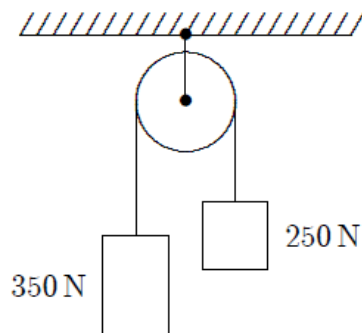
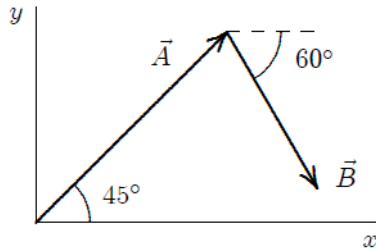


**The Copperbelt University (CBU)****School of Mathematics and Natural Sciences****PH 110 Test 1 – Deferred****September 2020****Online****Name:** \_\_\_\_\_ **Id Number:** \_\_\_\_\_**Group:** \_\_\_\_\_**Use gravitational acceleration  $g = 9.82 \text{ m/s}^2$  where not specified.****ANSWER ALL QUESTIONS**

1. In a freefall vertical motion where the time of ascent is equal to the time of descent, use equations to show that the initial velocity at firing upwards is equal to the final velocity at landing. [10 marks]
2. Explain why your weight may be different when you are in Kitwe compared to when you are in Gwembe valley even when your mass is the same. [10 marks]
3. Explain with the use of equations why a pistol fired from the clouds 10 km away is capable of killing a person on the ground compared to when it is fired horizontally over same distance. [10 marks]
4. A 1000 kg elevator is rising and its speed is increasing at  $8 \text{ m/s}^2$ . Calculate the tension of the cable holding the elevator [10]
5. Two blocks, weighing 350 N and 250 N, respectively, are connected by a string that passes over a massless pulley as shown. Calculate the tension in the string and explain why the tension on the left is not greater than the tension on the right side. [10 marks]



6. In the diagram,  $\vec{A}$  has magnitude 12 N and  $\vec{B}$  has magnitude 8 N. Calculate the x component of  $\vec{A} + \vec{B}$  [15 marks]



7. A projectile is fired at an angle of 65 degrees to the horizontal with initial velocity of 100 m/s. Find:
- Time of ascent [5 marks]
  - Time of flight [5 marks]
  - Maximum height reached [5 marks]
  - Range [5 marks]
  - Maximum possible range [5 marks]
8. Find the center of mass of a system of particles in the Cartesian coordinates for Mass (x, y, z) as follows: 10 kg (-2, 4, 2), 5 kg (6, 8, 2), and 15 kg (0, -7, 2). [10 marks]

~~~~~ COVID19 IS REAL ~~~~~ STAY SAFE~~~~ THE END ~~~~~