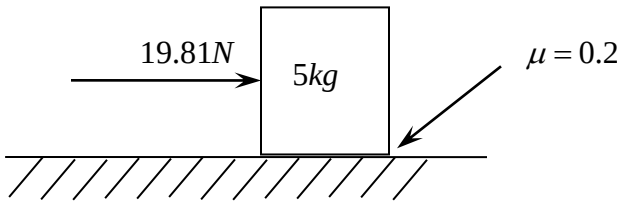
1. The $5kg$ block sits at rest on a horizontal plane when the $19.81N$ force begins to act. The coefficient of friction between the block and the plane is $\mu = 0.2$. Determine the acceleration of the block. Assume no tipping.

a. $3.76\frac{m}{s^2} \leftarrow$ b. $0.514\frac{m}{s^2} \rightarrow$

c. $2.00\frac{m}{s^2} \rightarrow$ d. $3.96\frac{m}{s^2} \rightarrow$



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2. The expression $v = \left(s^2 - 6s + 13\right)\frac{m}{s}$ describes the velocity of a particle moving along a straight line where s denotes position in meters. When the particle is located at $s = 2m$, its acceleration is most nearly:

a. $-2\frac{m}{s^2}$ b. $5\frac{m}{s^2}$

c. $-10\frac{m}{s^2}$ d. $-14\frac{m}{s^2}$

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3. At an instant in time a particle moving along a straight line has velocity $v = -3\frac{ft}{s}$ and acceleration $a = -1\frac{ft}{s^2}$. Select the true statement concerning this particles motion at this instant.

a. Both the speed and the position of the particle are increasing.
b. The speed of the particle is decreasing while its position is increasing.
c. The speed of the particle is increasing while its position is decreasing.
d. Both the speed and the position of the particle are decreasing.

4. A wheel begins to rotate about an axis through its center with constant angular acceleration $\alpha = 3\frac{rad}{s^2}$ starting from rest? The number of revolutions it completes until it achieves an angular velocity of $100rpm$ is most nearly:

a. 18.3 b. 2.91
c. 10.5 d. 4.27

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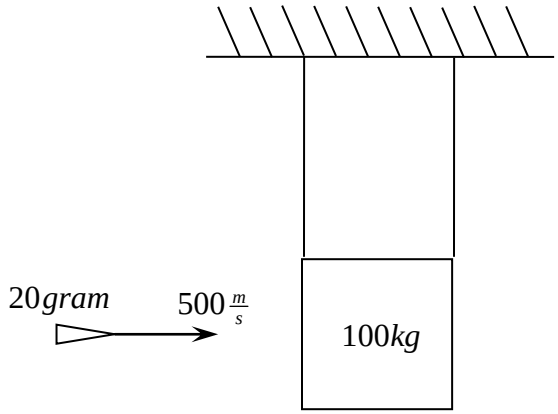
5. Two wires each having $2m$ length suspend the block from the ceiling. A $20gram$ bullet traveling at $500\frac{m}{s}$ strikes the block, initially at rest, and becomes embedded. The final speed of the block and the bullet is most nearly:

a. $10.0\frac{m}{s}$ b. $0.100\frac{m}{s}$
c. $1.00\frac{m}{s}$ d. $0.01\frac{m}{s}$

6. The maximum angle the wires suspending the block make with the vertical is most nearly:

a. 89.9^o b. 13.1^o
c. 1.29^o d. 6.93^o



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7. The $20kg$ wheel shown below has radius $r = 400mm$ and radius of gyration $k_G = 300mm$. Some jerk applies a 100 N force to the wheel acting at its mass center. Assuming the wheel does not slip relative to the rough surface, what is the speed of the wheel's center after it has moved 4 m?

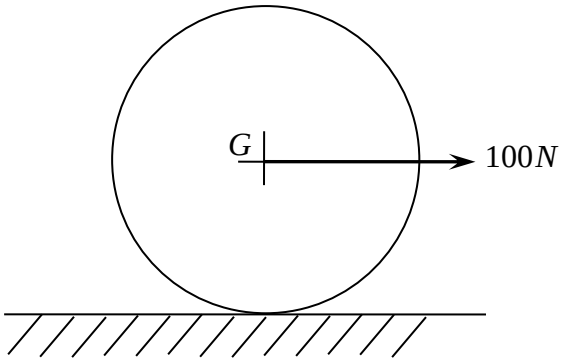
a. $14.9\frac{m}{s}$ b. $21.1\frac{m}{s}$

c. $5.06\frac{m}{s}$ d. $12.9\frac{m}{s}$

8. Assuming the wheel does not slip relative to the rough surface, what is the velocity of the wheel's center after 4 s after the jerk applies the 100 N force?

a. $9.60\frac{m}{s}\rightarrow$ b. $16.6\frac{m}{s}\rightarrow$

c. $5.12\frac{m}{s}\rightarrow$ d. $12.8\frac{m}{s}\rightarrow$



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9. Some jerk pushes a 32.2 lb particle (block) on a smooth surface against a spring with constant k = 120 $\frac{lb}{ft.}$ until the spring is compressed 0.5 ft from its equilibrium position (unstretched length). The jerk releases the block from rest in this position. What is the initial acceleration of the block?

a. 120 $\frac{ft}{s^2}$ b. 60 $\frac{ft}{s^2}$

c. 11.0 $\frac{ft}{s^2}$ d. 32.2 $\frac{ft}{s^2}$

10. The spring is not connected to the block. What is the maximum speed attained by the block?

a. 32.2 $\frac{ft}{s}$ b. 7.74 $\frac{ft}{s}$

c. 2.74 $\frac{ft}{s}$ d. 5.48 $\frac{ft}{s}$