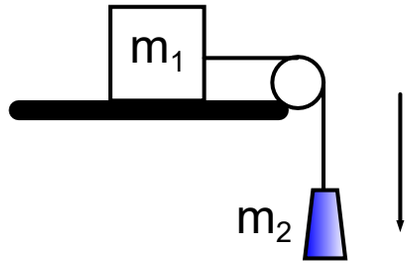
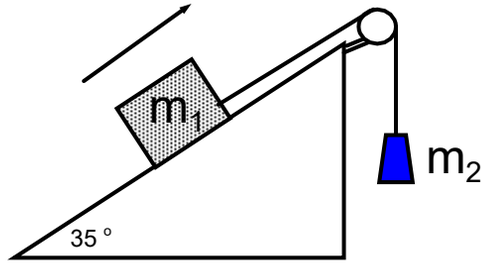
Physics 621 Advanced Connected Systems

1.



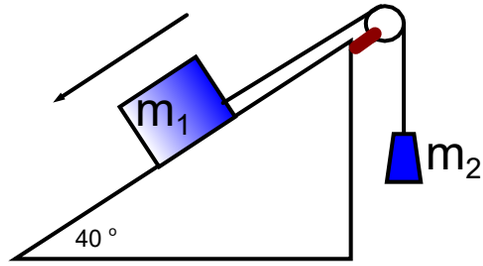
m_1 = 10.0 kg
m_2 = 15.0 kg
μ_k = 0.20
a_{sys}= ?
$|F_T|$ = ?

2.



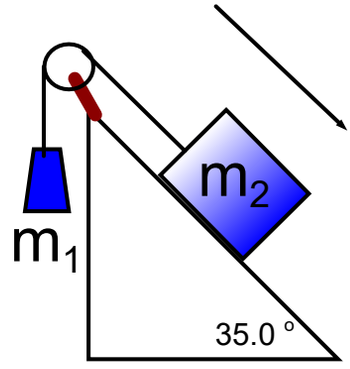
m_1 = 3.0 kg
m_2 = 5.0 kg
μ_k = 0.18
a_{sys}= ?
$|F_T|$ = ?

3.



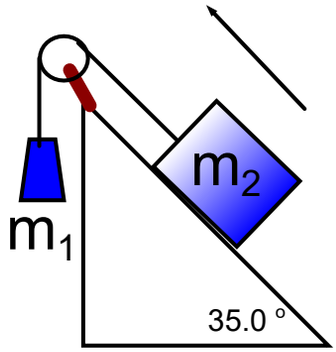
m_1 = 10.0 kg
m_2 = 5.0 kg
a_{sys}= ?
$|F_T|$ = ?
frictionless incline

4.



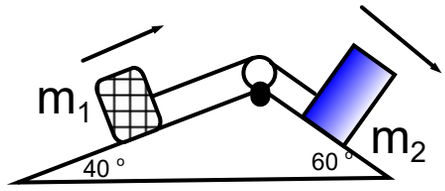
m_1 = 189.3 g
m_2 = ?
μ_k = 0.208
a_{sys}= 0.175 m/s^2[sys dir]

5.



m_1 = ?
m_2 = 250 g
μ_k = 0.164
a_{sys}= 0.0968 m/s^2[sys dir]

6. Enrichment Only-Optional



m_1 = 20 kg
m_2 = 30 kg
$\mu_{k\,1}$ = 0.20
$\mu_{k\,2}$ = 0.30
a_{sys} = ?
$|F_T|$ = ?

Answers:

1. a_{sys} = 5.10 m/s^2 [sys dir], $|F_T|$ = 70.6 N
2. a_{sys} = 3.5 m/s^2 [sys dir], $|F_T|$ = 32 N
3. a_{sys} = 0.93 m/s^2 [sys dir], $|F_T|$ = 54 N
4. 500. g
5. 181 g
6. a_{sys} = 1 m/s^2 [sys dir], $|F_T|$ = 1.8 x 10^2 N

Sig. figs. can vary depending on the algebra process you follow.

Great questions with some critical thinking.