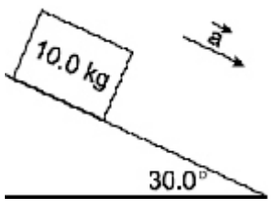
Physics 3204

Unit1- Section 2: Newton's Laws

Worksheet 3: Newton's Laws on an Incline

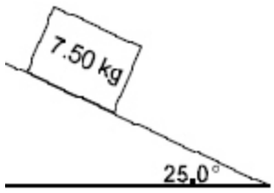
1. A 10.0 kg box is accelerating down a frictionless incline as shown. What are the magnitudes of the parallel and perpendicular components of the gravitational force acting on the box?

	$F_{Parrallel}$ (N)	$F_{perpendicular}$ (N)
(A)	49.0	84.9
(B)	49.0	98.0
(C)	84.9	49.0
(D)	98.0	49.0



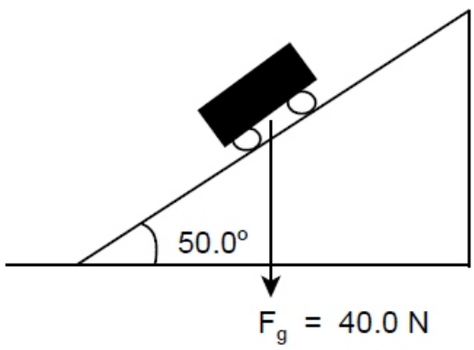
2. What is the normal force acting on the 7.50 kg box shown?

(A) 3.17 N
(B) 6.80 N
(C) 31.1 N
(D) 66.6 N



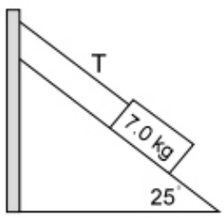
3. The diagram below represents a cart moving on a ramp. Assuming no friction, what is the magnitude of the net force acting on the cart?

(A) 25.7 N
(B) 30.6 N
(C) 32.1 N
(D) 38.3 N



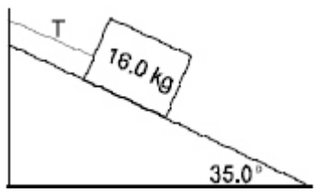
4. A box is held at rest on a frictionless incline as shown below. What is the tension, T, in the rope?

(A) 29 N
(B) 32 N
(C) 62 N
(D) 69 N



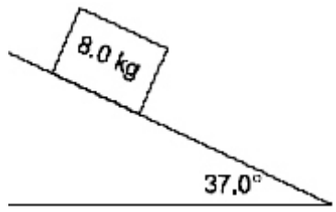
5. A 16.0 kg box is held stationary on a frictionless incline as shown. What is the tension in the string?

(A) 22.2 N
(B) 89.9 N
(C) 128 N
(D) 157 N



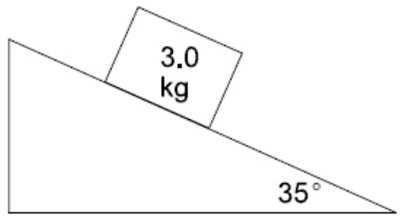
6. What is the force of friction acting on the 8.0 kg cart shown if it is moving at a constant speed down the incline?

(A) 47 N
(B) 59 N
(C) 63 N
(D) 78 N



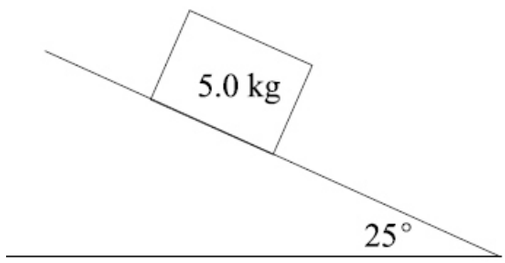
7. What force of friction acts on the object shown, if it slides down the incline at a constant velocity?

(A) 17 N
(B) 21 N
(C) 24 N
(D) 29 N



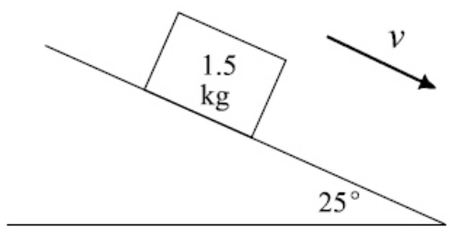
8. If the 5.0 kg box shown below is at rest on the incline, what is the net force acting on it?

(A) 0 N
(B) 5.0 N
(C) 21 N
(D) 49 N



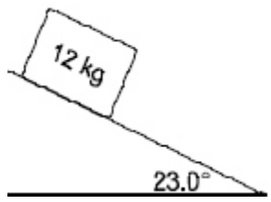
9. A 1.5 kg block slides down an incline at a constant speed as shown. What is the net force acting on this block?

(A) 0 N
(B) 6.2 N
(C) 13 N
(D) 15 N



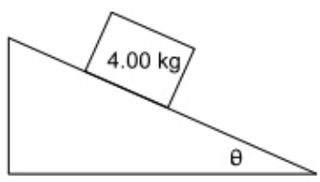
10. What is the coefficient of kinetic friction for the incline shown if the 12 kg block is accelerating down the incline at 1.15 m/s^2?

(A) 0.30
(B) 0.42
(C) 0.70
(D) 0.87

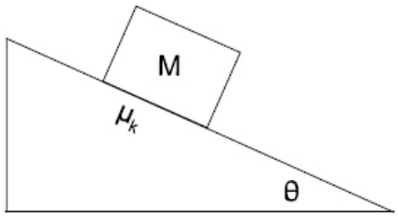


11. If the box shown below slides down the frictionless incline with an acceleration of 4.90 m/s^2, what is the angle of the incline?

(A) 15.0°
(B) 30.0°
(C) 45.0°
(D) 60.0°



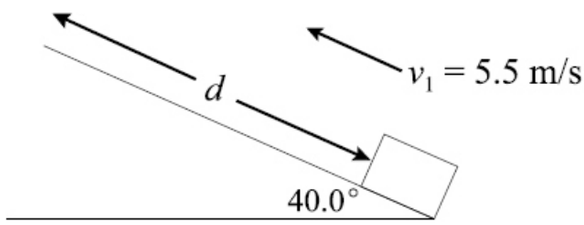
12. A block of mass M slides down an incline having a coefficient of kinetic friction,μ_k What is the acceleration of the block?



(A) Mgsinθ
(B) gsinθ − μ_kg
(C) g(sinθ − $\mu_k$cosθ)
(D) g(cosθ − $\mu_k$sinθ)

13. A block is launched up a frictionless incline with an initial speed of 5.5 m/s as shown. What is the maximum displacement, d, of the block up the incline?

(A) 0.44 m
(B) 1.5 m
(C) 2.0 m
(D) 2.4 m

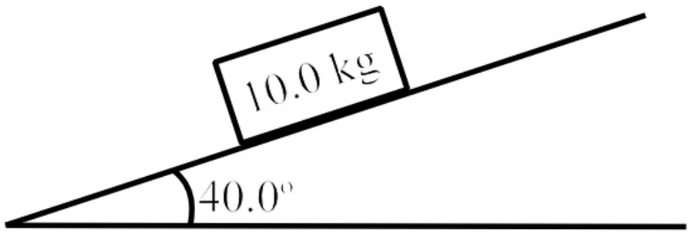


14. A 75 kg skier accelerates at 1.25 m/s^2 from rest while descending a uniform 16^o slope. What is the magnitude of the frictional force between the skis and the slope surface?

(A) 94 N
(B) 110 N
(C) 610 N
(D) 640 N

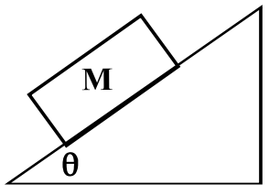
15. A 10.0 kg box is at rest on an inclined plane as shown in the diagram below. What is the force of friction acting on the box?

(A) 6.43 N
(B) 7.66 N
(C) 63.0 N
(D) 75.1 N



16. In the diagram below, what causes acceleration down the incline? (Ignore friction)

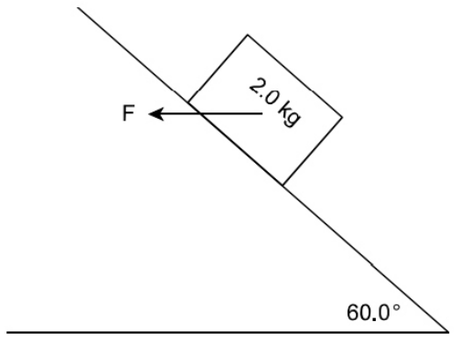
(A) M cosθ
(B) Mg cosθ
(C) Mg sinθ
(D) M sinθ



17. A block slides down an inclined plane at a constant velocity of 6.0 m/s. What is the coefficient of kinetic friction if the inclined plane makes a 25^o angle with the horizontal?

(A) 0.37
(B) 0.42
(C) 0.47
(D) 0.91

1. A 2.0 kg block is held at rest on a frictionless incline angled at 60.0° by the horizontal force, F, shown below. Calculate the magnitude of F. **JUNE 2009**



2. A skier starts from rest and begins descending a 30.0° slope. The coefficient of kinetic friction is 0.10. **AUGUST 2006**

   (i) What is the acceleration of the skier? Include a free body diagram.
   (ii) How far down the slope will the skier travel in 10.0 s?

3. A 12.0 kg object is on an incline making a 27° angle to the horizontal. The coefficient of kinetic friction, μ_k, is 0.200. **AUGUST 2005**

   (i) What is the magnitude of the net force on the object?
   (ii) If the object starts from rest, what is its velocity after 1.2 s?