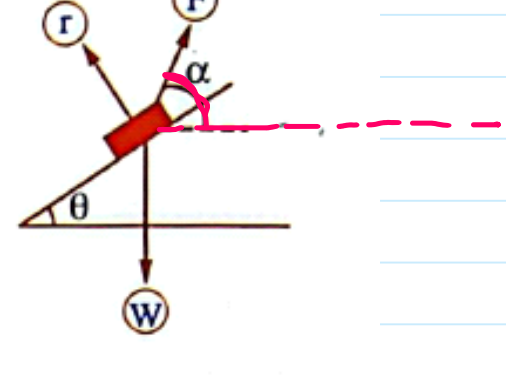
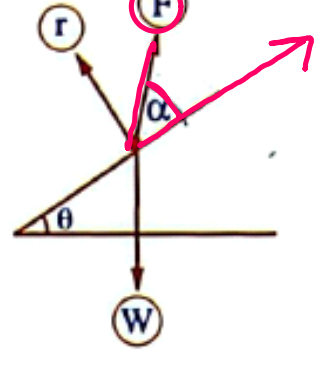
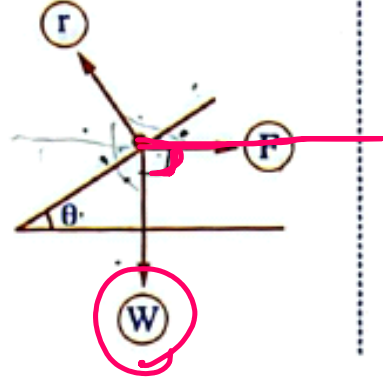
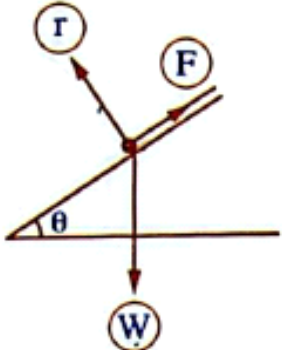


Equilibrium of a body on a horizontal rough plane_5

Monday, October 27, 2025 5:16 PM

- (1) The force is in the direction of the line of the greatest slope upwards.
- (2) The force acts horizontally.
- (3) The force inclines by α with the plane upwards.
- (4) The force inclines by α with the horizontal upwards.



A light string \overline{AB} of length 8 cm. Its terminal A is fixed at a point. A weight of 300 gm.wt. is suspended at the other terminal B. Find the magnitude of the needed force to keep the weight in equilibrium at a distance of 4 cm from the horizontal line passing through A, also find the tension in the string in each of the two cases.

- (1) If the force is horizontal.
- (2) If the direction of the force is perpendicular to \overline{AB} .

Handwritten solution for Case (1):

Diagram shows a horizontal line through A. Point C is 4 cm from A. B is 4 cm vertically below C. String length AB = 8 cm. Weight = 300 gm. Force F is horizontal to the right at B.

Calculations:

$$AC = \sqrt{8^2 - 4^2} = 4\sqrt{3} \text{ cm}$$

$$\frac{300}{4} = \frac{F}{4\sqrt{3}} = \frac{T}{8}$$

$$F = \frac{300 \times 4\sqrt{3}}{4} = 300\sqrt{3}$$

$$T = \frac{300 \times 8}{8} = 300$$

Handwritten solution for Case (2):

Diagram shows a horizontal line through A. B is 8 cm vertically below A. Force F is perpendicular to AB. Weight = 300 gm.

Angles: 120° between weight and AB, 90° between F and AB, 150° between weight and F.

Lami's rule:

$$\frac{F}{\sin 120} = \frac{T}{\sin 150} = \frac{300}{\sin 90}$$

Equilibrium of a body on a horizontal rough plane_6

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A body of weight 18 kg.wt. is placed on a smooth plane inclined to the horizontal by an angle of measure 30° . It is pulled upwards under the action of a force (F) inclines with the line of greatest slope of the plane by an angle of measure 30° . Find the magnitude of this force and the reaction of the plane.

$$360 - (150 + 60) = 150$$

$$\frac{N}{\sin 150} = \frac{F}{\sin 150} = \frac{18}{\sin 60}$$

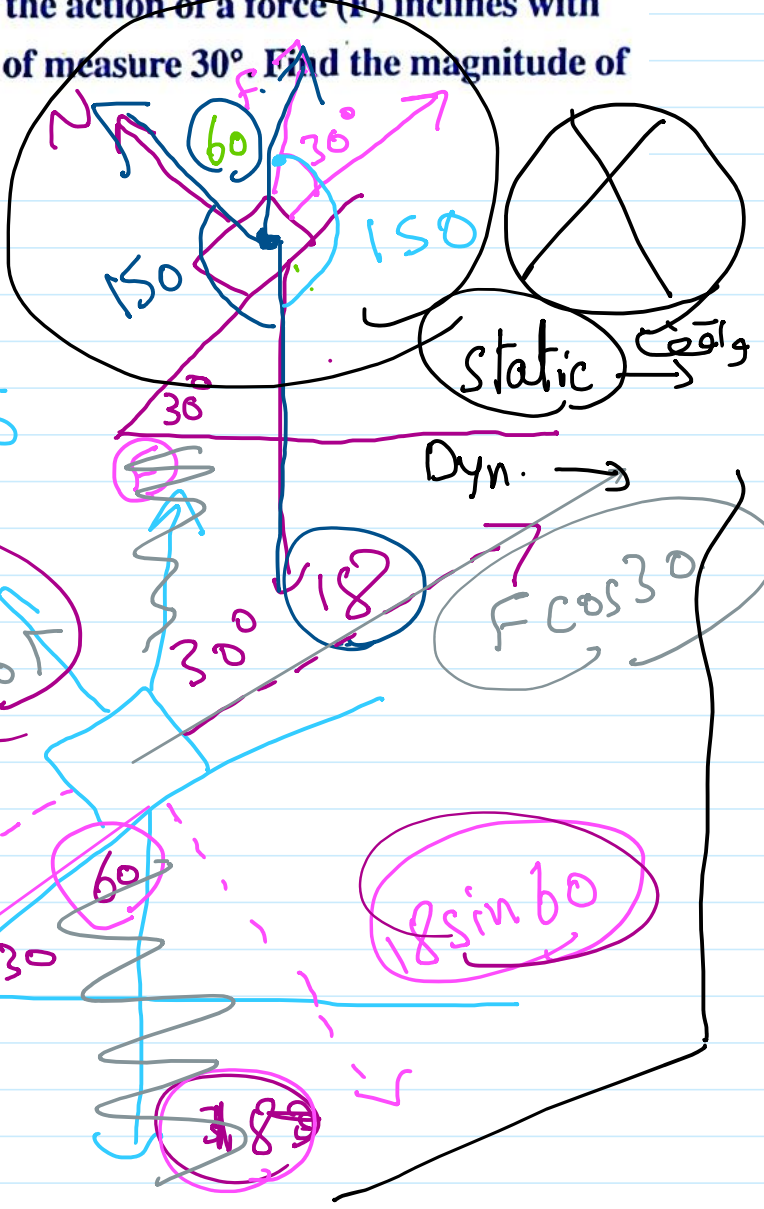
$$F \cos 30 = 18 \cos 60$$

$$F$$

$$N + F \sin 30 = 18 \sin 60$$

$$18 \cos 60$$

$$18 \sin 60$$



A body of weight (W) newton is suspended by two strings. The first inclines on the vertical by an angle of measure 30° and passes over a fixed smooth pulley and carries at its free end a weight $16\sqrt{3}$ newton. The second string inclines on the vertical by an angle of measure θ and passes over another fixed smooth pulley and carries at its terminal a body of weight 16 newton. Find in equilibrium case the value of W and the value of θ

