

forces of friction - practice problems

1. A cafeteria tray slides across a counter. The tray has a coefficient of kinetic friction of 0.32 and a normal force of 75 N. What is the kinetic friction force?

2. A 12 000 g shipping box slides across a level warehouse floor. The label says it contains books, but the coefficient of kinetic friction is the important surface detail: 0.25. What is the kinetic friction force?

3. A 20 kg crate sits on a level floor. The coefficient of static friction is 0.45. If you push horizontally with 70 N, does the crate move? What is the static friction force?

4. The same 20 kg crate has coefficient of static friction 0.45 and coefficient of kinetic friction 0.30. If you push horizontally with 100 N, will it move? If it moves, what is the kinetic friction force?

5. A 10 kg box slides on a level floor and the friction force is 24.5 N. What is the coefficient of kinetic friction?

6. A box slides on a level surface with coefficient of kinetic friction 0.40. The friction force is 0.0392 kN. What is the mass of the box?

7. An 8 kg crate is pulled across a level floor with a 40 N horizontal force. The coefficient of kinetic friction is 0.20. What is the crate's acceleration?

8. A 5 kg sled is already sliding at 21.6 km/h on level snow. The coefficient of kinetic friction is 0.30, and the hill behind it is no longer affecting the motion. If no one pushes the sled, how long does it take to stop?

9. A 10 kg box slides across a level floor at 4.0 m/s. What is the kinetic friction force?

10. A 20 kg crate is sliding at 28.8 km/h on a level floor. The coefficient of kinetic friction is 0.25. How far does it slide before stopping?

11. A 5 kg block rests on a level table and is attached by a light string over a pulley to a hanging mass. The coefficient of static friction between the block and table is 0.60. What is the largest hanging mass that can be held at rest?

12. A 6 kg block sits on a level table with coefficient of static friction 0.40. It is attached over a pulley to a 2 kg hanging mass. Will the system stay at rest? If so, what is the static friction force on the table block?

13. A 15 kg crate sits on a level floor. The coefficient of static friction is 0.50. A person pushes horizontally with 0.060 kN. Does the crate move, and what is the friction force?

14. A 10 kg box rests on a 15 degree ramp and does not slide. What are the normal force and the static friction force needed to hold it in place?

15. A 10 kg box is placed on a 25 degree ramp. The coefficient of static friction is 0.35. Will the box stay at rest or slide?

16. A small block begins to slide when a board reaches an angle of 28.8 degrees. What is the coefficient of static friction between the block and the board?

17. A 12 kg box is sliding down a 20 degree ramp. The coefficient of kinetic friction is 0.20. What is the acceleration down the ramp?

18. A block slides down an 18 degree ramp with acceleration 1.2 m/s^2 . What is the coefficient of kinetic friction?

19. A 25 kg crate starts at rest on a level floor in a storage room. The coefficient of static friction is 0.50 and the coefficient of kinetic friction is 0.35. A person pulls horizontally with 150 N for 0.050 min, and the crate's handle is 12 cm wide. How far does the crate move?