1. In order to calculate speed, you divide the distance traveled by the time measured:

$$v = d / t$$

where 'd' is the distance it traveled and 't' is the time taken to travel that distance. Your measurements indicate that the distance is 1.00 ± 0 .01 m and the time is 2.0 ± 0.2 s. How will you present the result of your calculation?

A. 0.500 ± .002 m/s
B. 0.50 ± .06 m/s
C. 0.5 ± .3 m/s
D. 0.5 ± .6 m/s
E. 1 ± 2 m/s

$v = \frac{d}{t} = 0.5$

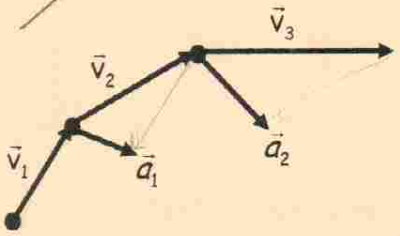
$\Delta v = \frac{d}{t}\left(\frac{0.01}{1} + \frac{0.2}{2}\right)$

$= 0.055$

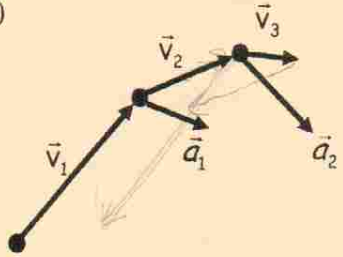
0.5 ± 0.06

2. Which of the following motion diagrams best represents a car slowing down while going around a curve in the road?

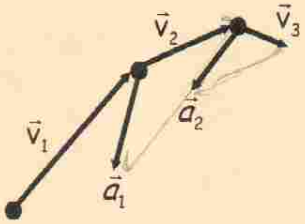
(A)



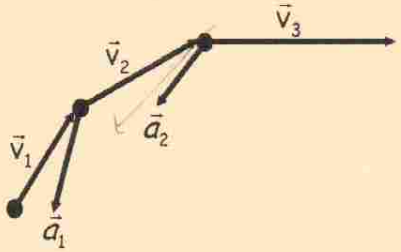
(B)



(C)



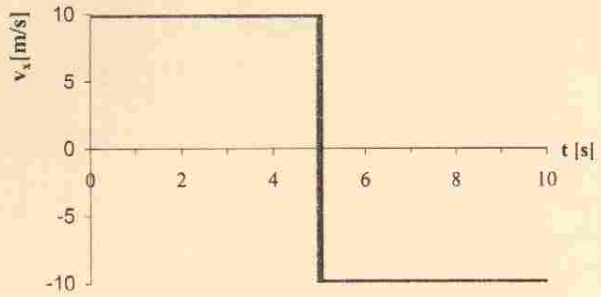
(D)



Slow down $a < 0$ $v > 0$

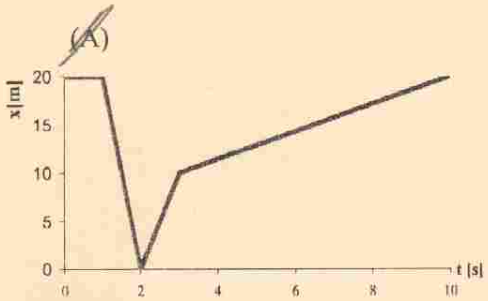
$v < 0$

3. The figure below shows the velocity versus time graph for an object moving along the x-axis.

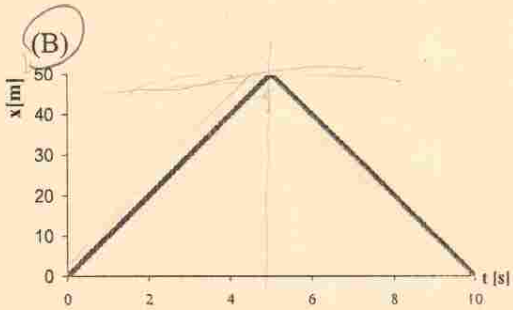


Which of the following position versus time graphs could correspond with the above velocity versus time graph?

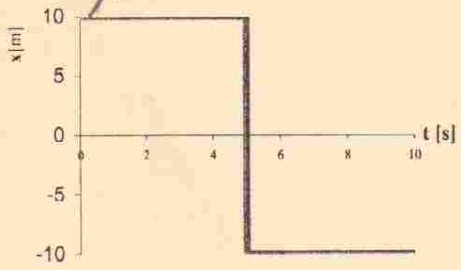
(A)



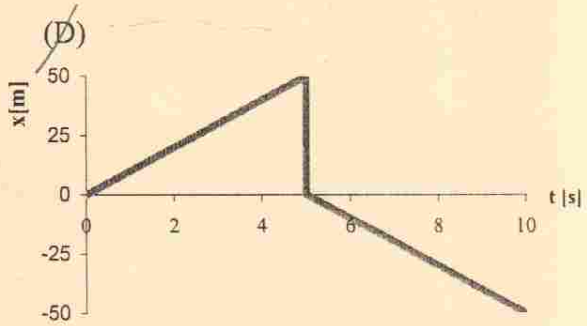
(B)



(C)

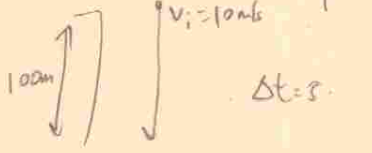


(D)



4. A rock is thrown straight down off the edge of a tall cliff with an initial velocity of -10 m/s. Take the edge of the cliff to be the origin, and up to be the direction of positive x. The ground below the cliff is at x=-100m. What of the following best describes the position of the rock 5 seconds after it was thrown?

(A) x = -5 m
(B) x = -10 m
(C) x = -50 m
(D) x = -100 m



$v_i = -10$
$d = -100$
$t = 5$
$a = -9.8$

$\Delta d = v_i \Delta t + \frac{1}{2} a \Delta t^2$
$= (-10)(5) + \frac{1}{2}(-9.8)(5)^2$
$= -172.5$

5. In the lab, you use a stopwatch to measure the time it takes for a cart to move a distance of one metre. You repeat the measurement 5 times with the results:

1.62 ± .01 s
0.76 ± .01 s
0.96 ± .01 s
2.06 ± .01 s
1.84 ± .01 s.

avg = 1.488

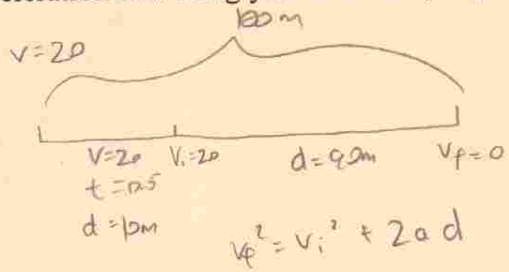
avg - min = 0.688
max - avg = 0.612
} 0.65

How will you present the result of your measurement?

A. 1.448 ± 0.002 s
B. 1.45 ± 0.05 s
C. 1.4 ± 0.2 s
D. 1.4 ± 0.7 s
E. 1 ± 0.1 s

6. You are driving at a constant speed of 20.0 m/s. You are 100.0 m from an intersection when the traffic light turns red. Assume that your reaction time is 0.50 s and that your car brakes with constant acceleration. What acceleration will bring you to rest as you just reach the intersection?

(A) a = -2.2 m/s^2
(B) a = -2.0 m/s^2
(C) a = -4.4 m/s^2
(D) a = -0.11 m/s^2
(E) a = -0.10 m/s^2



$v = d/t$

$d = v\Delta t$

$v_f^2 = v_i^2 + 2ad$

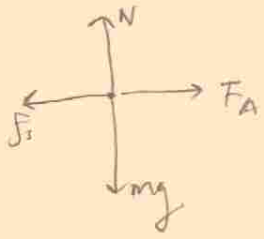
$a = -2.2\ m/s^2$

$v = \frac{d}{t}$

7. A book is initially at rest on a flat, level table. The coefficient of static friction between the book and the table is 0.9, and the coefficient of kinetic friction between the book and the table is 0.5. The normal force of the table acting on the book is 100 N. If you push on the book with a force of 30 N, the magnitude of the force of static friction of the table on the book is

(A) 90 N
(B) 80 N
(C) 50 N
(D) 30 N
(E) 0 N

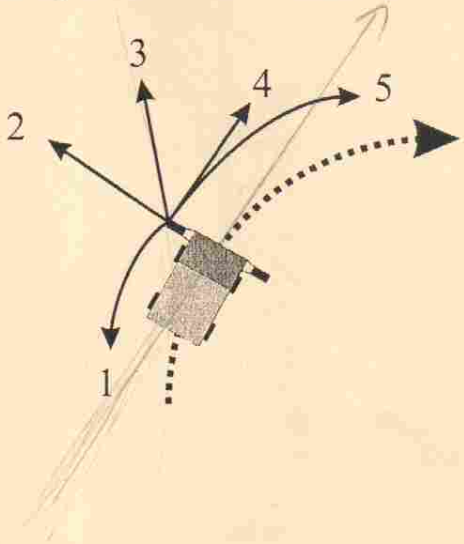
$\mu_s = 0.9$
$\mu_k = 0.5$
$N = 100N$
$F_A = 30N$



$\Sigma F_x = 0 = F_A - f_s$
$F_A = f_s$

$f_{s\,max} = \mu_s N$
$= 90N$

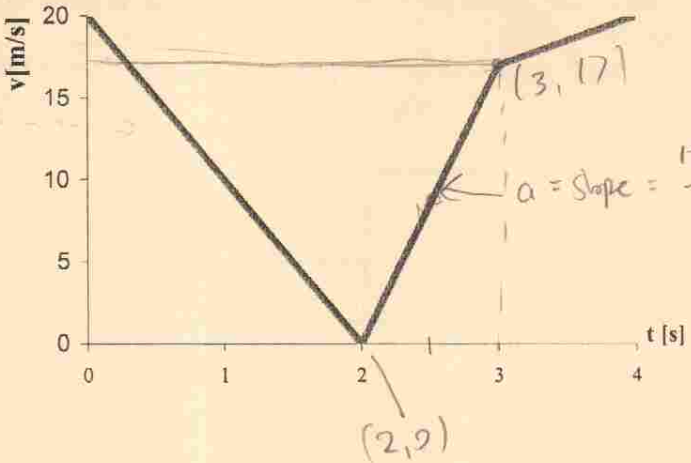
8. A 2,000 kg truck drives around a corner with a speed of 70 km/h on a rough road. Due to bad maintenance one of the side mirrors screws off and flies away from the truck, as indicated in the figure below. Which of the following lines best describes the mirror's trajectory?



1. Trajectory 1.
2. Trajectory 2.
3. Trajectory 3.
4. Trajectory 4.
5. Trajectory 5.

9. The figure below shows the velocity versus time graph for a 10 kg object. What of the following best represent the magnitude of the net force acting on the object at time t = 2.5 seconds?

(A) 85 N
(B) 8.5 N
(C) 170 N
(D) 17 N
(E) 35 N



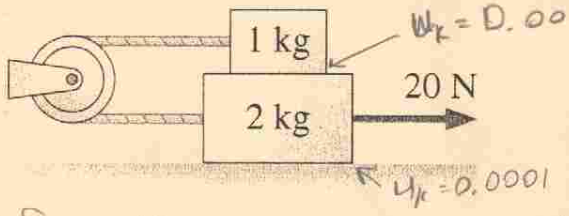
m = 10 kg

$F_{net} = ma$

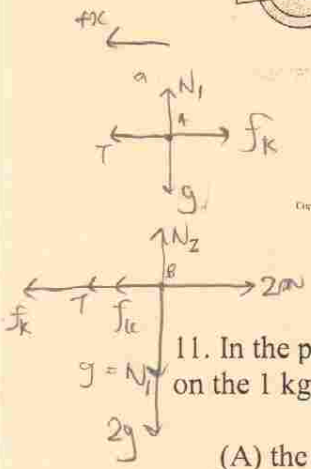
$= 10 \times 17$

$= 170$

10. The coefficient of kinetic friction between the lower block and the floor is 0.0001. The coefficient of kinetic friction between the lower block and the upper block is 0.0005. What is the acceleration of the upper block?



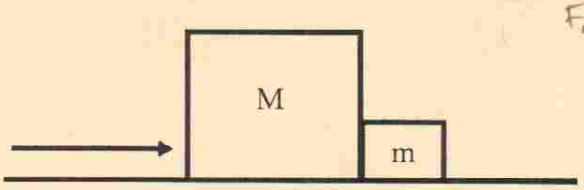
(A) 6.7 m/s^2
(B) 10 m/s^2
(C) 12 m/s^2
(D) 20 m/s^2
(E) 60 m/s^2



11. In the previous question, the Newton's Third Law reaction force to the force of the 2 kg block on the 1 kg block is:

(A) the weight of the 1 kg block.
(B) the normal force of the floor on the 2 kg block.
(C) the tension force on the 1 kg block.
(D) the weight of the 2 kg block.
(E) the normal ~~for~~ force of the 1 kg block on the 2 kg block.

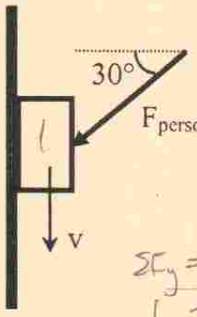
12. Two crates start at rest, and need to be pushed across a level, frictionless surface. A student decides to place one crate in front of the other, as shown in the diagram, so as to move them at the same time. Crate 'M' is very heavy, and crate 'm' is quite light. Which statement best describes the situation?

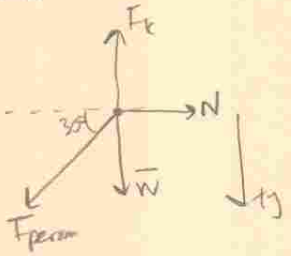


(A) The force of M on m is greater than the force of m on M.
(B) The force of m on M is greater than the force of M on m.
(C) The force of m on M is equal to the force of M on m.
(D) Could be any of the above, depending on the acceleration of the system.

13. A person pushes a heavy book up against the wall as shown in the diagram. The book slides down the wall at a constant velocity. The coefficient of kinetic friction between the book and the wall is μ_k. Which one of the following answers best describes the magnitude of the force of kinetic friction between the book and the wall?

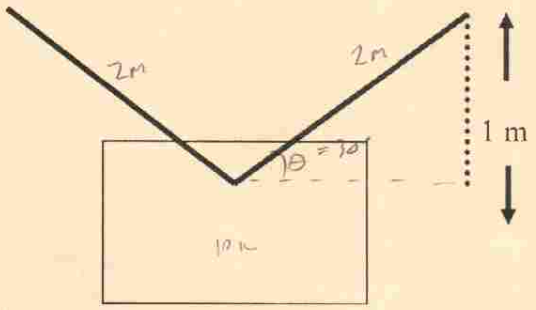
(A) $\mu_k (F_{person} + mg) \sin(30°)$
(B) mg
(C) $\mu_k mg$
(D) $\mu_k F_{person} \cos(30°)$
(E) Not enough information to answer the question

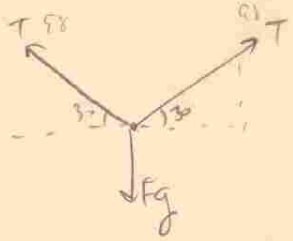




14. A 10 kg framed painting is to be suspended 1 m below the ceiling by two 2 m long cables that angle outward at equal angles. Which answer best represents the tension in one of the cables?

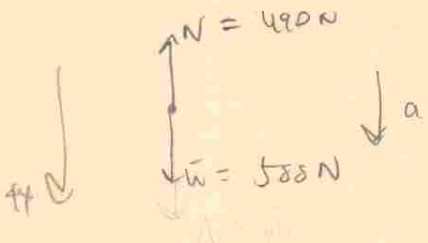
(A) 55 N
(B) 200 N
(C) 180 N
(D) 50 N
(E) 100 N





15. A student with a mass of 60 kg is standing in an elevator, on a spring scale which shows the apparent weight of the student. If the scale indicates that the student weighs 50 kg, what is the acceleration of the elevator?

(A) 18.3 m/s^2 [up]
(B) 1.6 m/s^2 [up]
(C) 0 m/s^2 [up]
(D) 1.6 m/s^2 [down]
(E) 18.3 m/s^2 [down]



The End