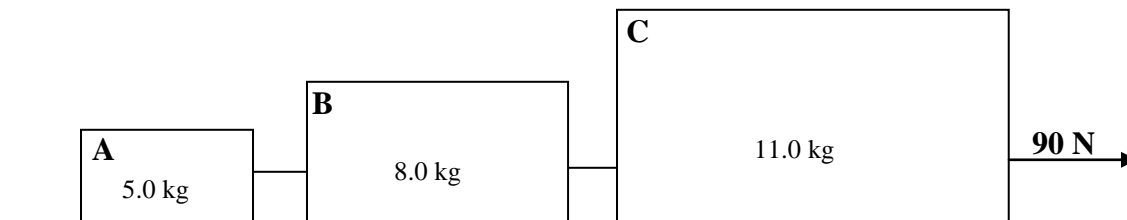


For all calculation questions:

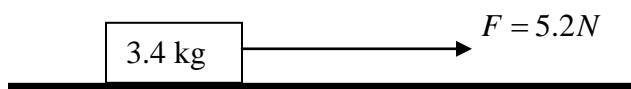
- **identify the formula you are using**
 - **show your work**
 - **place your answer with correct units in a box**
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1. State Newton's three laws of motion and give an example from your life of each.
2. Find the force of gravity at the earth's surface on a 5.7 kg mass.
3. What is the mass of an object which weighs 79 N on the Earth's surface?
4. What is the gravitational field strength ('g) on Venus if its mass is 4.88×10^{24} kg and its radius is 6.073×10^6 m.
5. If the force of gravity on an object at the earth's surface is 3200 N, what is the force of gravity when the object is 1.5 earth radii into space?
6. What is the gravitational attraction between a man with a mass of 110 kg and his wife (mass of 55 kg) when they are just 15 cm apart?
7. How much force is required to pull a 75 kg crate along a floor if the coefficient of friction is 0.26?
8. What is the coefficient of friction if a 7 N force is required to pull a 2.3 kg object along a floor at a constant velocity?
9. A 30N force applied to a rubber band causes a stretch of 5.4 cm. What is the spring constant?
10. How much will a fishing line stretch when a 65 N force is applied to a 1 m length?
 $\left(k = 14.2 \frac{N}{m} \right)$
11. A 2.1 kg toy is pulled by a force of 4 N. If the coefficient of friction is 0.135 and the toy starts from rest, how far will it travel in the first 3 seconds?
12. A 2200kg car traveling 75 km/h on an icy, level road approaches an intersection. The brakes lock and the car skids to a stop. If the coefficient of friction between the road and tires is 0.078, what is the minimum distance in which the car will stop? (answer in meters)
13. Two boys pull on a 60 kg sled. One pulls with 700 N to the right while the other pulls with 640 N to the left. What will be the acceleration of the sled?

14. Blocks A, B, and C are joined by ropes. A force of 90 N is applied to C. The coefficient of friction is 0.355.



- What is the net force on the boxes?
 - What is the acceleration of the boxes?
 - What is the tension in the rope joining box B to A?
15. A block with a mass of 7.4 kg is sliding along a frictionless surface at 9 m/s. If it encounters a rough surface which exerts a force of friction of 7 N, how long will it take to come to a stop?
16. Calculate the unbalanced force acting on a 12.7 kg object that accelerates from 5 m/s to 18 m/s in 7.3 sec.
17. A fully loaded rocket has a mass of 2.63×10^6 kg. Its engines have a thrust of 2.81×10^7 N.
- Calculate the force of gravity on the rocket.
 - What is the acceleration of the rocket as it blasts off?
18. A 625 N student (as weighed in a physics lab) wants to see how his weight is affected by his riding in an elevator. Suppose this student is standing on a scale that reads in Newtons and is travelling up but accelerating at -1.4 m/s^2 . What value will the scale read ?
19. A 3.4 kg object is pulled along a horizontal surfaces as shown in the diagram by a horizontal force of 5.2 N. If the object is accelerating at a rate of 1.1 m/s^2 to the right, what is the force of friction acting on the object?



20. Jeff (mass 87 kg) and Kevin (mass 92 kg) are standing on the same surface ($\mu = 0.23$). Jeff pushes Kevin with a force of 1000 N. Determine the acceleration Jeff and Kevin will experience after the push.