A plane is flying with a constant speed along a straight line at an angle of 60° with the horizontal. The weight W of the plane is 90, 000 N and its engine provides a thrust T of 120, 000 N in the direction of flight. Two additional forces are exerted on the plane: the lift force F perpendicular to the plane's wings, and the force R due to air resistance opposite to the direction of motion. Draw the free-body diagram showing all forces on the plane. Determine F and R.
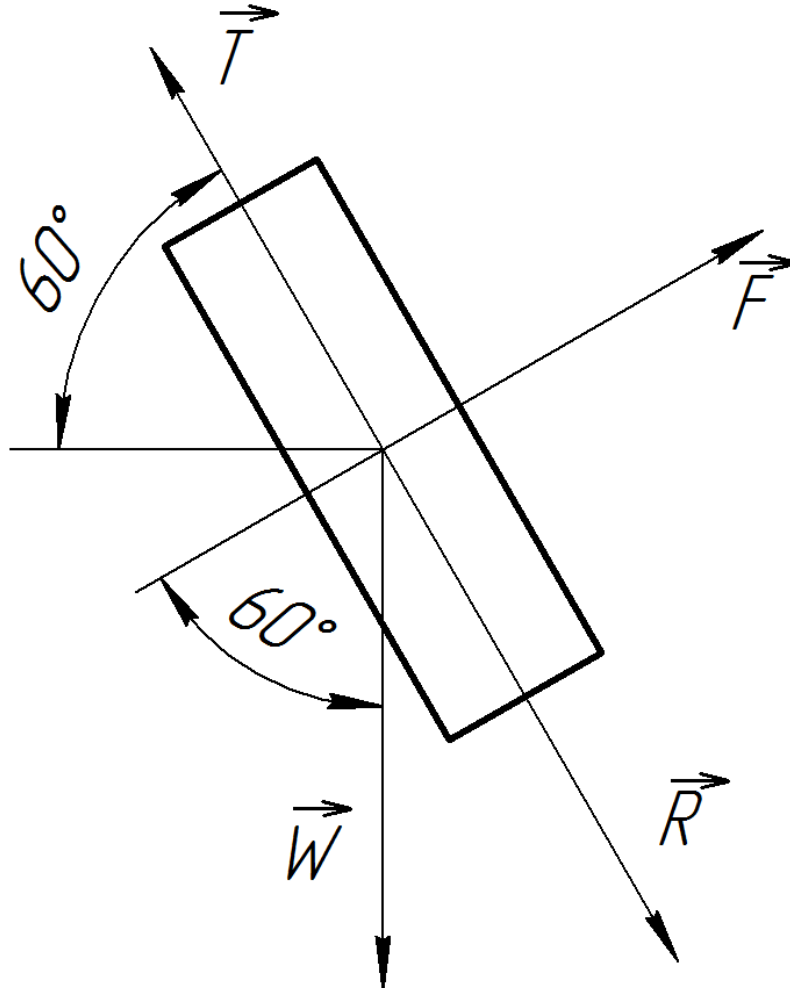
2-nd Newton's law in two projections:

1. F-axis

$$F - W\cos(60) = 0$$

$$F = W\cos(60)$$

$$F = 90\,000N * \cos(60) = 45\,000N$$

2. R-axis

$$R - T + W\cos(30) = 0$$
$$R = T - W\cos(30)$$
$$R = 120\,000N - 90\,000N * \cos(30) = 42\,057.7N$$

Answer: $F = 45\,000N, R = 42\,057.7N$