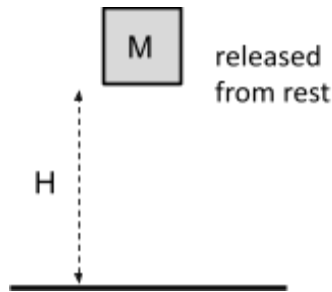


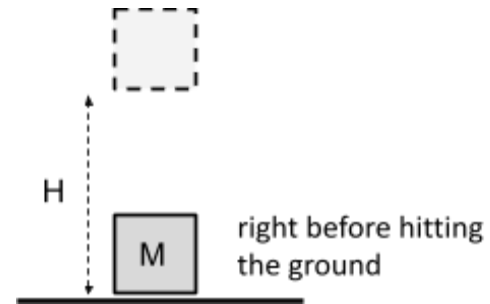
Fill in a **LOL diagram** and write a **Conservation of Energy** equation (let  $g=10\text{m/s}^2$ )

1. A 2kg block of wood is dropped from rest at a height  $H=5\text{m}$  above the ground and falls down. What is the speed of the mass right before striking the ground? (**System: block and Earth**)

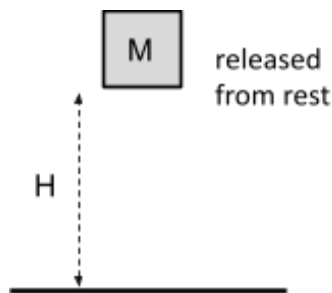


initial energies

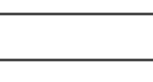
K       $U_g$        $U_s$



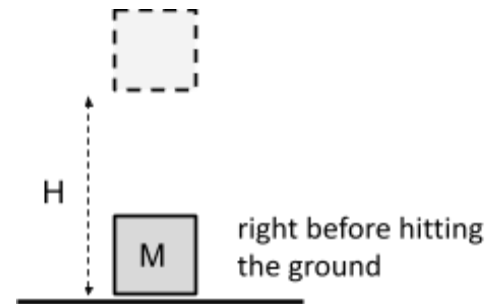
2. A 2kg block of wood is dropped from rest at a height  $H=3\text{m}$  above the ground and falls down. What is the speed of the mass right before striking the ground? (**System: block only, no Earth**)



initial energies



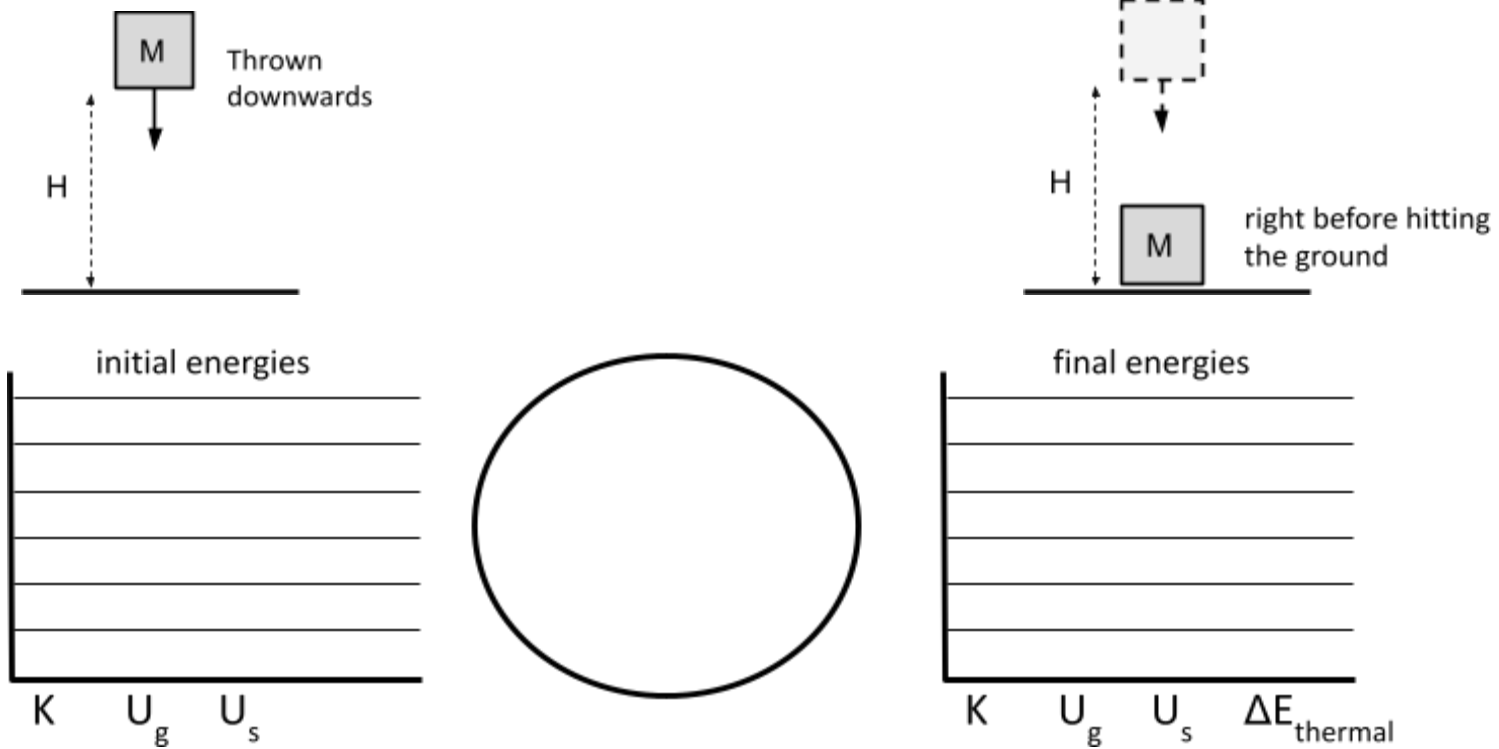
K       $U_g$        $U_s$



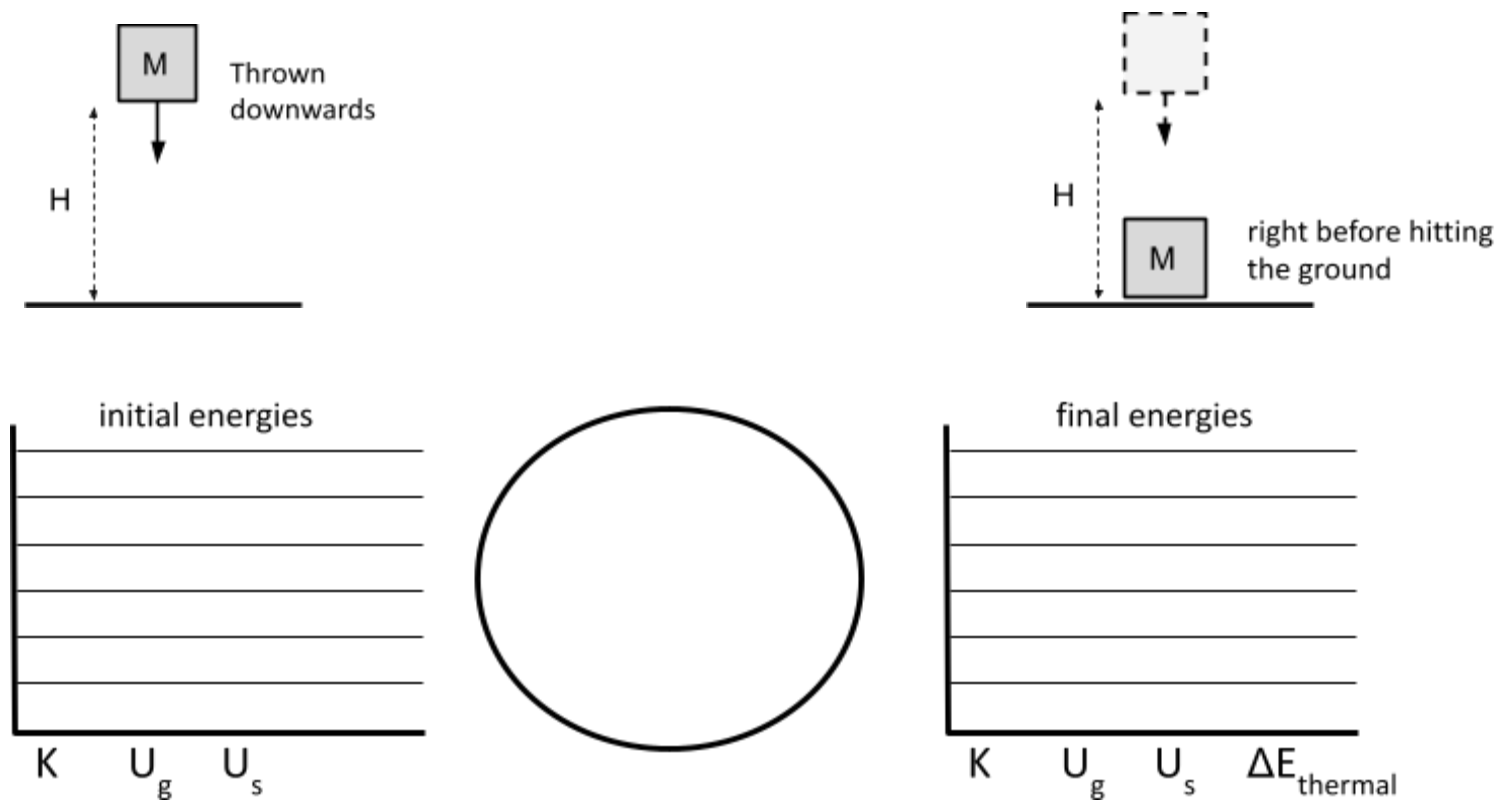
final energies

K     $U_g$      $U_s$      $\Delta E_{\text{thermal}}$

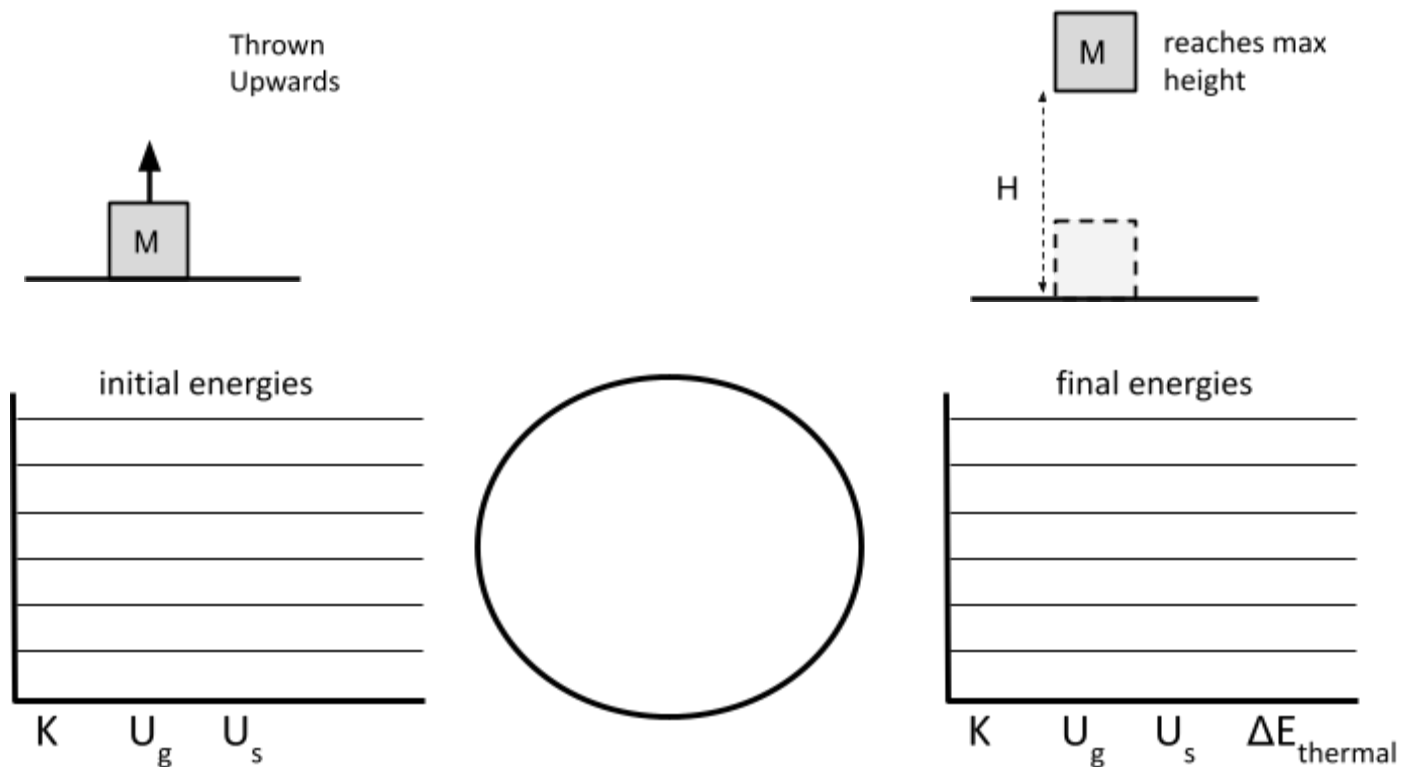
3. A block of wood of mass  $M=4\text{kg}$  is thrown downwards with a speed  $S=5\text{m/s}$  from a height  $H=5\text{m}$  above the ground. How fast is the block going right before it hits the ground? (**System: block and Earth**)



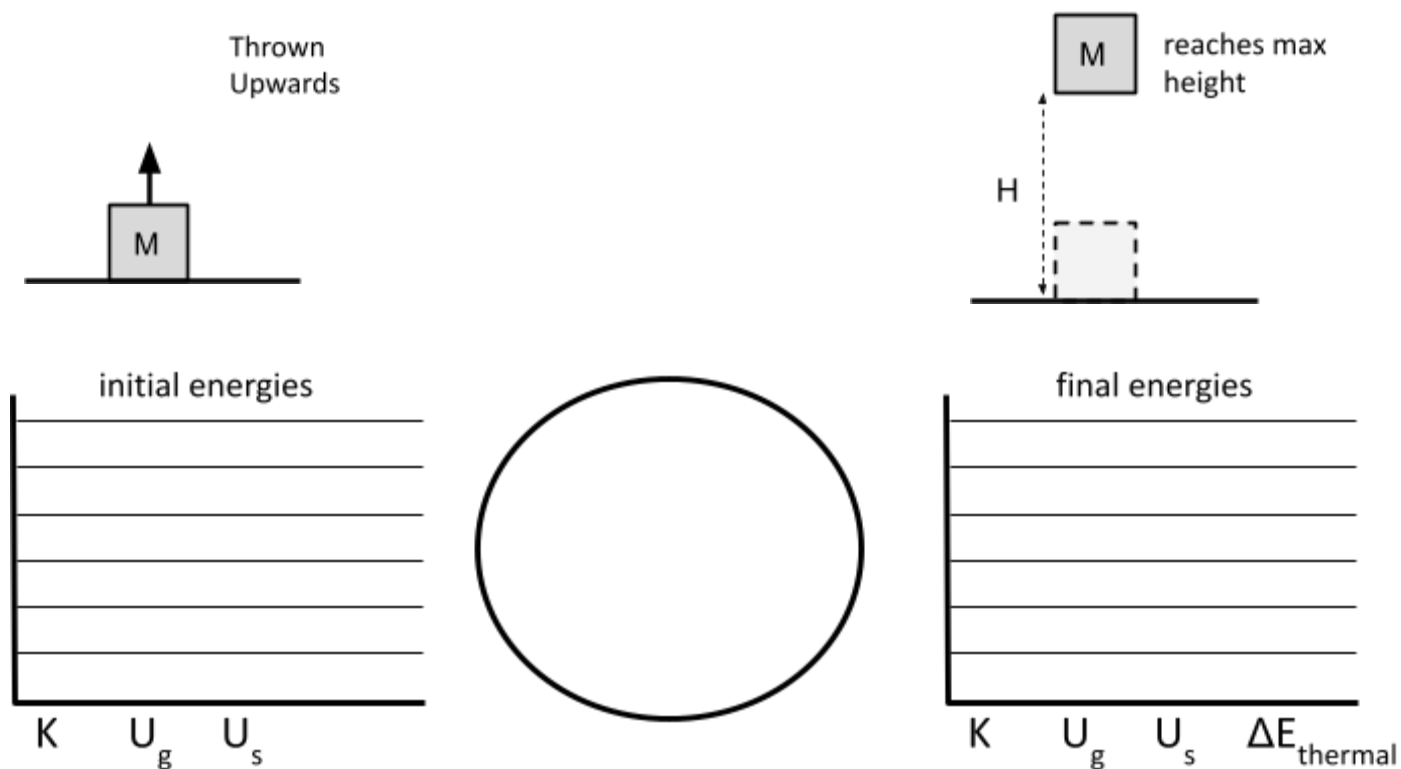
4. A block of wood of mass  $M=4\text{kg}$  is thrown downwards with a speed  $S=5\text{m/s}$  from a height  $H=5\text{m}$  above the ground. How fast is the block going right before it hits the ground? (**System: block only**)



5. A 10kg block is thrown upwards from the ground with a speed 4m/s. What is the max height  $H$  reached?  
**(System: block and Earth)**

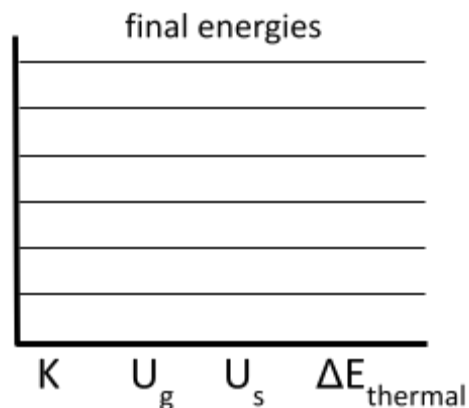
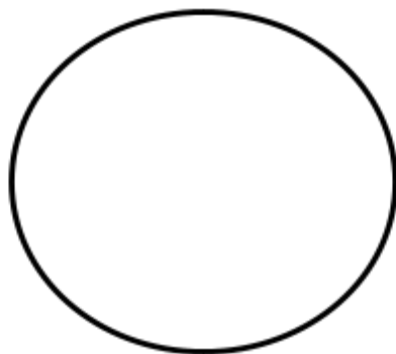
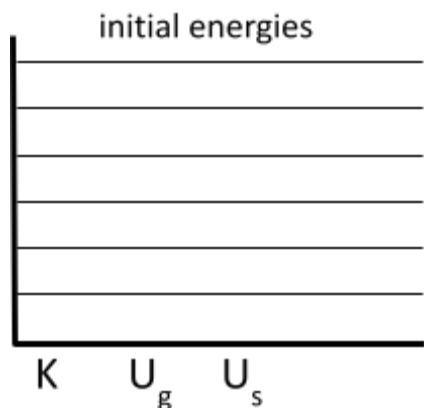
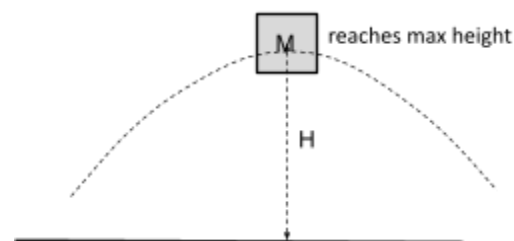
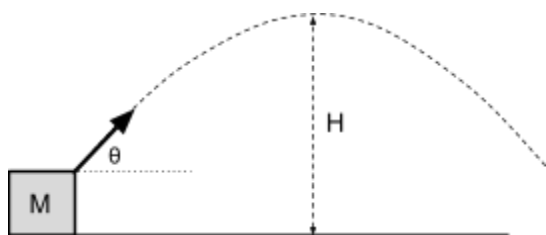


6. A 10kg block is thrown upwards from the ground with a speed 4m/s. What is the max height  $H$  reached?  
**(System: block only)**



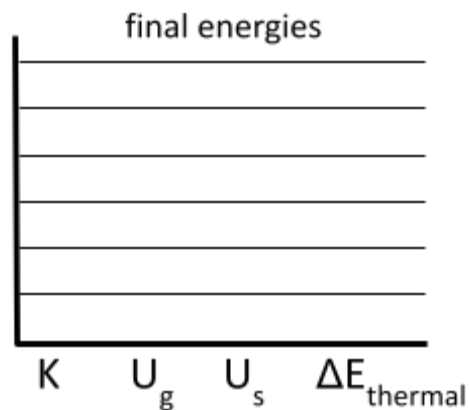
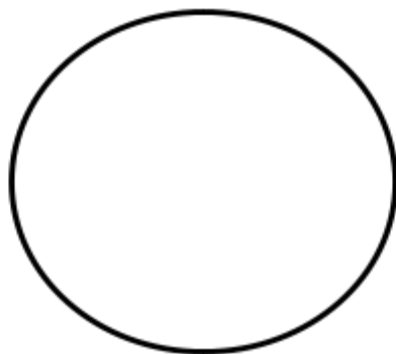
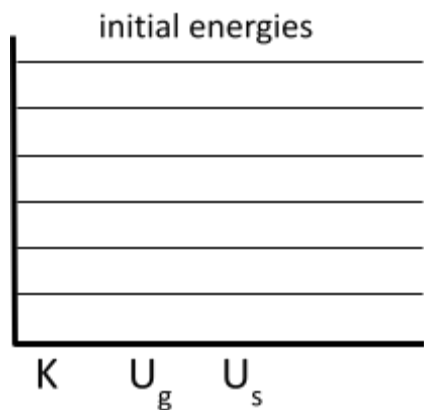
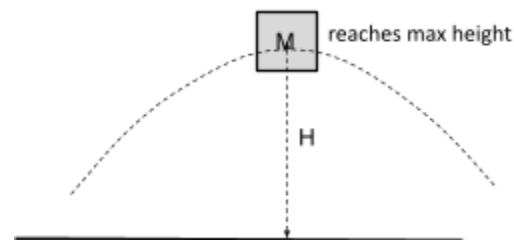
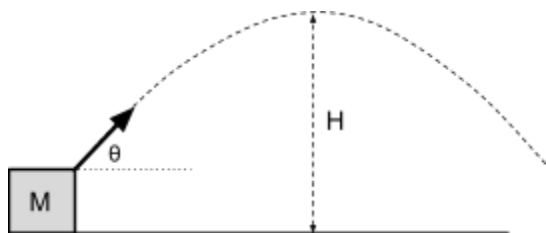
7. A 4kg block of wood is thrown at an angle from the ground with a speed 10m/s and reaches a max height of  $H=2\text{m}$ . What is the speed of the block at peak height?

**(System: block and Earth)**

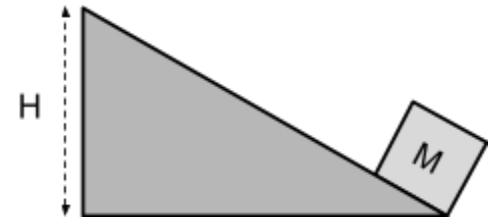
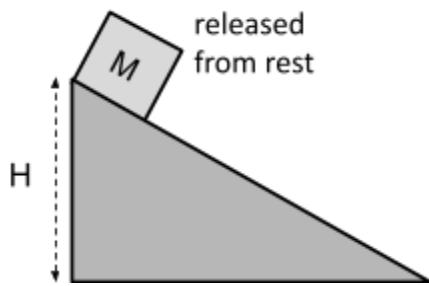


8. A 4kg block of wood is thrown at an angle from the ground with a speed 10m/s and reaches a max height of  $H=2\text{m}$ . What is the speed of the block at peak height?

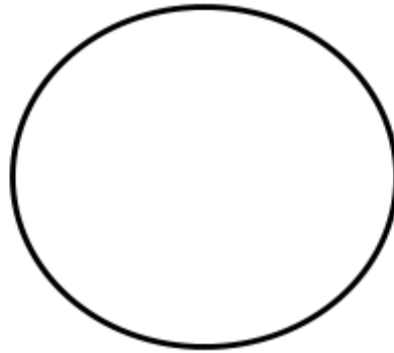
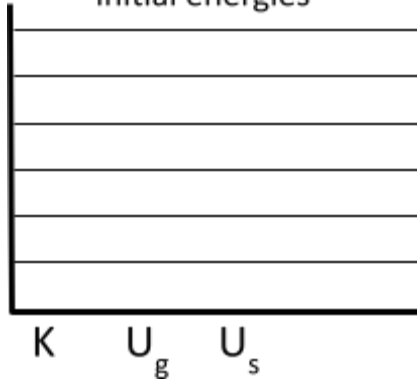
**(System: block only)**



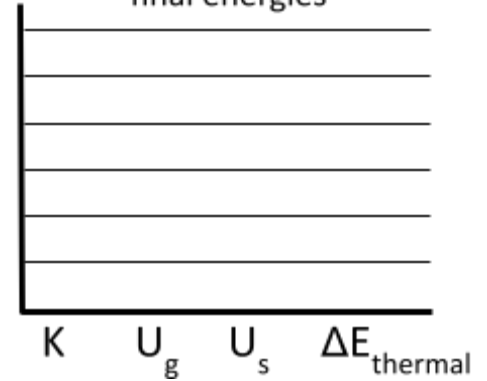
9. A block of wood of mass  $M=4\text{kg}$  is released on an incline of height  $H=5\text{m}$  that is fixed in place. The incline is frictionless. How fast is the block going when it reaches the ground? (**System: block and Earth**)



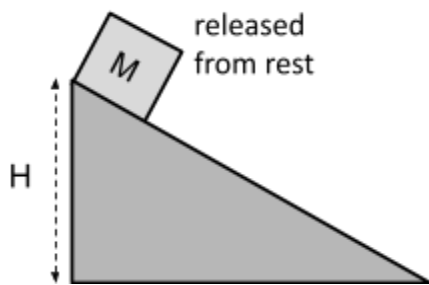
initial energies



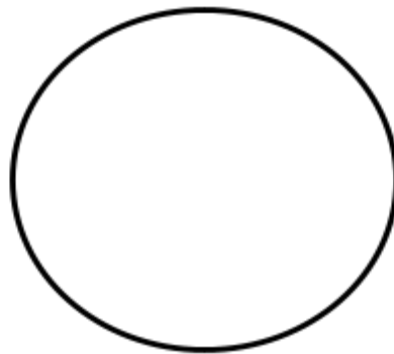
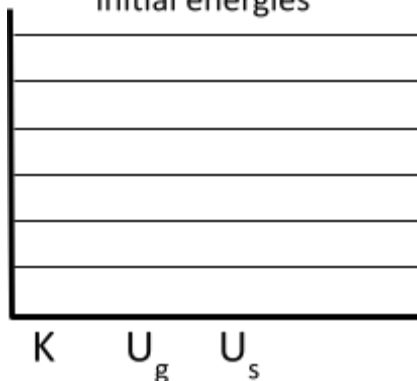
final energies



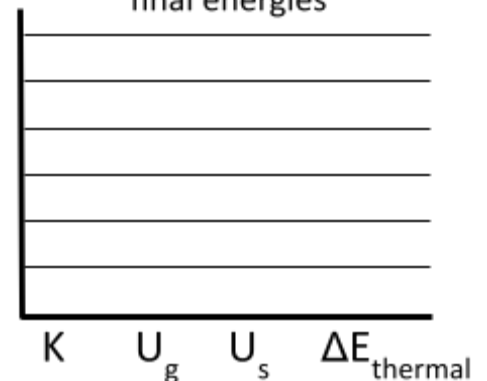
10. A block of wood of mass  $M=4\text{kg}$  is released on an incline of height  $H=5\text{m}$  that is fixed in place. The incline is frictionless. How fast is the block going when it reaches the ground? (**System: block only**)



initial energies

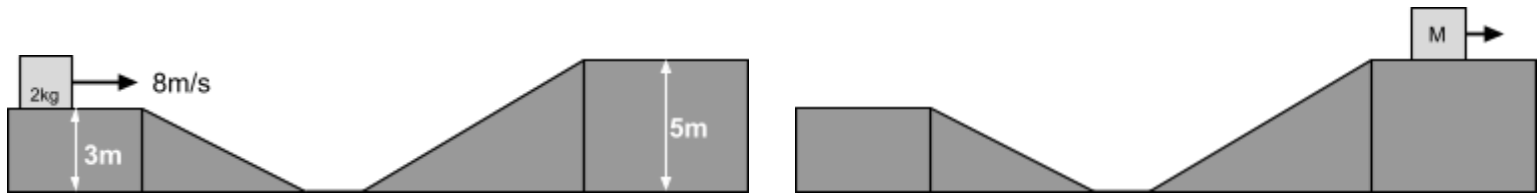


final energies



11. A block of wood of mass  $M=2\text{kg}$  is initially moving  $8\text{m/s}$  on a horizontal surface. The box slides down and then up a ramp, and is finally moving with a reduced speed along higher horizontal surface. There is NO friction between any surfaces. Find the speed when it reaches the top of the  $5\text{m}$  tall ramp.

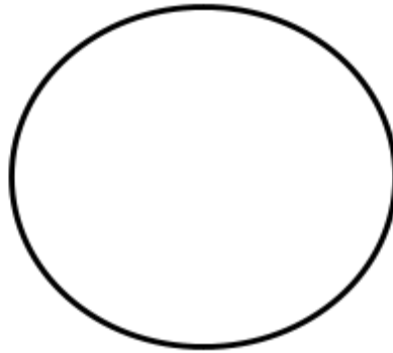
**(System: block and Earth)**



initial energies

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K    $U_g$     $U_s$

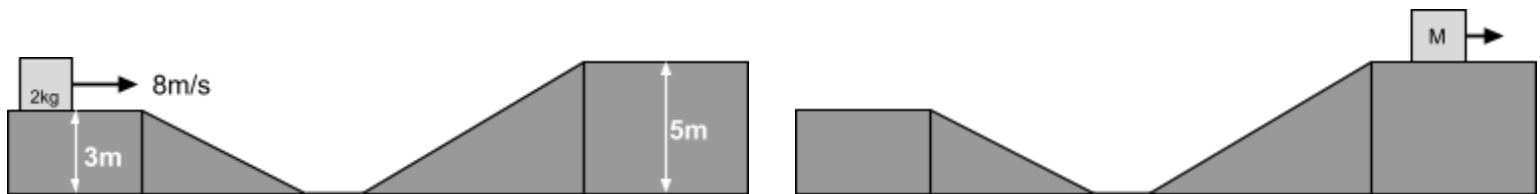


final energies

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K    $U_g$     $U_s$     $\Delta E_{\text{thermal}}$

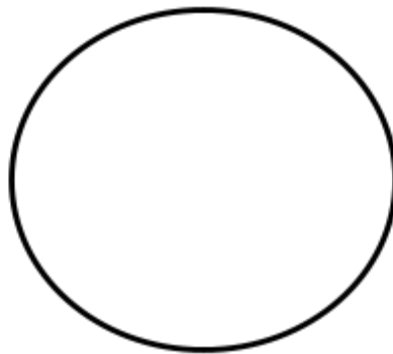
12. A block of wood of mass  $M=2\text{kg}$  is initially moving  $8\text{m/s}$  on a horizontal surface. The box slides down and then up a ramp, and is finally moving along a higher horizontal surface. There's NO friction between any surfaces. Find the speed when it reaches the top of the  $5\text{m}$  tall ramp. **(System: block only)**



initial energies

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K    $U_g$     $U_s$



final energies

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K    $U_g$     $U_s$     $\Delta E_{\text{thermal}}$