```mathematica
In[1]:= la = m * ht^2 / 2 - k * h^2 / 2
```
$$Out[1]= -\frac{h^2 k}{2} + \frac{ht^2 m}{2}$$

```mathematica
In[2]:= q = D[la, ht]
```
Out[2]= ht m

```mathematica
In[3]:= f = D[la, h]
```
Out[3]= -h k

```mathematica
In[4]:= s = q /. { ht → D[h[t], t], h → h[t] }
```
Out[4]= m h′[t]

```mathematica
In[5]:= c = f /. {ht → D[h[t], t], h → h[t]}
```
Out[5]= -k h[t]

```mathematica
In[6]:= EL = c - D[s, t]
```
Out[6]= -k h[t] - m h″[t]

```mathematica
In[7]:= la = m * L^2 * ht^2 / 2 - m * g * L * (1 - Cos[h])
```
$$Out[7]= \frac{1}{2} ht^2 L^2 m - g L m (1 - Cos[h])$$

```mathematica
In[8]:= q = D[la, ht]
```
Out[8]= ht L² m

```mathematica
In[9]:= s = q /. {ht → D[h[t], t], h → h[t]}
```
Out[9]= L² m h′[t]

```mathematica
In[10]:= dl = D[la, h]
```
Out[10]=
      -g L m Sin[h]

```mathematica
In[11]:= c = D[la, h] /. {ht → h'[t], h → h[t]}
```
Out[11]=
      -g L m Sin[h[t]]

```mathematica
In[12]:= EL = c - D[s, t]
```
Out[12]=
      -g L m Sin[h[t]] - L² m h″[t]

```mathematica
In[13]:= EL = Simplify[EL / (m * L)]
```
Out[13]=
      -g Sin[h[t]] - L h″[t]

In[19]:=
```
w[la_] := Module[{q, f, o, d, c, s, r, EL},
    q = D[la, ht]; f = D[la, h]; o = D[la, htt];
    d = {htt → D[h[t], {t, 2}], ht → D[h[t], t], h → ht[t]};
    c = f /. d;
    s = q /. d;
    r = o /. d;
    EL = c - D[s, t] + D[r, {t, 2}];
    EL]
```

In[20]:=
```
w[la]
```

Out[20]=

$$-g\,L\,m\,Sin[ht[t]] - L^2\,m\,h''[t]$$