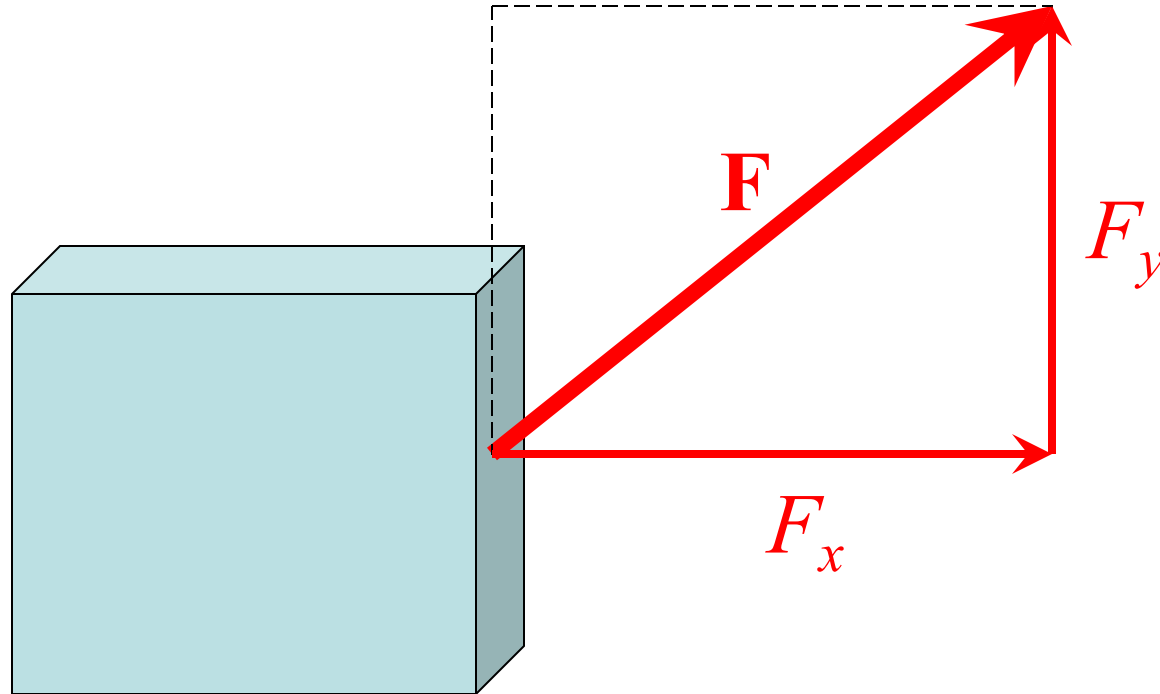


Forces – Dynamics

- I. Laws of Motion: 1 & 2
 - inertia, force, mass
 - weight
- II. Law 3
 - interaction & nature of force
 - types of force: normal, friction
 - air resistance, terminal velocity
- III. Applications/Problem Solving**
 - components, inclines**

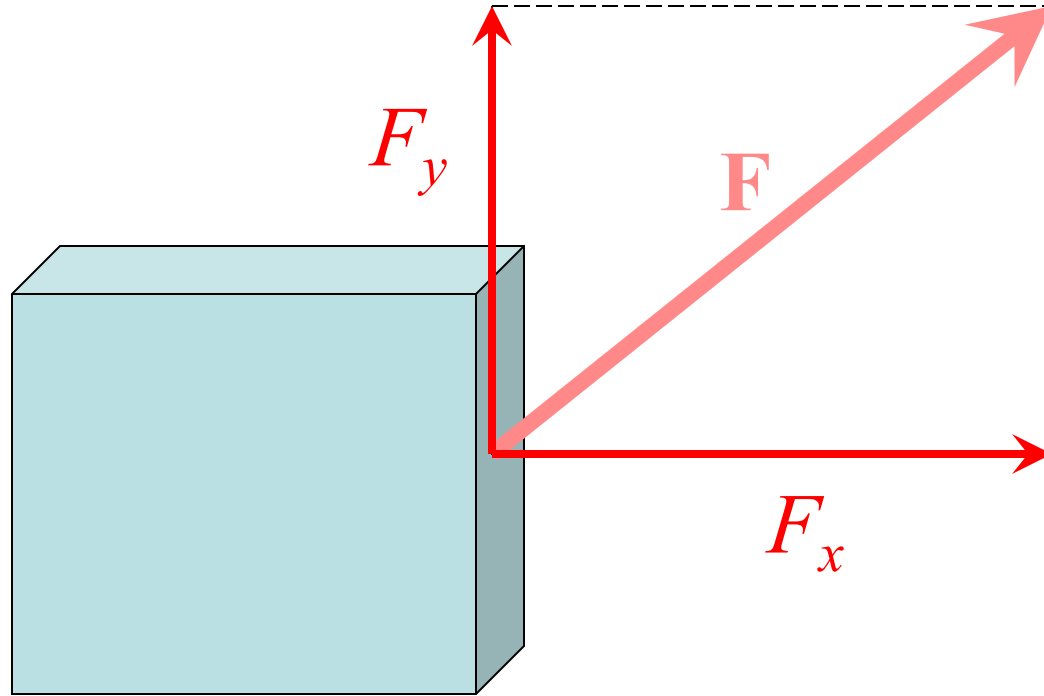
	The student will be able to:	HW:
1	State Newton's 1 st and 2 nd Laws of Motion and apply these laws to physical situations in order to determine what forces act on an object and to explain the object's resulting behavior. ✓	1 – 5
2	Recognize and state the proper SI unit of force and give its equivalence in fundamental units and use the relation $\mathbf{F}_{\text{net}} = m\mathbf{a}$ to solve problems. ✓	6 – 10
3	Recognize the difference between weight and mass and convert from one to the other. ✓	11 – 18
4	State and utilize Newton's 3 rd Law to solve related problems. ✓	19 – 21
5	Understand and utilize the concept of the normal force to solve related problems. ✓	22 – 25
6	Understand and utilize the relation between friction force, normal force, and coefficient of friction for both cases: static and kinetic. ✓	26 – 32
7	State the factors that influence air resistance and describe qualitatively the effect of each factor on the magnitude of the frictional force. And explain what is meant by "terminal velocity". ✓	33 – 35
8	Resolve forces into components using trigonometry and use the results to solve related force problems.	36 – 40
9	Apply the concept of force components to objects on an incline and solve related problems.	41 – 47

A force at an angle...

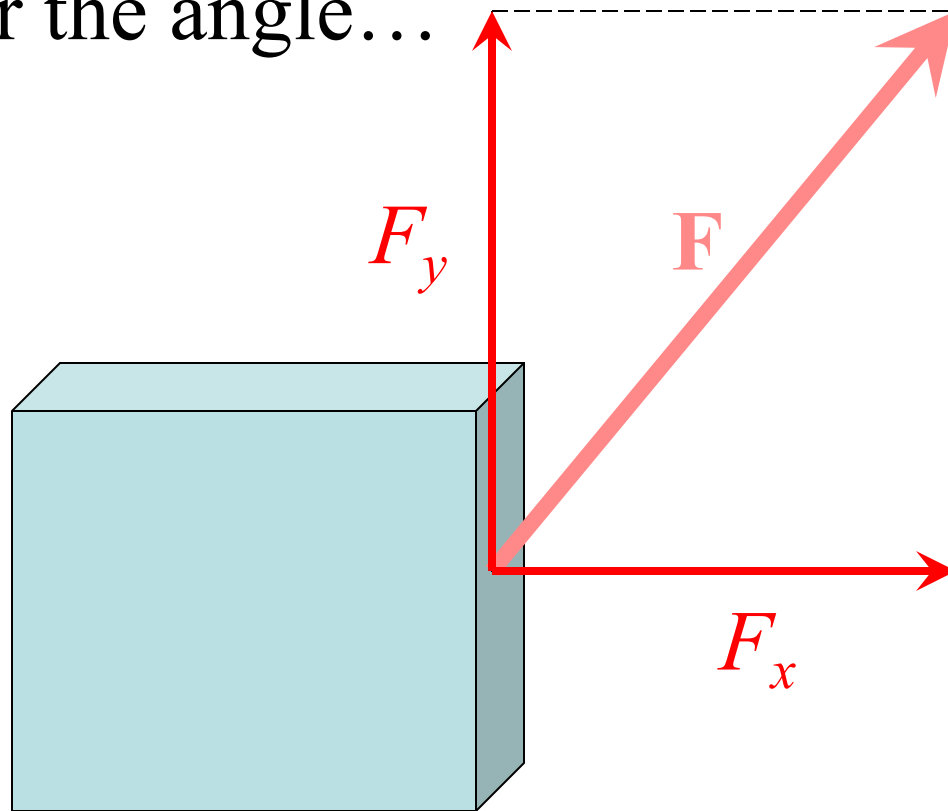


...may be thought of as *two forces*,
equivalent to its components.

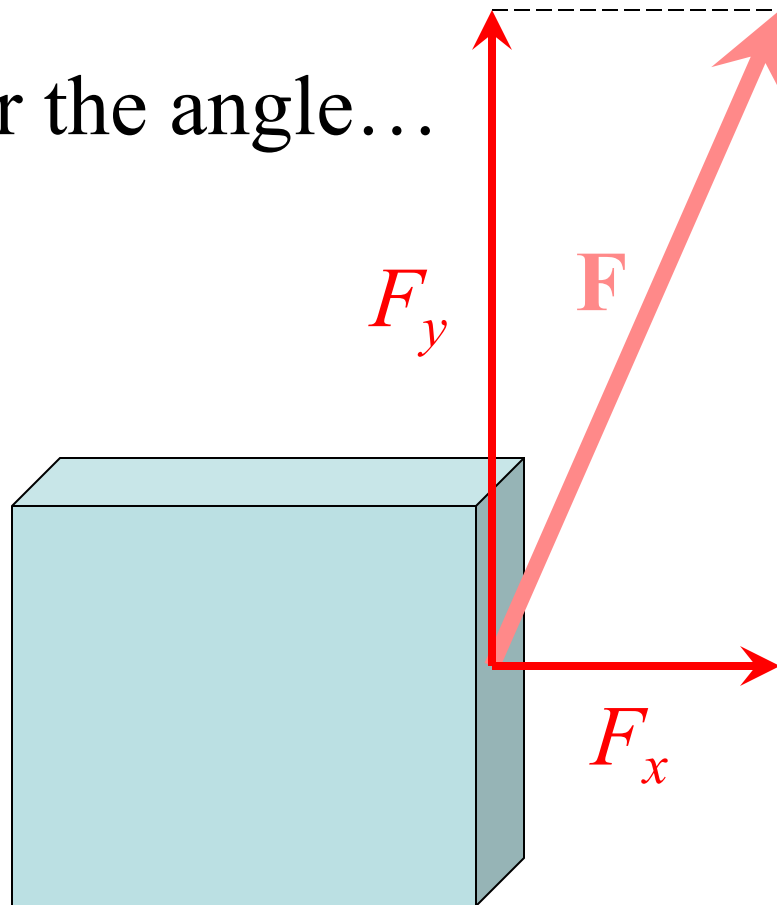
The greater the angle...



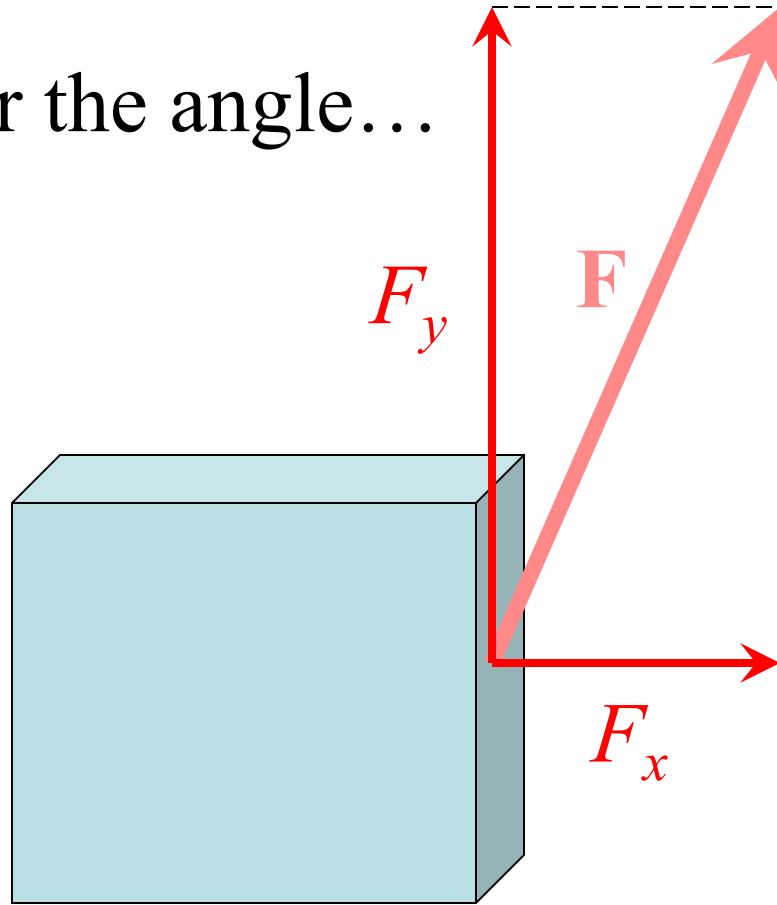
The greater the angle...



The greater the angle...



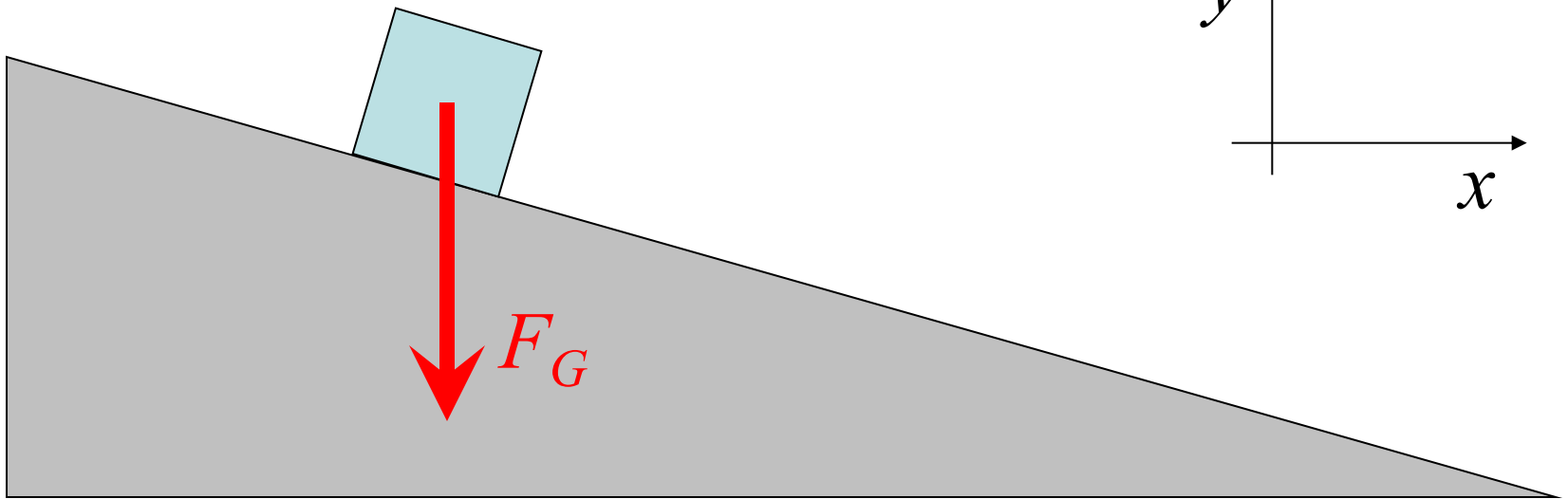
The greater the angle...



...there is greater upward force
and lesser forward force.

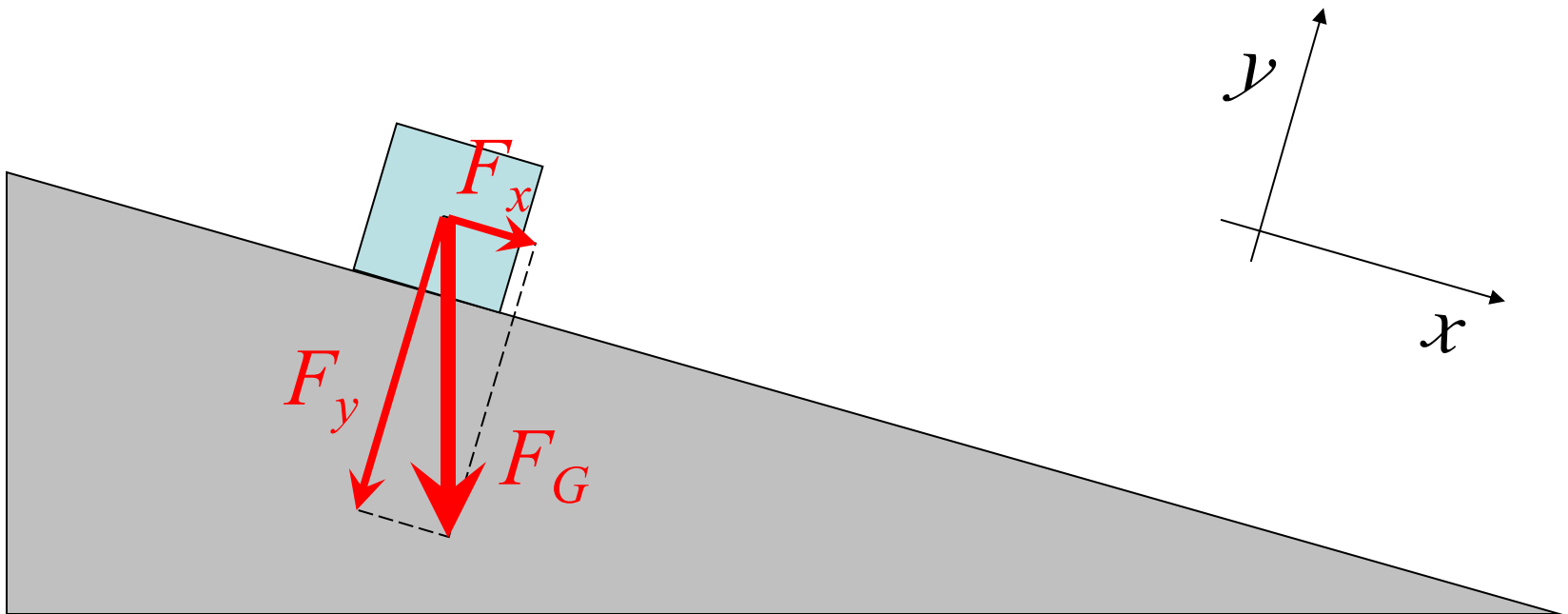
What force causes an object to go downhill?

Is it the force of gravity?

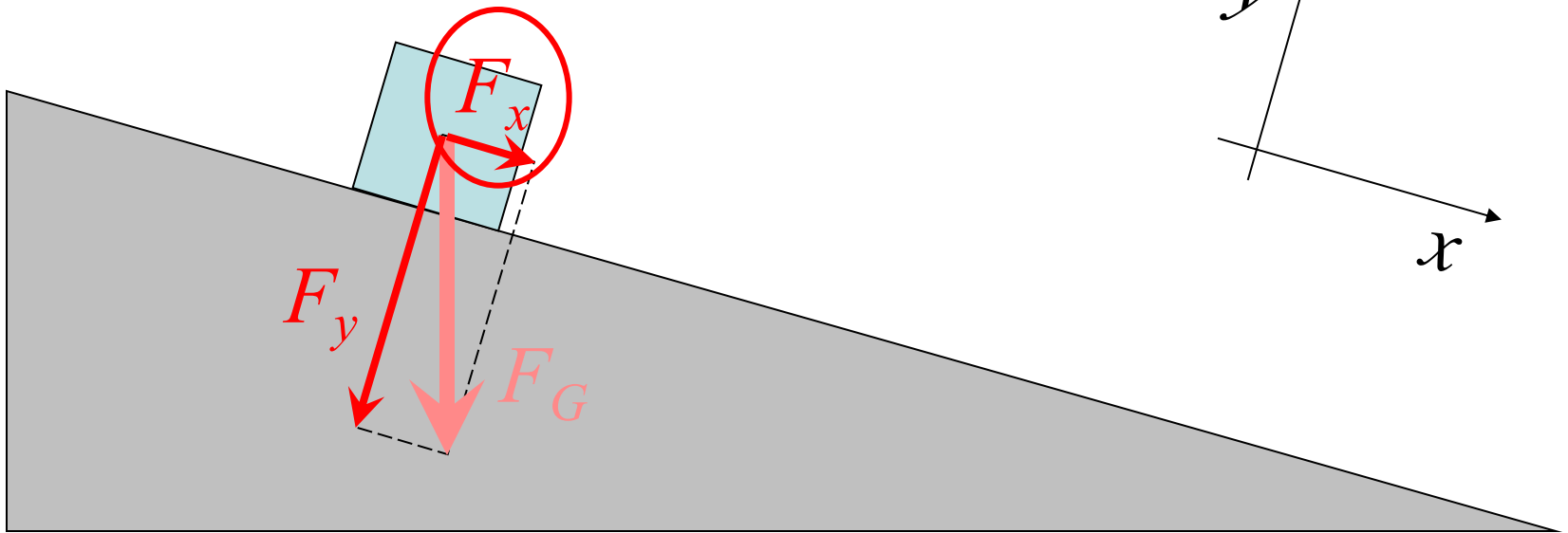


What force causes an object to go downhill?

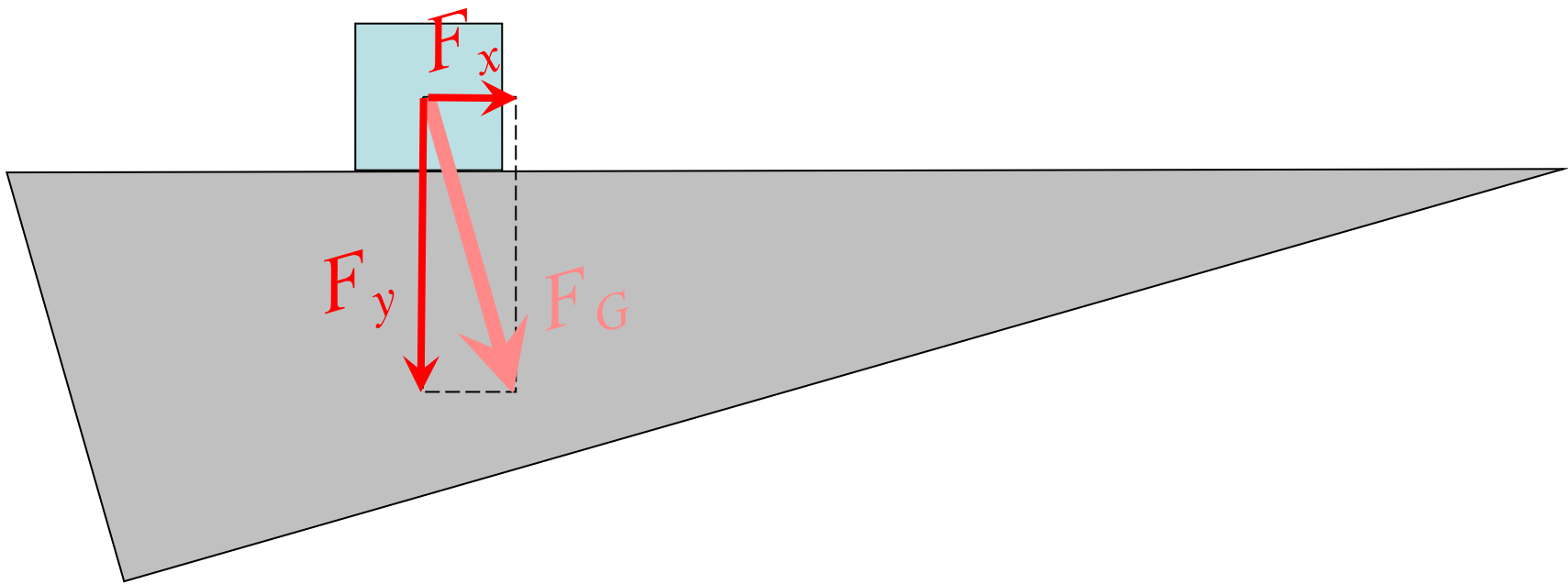
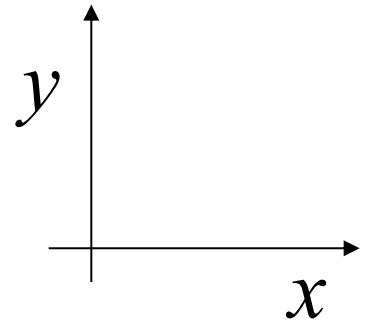
The answer is best understood by using a *tilted* coordinate system:



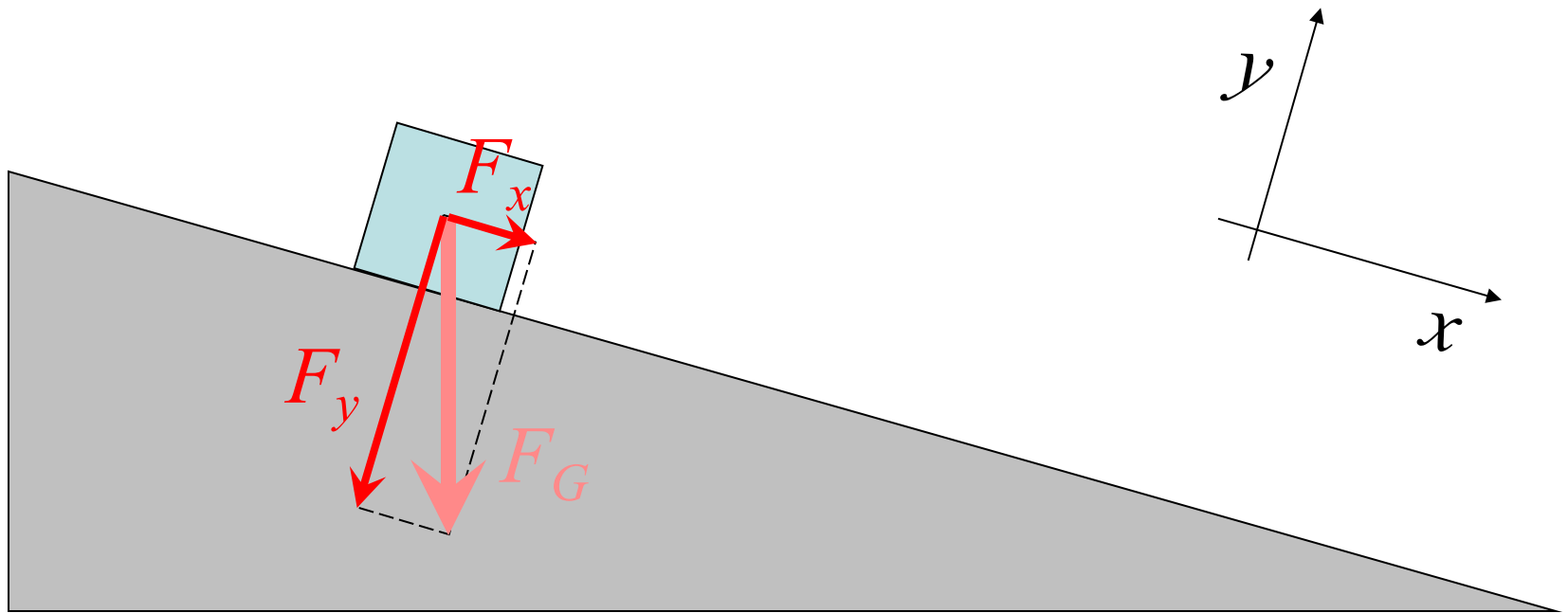
It is only a *component* of gravity that forces the object downhill.



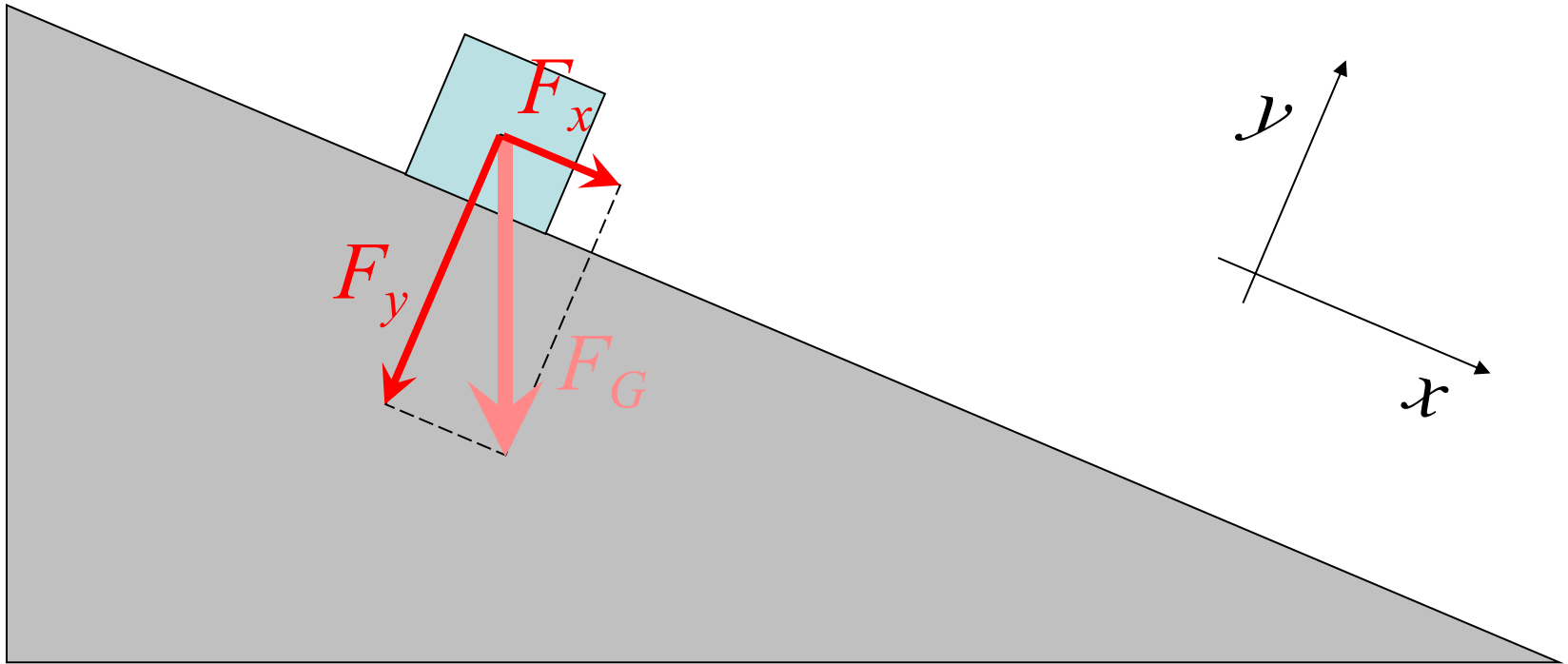
It is only a component of gravity that forces the object downhill.



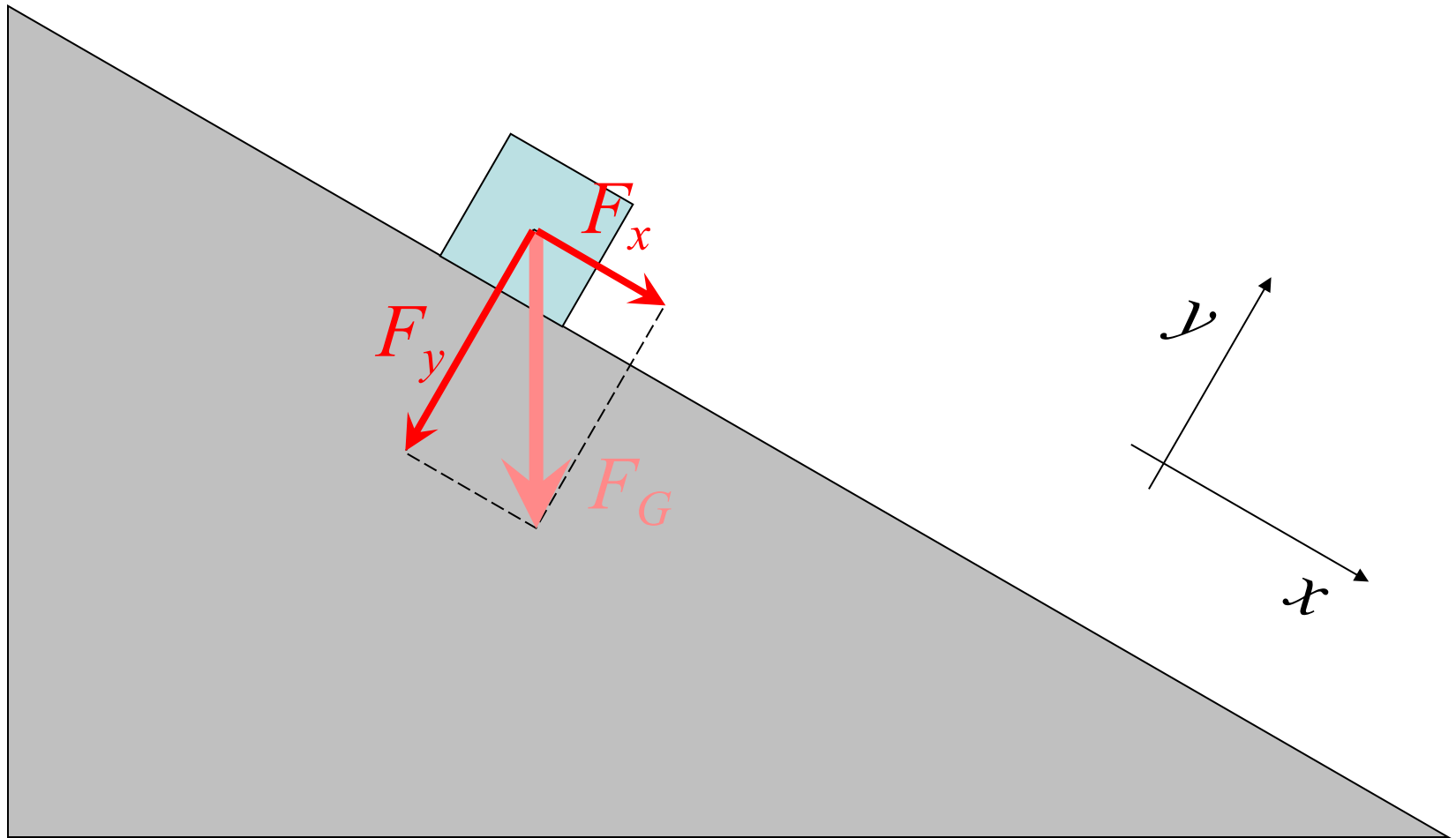
The greater the slope...



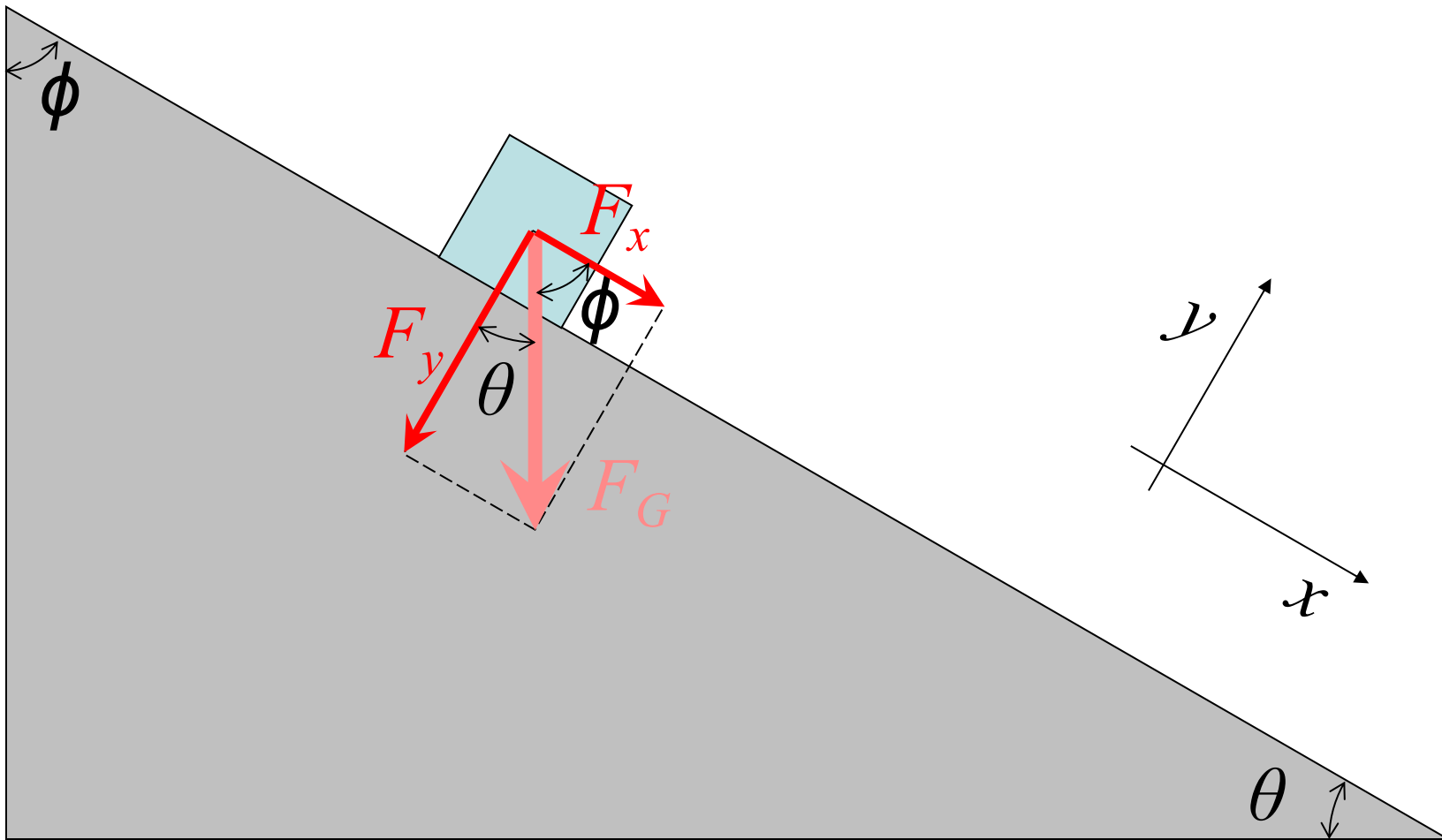
The greater the slope...

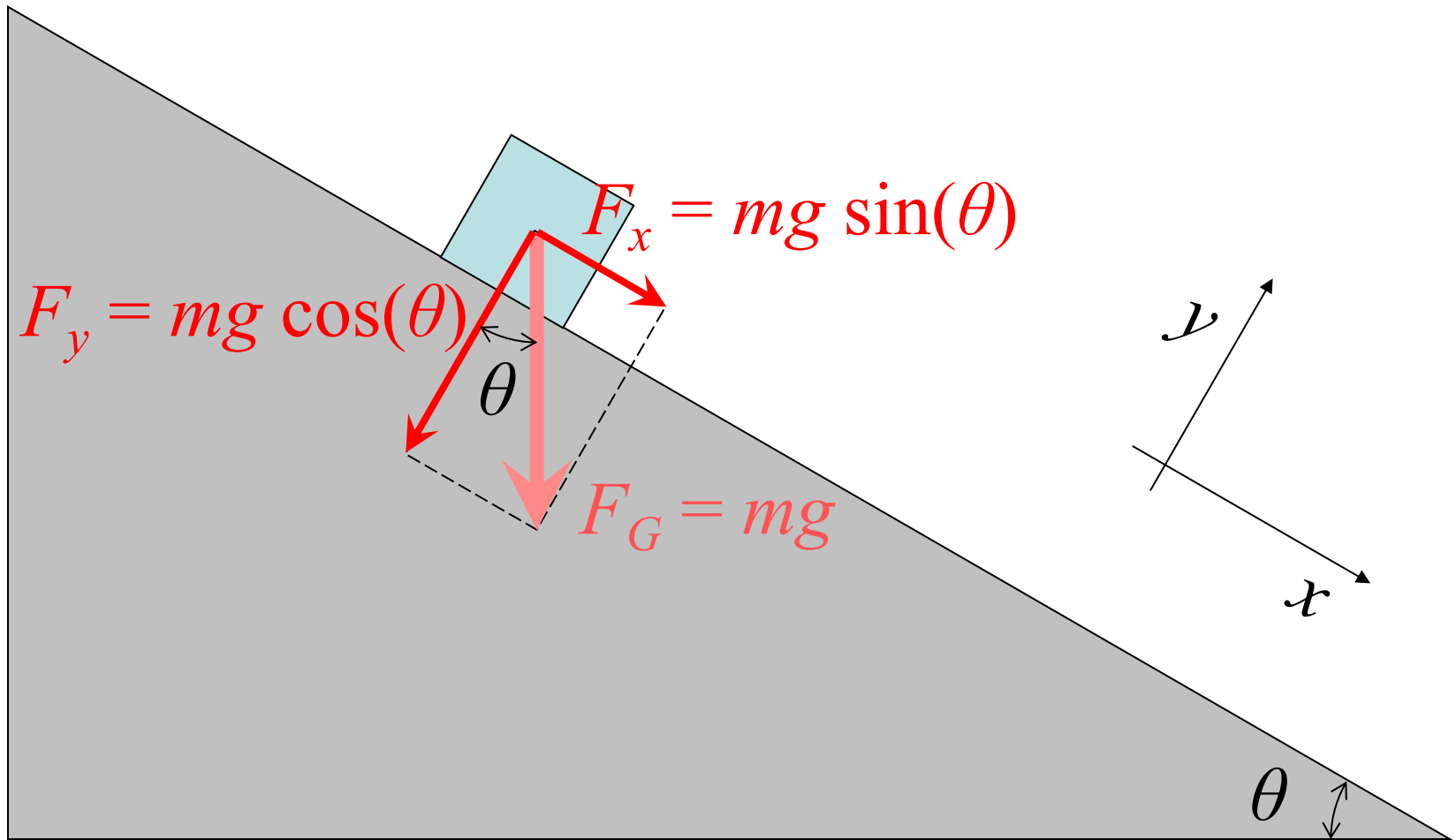


The greater the slope...



...there is greater force parallel to the surface (F_x) and lesser force perpendicular to the surface (F_y).





It is often necessary to find the components of gravity in terms of the angle of incline, θ .