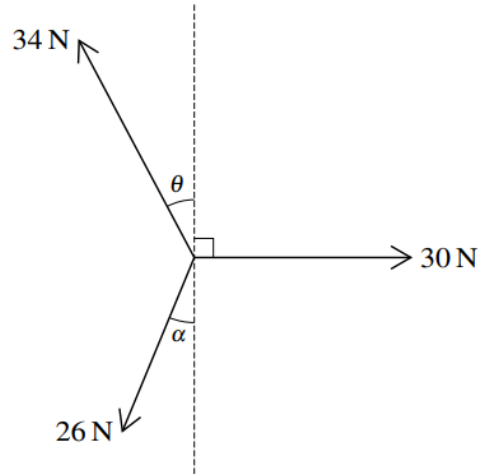
Three coplanar forces of magnitudes 10 N, 25 N and 20 N act at a point O in the directions shown in the diagram.

(a) Given that the component of the resultant force in the x -direction is zero, find α , and hence find the magnitude of the resultant force. [4]

(b) Given instead that $\alpha = 45$, find the magnitude and direction of the resultant of the three forces. [5]

June2021/Q6/41

5.

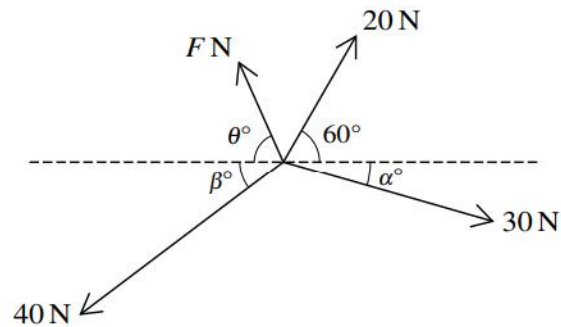


Coplanar forces of magnitudes 34 N, 30 N and 26 N act at a point in the directions shown in the diagram.

Given that $\sin \alpha = \frac{5}{13}$ and $\sin \theta = \frac{8}{17}$, find the magnitude and direction of the resultant of the three forces. [6]

June2021/Q2/42

6.



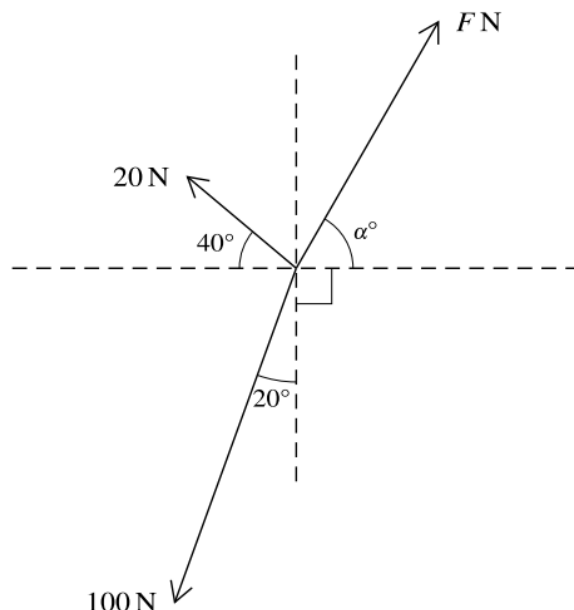
Four coplanar forces act at a point. The magnitudes of the forces are 20 N, 30 N, 40 N and F N. The directions of the forces are as shown in the diagram, where $\sin \alpha^\circ = 0.28$ and $\sin \beta^\circ = 0.6$.

Given that the forces are in equilibrium, find F and θ . [6]

June2021/Q3/43

CIE A'LEVEL MECHANICS (M1) TOPIC WISE QUESTIONS PAPERS
Forces in Two Dimensions

7.



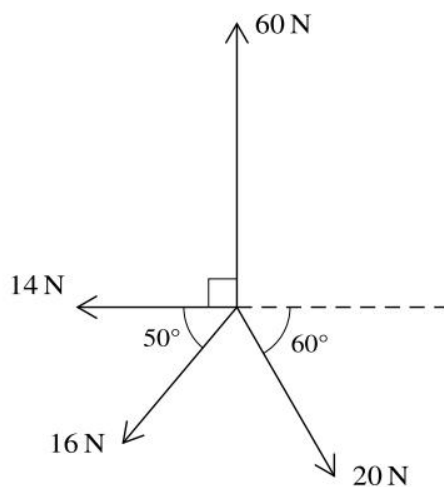
Three coplanar forces of magnitudes 20 N, 100 N and F N act at a point. The directions of these forces are shown in the diagram.

Given that the three forces are in equilibrium, find F and α .

[6]

June2022/Q4/41

8.



Coplanar forces of magnitudes 60 N, 20 N, 16 N and 14 N act at a point in the directions shown in the diagram.

Find the magnitude and direction of the resultant force.

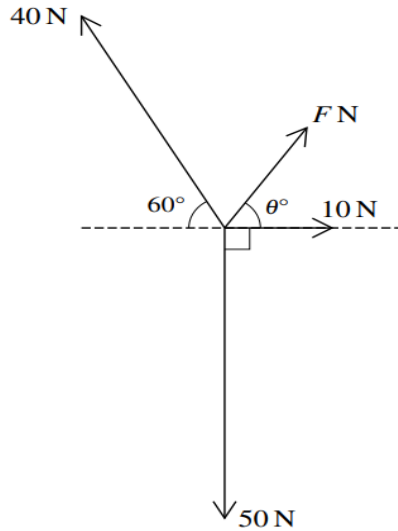
[6]

June2022/Q2/42

CIE A'LEVEL MECHANICS (M1) TOPIC WISE QUESTIONS PAPERS
Forces in Two Dimensions

June2022/Q4/43

9.



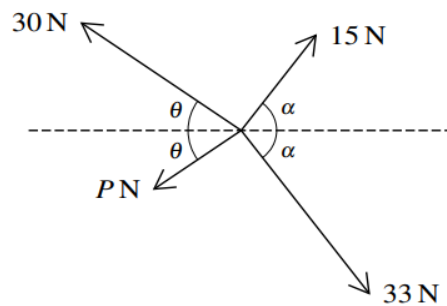
Four coplanar forces act at a point. The magnitudes of the forces are F N, 10 N, 50 N and 40 N. The directions of the forces are as shown in the diagram.

(a) Given that the forces are in equilibrium, find the value of F and the value of θ . [6]

(b) Given instead that $F = 10\sqrt{2}$ and $\theta = 45^\circ$, find the direction and the exact magnitude the resultant force. [3]

June2023/Q5/41

10.



Coplanar forces of magnitudes 30 N, 15 N, 33 N and P N act at a point in the directions shown in the diagram, where $\tan \alpha = \frac{4}{3}$. The system is in equilibrium.

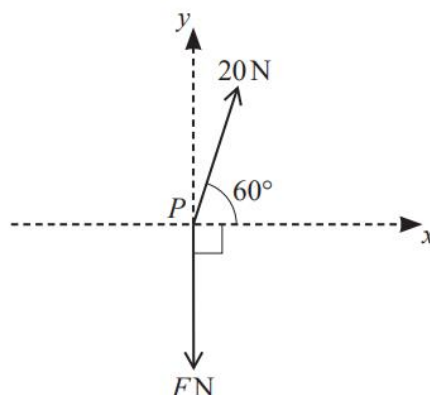
(a) Show that $\left(\frac{14.4}{30-P}\right)^2 + \left(\frac{28.8}{P+30}\right)^2 = 1$. [4]

(b) Verify that $P = 6$ satisfies this equation and find the value of θ . [2]

June2023/Q3/42

CIE A'LEVEL MECHANICS (M1) TOPIC WISE QUESTIONS PAPERS
Forces in Two Dimensions

11.

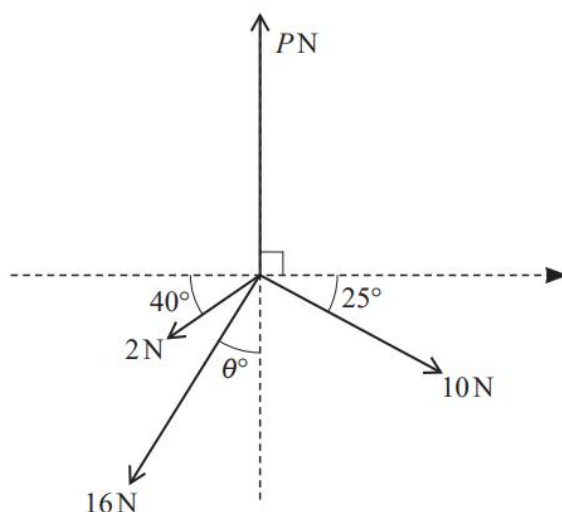


Two forces of magnitudes 20 N and $F\text{ N}$ act at a point P in the directions shown in the diagram.

- (a) Given that the resultant force has no component in the y -direction, calculate the value of F . [2]
- (b) Given instead that $F = 10$, find the magnitude and direction of the resultant force. [5]

June2022/Q2/43

12.



Four coplanar forces of magnitude $P\text{ N}$, 10 N , 16 N and 2 N act at a point in the directions shown in the diagram. It is given that the forces are in equilibrium.

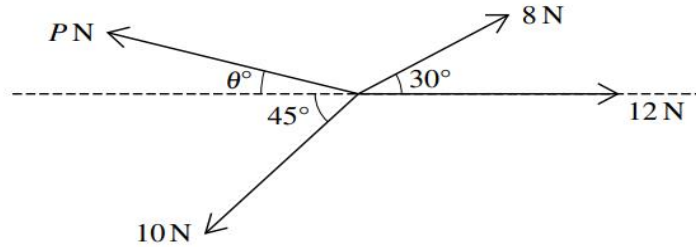
Find the values of θ and P . [6]

June2024/Q3/42

CIE A'LEVEL MECHANICS (M1) TOPIC WISE QUESTIONS PAPERS

Forces in Two Dimensions

13.



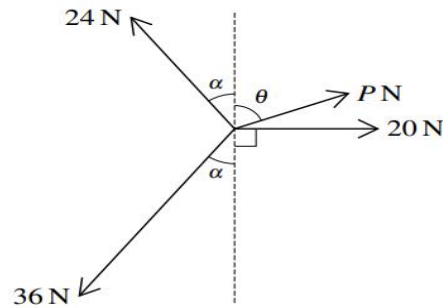
Coplanar forces of magnitudes 8 N, 12 N, 10 N and P N act at a point in the directions shown in the diagram. The system is in equilibrium.

Find P and θ .

[6]

October2020/Q3/41

14.



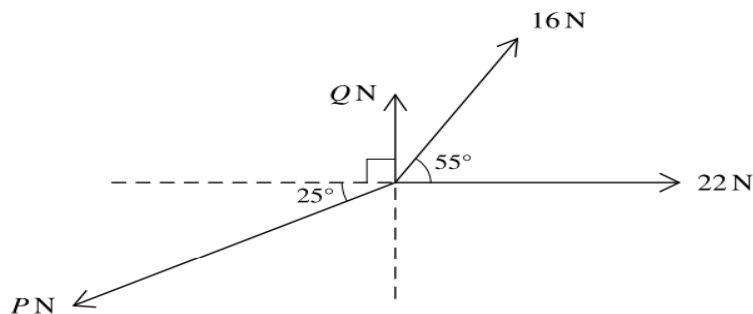
Coplanar forces of magnitudes 24 N, P N, 20 N and 36 N act at a point in the directions shown in the diagram. The system is in equilibrium.

Given that $\sin \alpha = \frac{3}{5}$, find the values of P and θ .

[6]

October 2021/Q3/41

15.



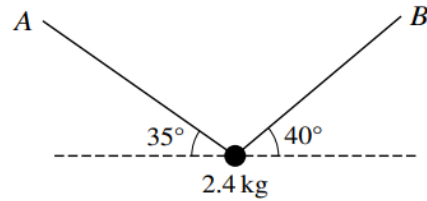
Coplanar forces of magnitudes P N, Q N, 16 N and 22 N act at a point in the directions shown in the diagram. The forces are in equilibrium.

Find the values of P and Q .

[5]

October2022/Q1/41

16.



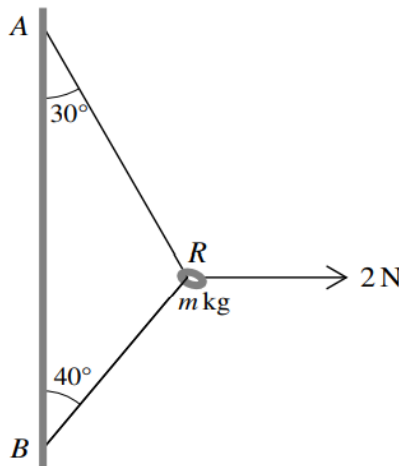
A particle of mass 2.4 kg is held in equilibrium by two light inextensible strings, one of which is attached to point A and the other attached to point B . The strings make angles of 35° and 40° with the horizontal (see diagram).

Find the tension in each of the two strings.

[5]

October 2023/Q2/41

17.



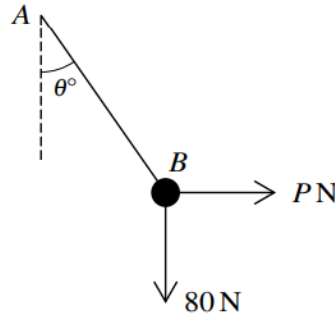
The diagram shows a smooth ring R , of mass m kg, threaded on a light inextensible string. A horizontal force of magnitude 2 N acts on R . The ends of the string are attached to fixed points A and B on a vertical wall. The part AR of the string makes an angle of 30° with the vertical, the part BR makes an angle of 40° with the vertical and the string is taut. The ring is in equilibrium.

Find the tension in the string and find the value of m .

[5]

October 2023/Q2/42

18.



A light string AB is fixed at A and has a particle of weight 80 N attached at B . A horizontal force of magnitude $P\text{ N}$ is applied at B such that the string makes an angle θ° to the vertical (see diagram).

- (a) It is given that $P = 32$ and the system is in equilibrium.

Find the tension in the string and the value of θ .

[4]

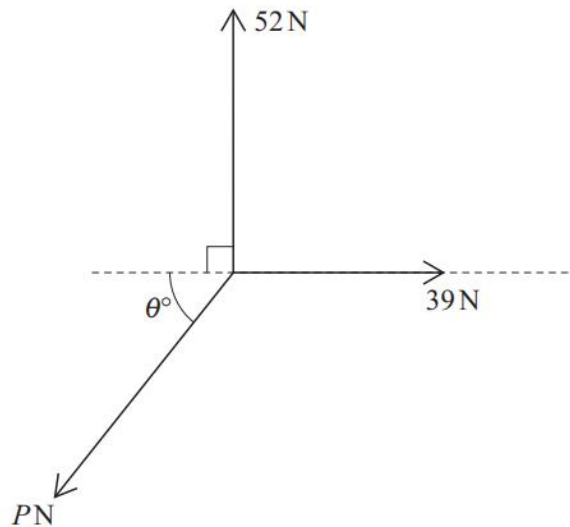
- (b) It is given instead that the tension in the string is 120 N and that the particle attached at B still has weight 80 N .

Find the value of P and the value of θ .

[4]

October 2023/Q5/43

19.



Coplanar forces of magnitudes 52 N , 39 N and $P\text{ N}$ act at a point in the directions shown in the diagram. The system is in equilibrium.

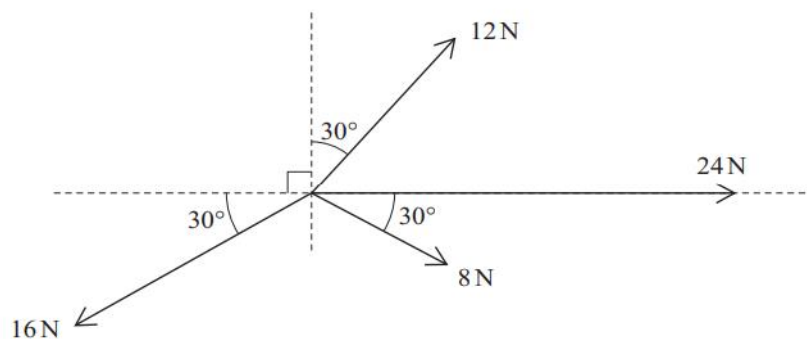
Find the values of P and θ .

[4]

October 2024/Q3/41

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Forces in Two Dimensions

20.

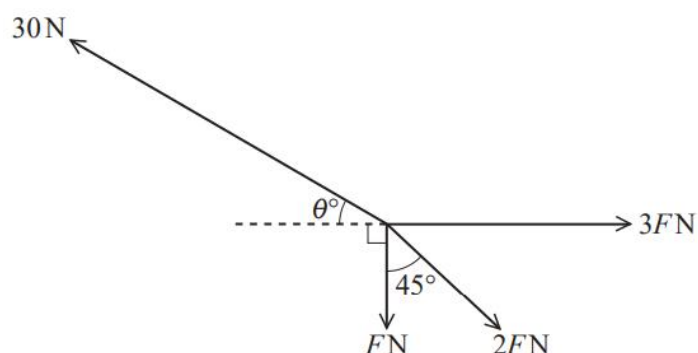


Coplanar forces of magnitudes 16 N, 12 N, 24 N and 8 N act at a point in the directions shown in the diagram.

Find the magnitude and direction of the single additional force acting at the same point which will produce equilibrium. [6]

October 2024/Q2/43

21.



Four coplanar forces act at a point. The magnitudes of the forces are F N, $2F$ N, $3F$ N and 30 N. The directions of the forces are as shown in the diagram.

Given that the forces are in equilibrium, find the value of F and the value of θ . [6]

March 2024/Q4/42