quad diagram

```
Quit[]
```

```
DrawSystem[θp_] := {
  (*geometric properties:*)
  {l_p = 2, (* length of payload box *)
   h_p = 1, (* hight of payload box *)
   l_1 = √25 ,
   l_2 = √25 ,
   m_1 = 1, m_2 = 1, m_p = 1,
   k_1 = 1/100.,
   k_2 = 1./100
  };
  (*initial locations:*)
  scale0 = 10;
  {{x_1 = 0, z_1 = scale0}, {x_2 = scale0, z_2 = scale0},
   {x_p = scale0/2, z_p = scale0/2, θ_p = θp Degree}},
  (*Orientation*)
  (Rp2I = (RotationMatrix[θ_p])) // MatrixForm;
  (*locations:*)
  {Iorigin = {0, 0},
   IaxisX = {0, 1},
   IaxisZ = {1, 0},
   Quad1CenterPos = {x_i, z_i} /. i → 1,
   Quad2CenterPos = {x_i, z_i} /. i → 2,
   PayloadCenterPos = {x_i, z_i} /. i → p,
   HangPoint1 = PayloadCenterPos - Rp2I.{l_p/2, -h_p/2},

   HangPoint2 = PayloadCenterPos + Rp2I.{l_p/2, h_p/2}},


  (*labels*)
  PayloadLabel = Text["Payload", {x_i, z_i} /. i → p, {-2, 4} + Rp2I.{-l_p/2, h_p/2}];

  (*down and right offset*)
  Quad1Label = Text["Quad1", {x_i, z_i} /. i → 1, {-1, -1}];
  Quad2Label = Text["Quad2", {x_i, z_i} /. i → 2, {-1, -1}];
  l1Label = Text["l_1", {(x_1 + x_p)/2, (z_1 + z_p)/2}, {-2, 1}];
  l2Label = Text["l_2", {(x_2 + x_p)/2, (z_2 + z_p)/2}, {2, 1}];
  (*general additions *)
  spring[r_: {1, 0}, n_: 20, w_: 1, origin_: {0, 0}] :=
   Line@Transpose[{r - origin, -Cross[r - origin]}.
```

```
          {(# - 1) / (2 n), Re[I^#] w / Norm[r - origin]} + origin] &@Range[2 n + 1];
  (*elements:*)
  Iarrows =
   {Dashed, Arrowheads[Small], Arrow[{Iorigin, IaxisX}], Arrow[{Iorigin, IaxisZ}]]};
  Labels = {PayloadLabel, Quad1Label, Quad2Label, l1Label, l2Label};
  Cabels = {Arrowheads[{-Small, Small}],
    Arrow[{HangPoint1, Quad1CenterPos}], Arrow[{HangPoint2, Quad2CenterPos}]};
  (*spr1=spring[r/.r→HangPoint1+{-1,1},n/.n→8,w/.w→1/3.,
     origin/.origin→Quad1Pos+{-1,-1}];*)
  spr1 = spring[r /. r → HangPoint1, n /. n → 8, 1/3.,
    origin /. origin → Quad1CenterPos];
  spr2 = spring[HangPoint2, 8, 1/3, Quad2CenterPos];
  PayloadBox = {Rotate[Rectangle[HangPoint1 - Rp2I.{0, h_p}, HangPoint2], -θ_p]};
  PayloadBoxRef = {Rotate[Rectangle[HangPoint1 - Rp2I.{0, h_p}, HangPoint2], 0]};
  PayloadBox = {Rotate[
      Rectangle[PayloadCenterPos - {l_p/2, h_p/2}, PayloadCenterPos + {l_p/2, h_p/2}], θ_p]};
  a = Graphics[{Iarrows, Labels, Cabels, spr1, spr2, PayloadBox}] }
```

```
DrawSystem[0]
```

$\{\{\{0, 10\}, \{10, 10\}, \{5, 5, 0\}\},$

$\{\{0, 0\}, \{0, 1\}, \{1, 0\}, \{0, 10\}, \{10, 10\}, \{5, 5\}, \{4, \frac{11}{2}\}, \{6, \frac{11}{2}\}\},$

}
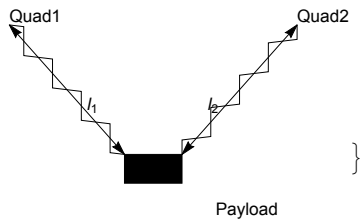
Manipulate[DrawSystem[θ][[3]], {{θ, 0}, -90, 90}]
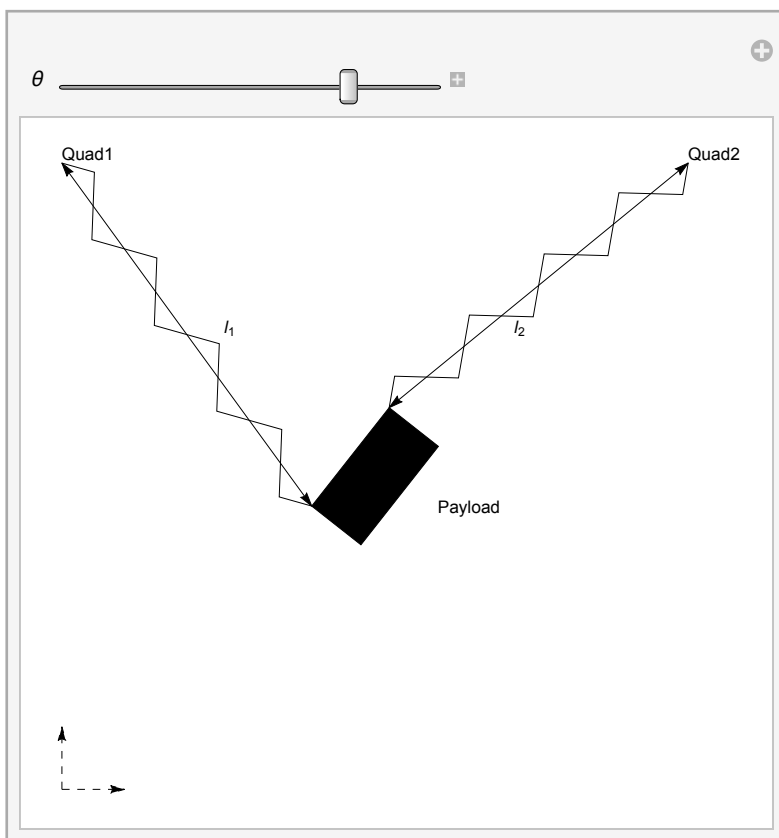
In[1010]:= $a = \left(\text{PayloadCenterPos} - \text{Rp2I}.\left\{\frac{l_p}{2}, \frac{h_p}{2}\right\}\right)$ **// N**

$b = \left(\text{PayloadCenterPos} + \text{Rp2I}.\left\{\frac{l_p}{2}, \frac{h_p}{2}\right\}\right)$

Graphics[{PayloadBox // N, Rectangle[a, b]}, PlotRange → All]

Out[1010]= {4.77452, 3.90494}

Out[1011]= {5.22548, 6.09506}

Out[1012]=