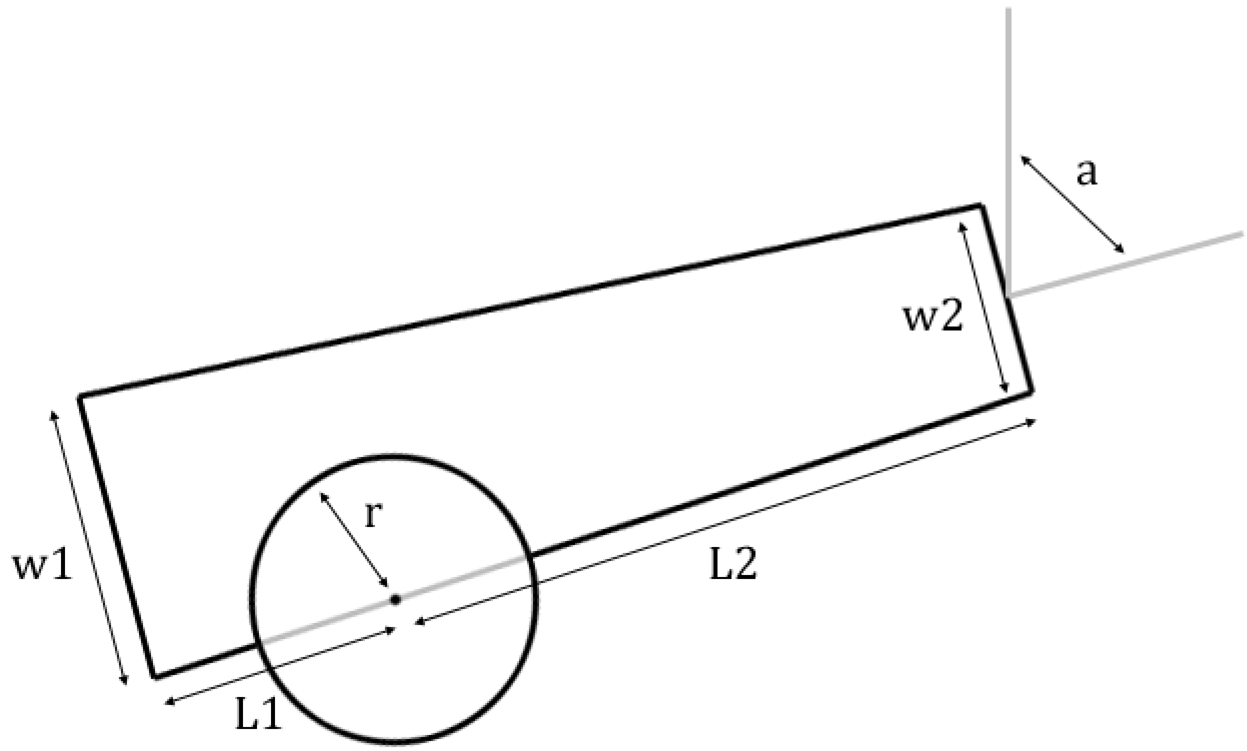
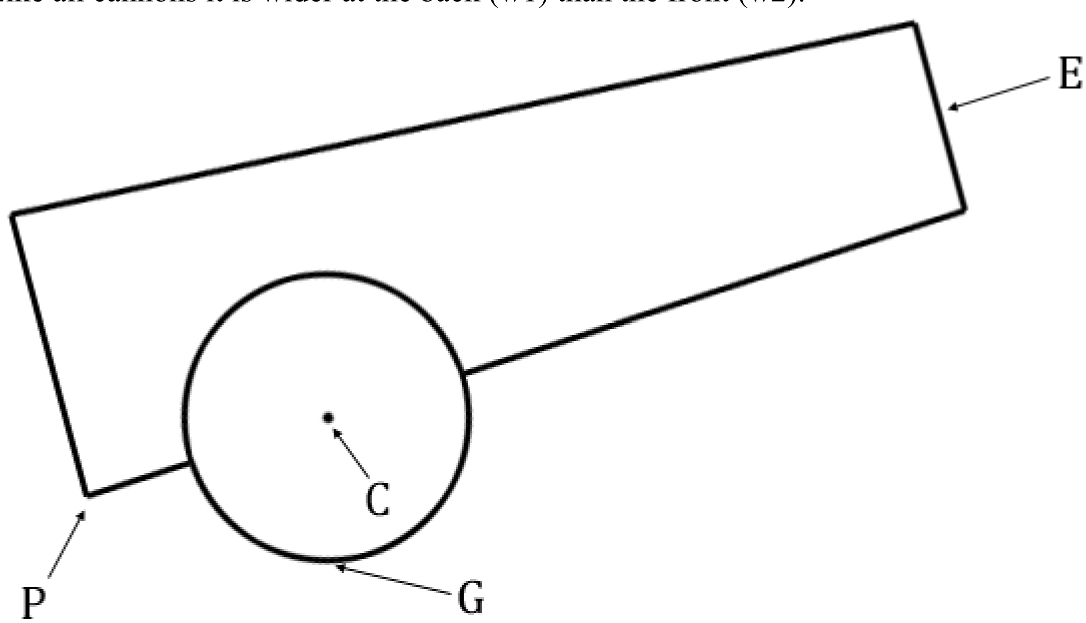
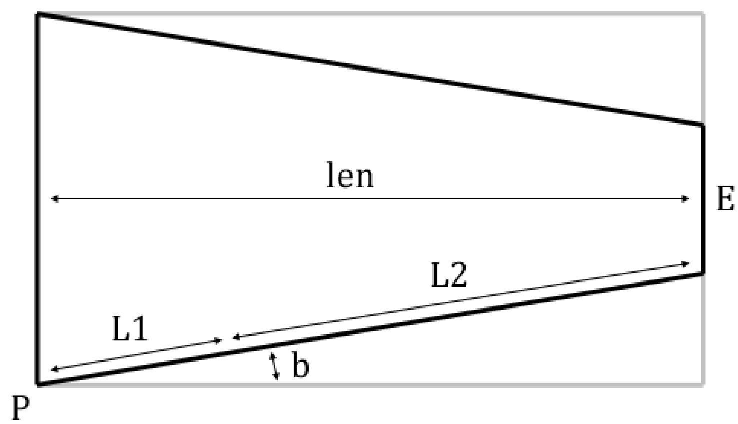
This is the cannon sitting on a wheel. The wheel's radius is r.



a is the aiming angle.
L1 is the distance from the back of the cannon to the wheel's axle, L2 is the rest of the length.
Like all cannons it is wider at the back (w1) than the front (w2).



G is the point on the ground where the wheel rests. Its coordinates are (xg, yg).
C is the exact position of the axle, its coordinates are (xc, yc).
P is the easiest point to start drawing the body of the cannon from, coordinates (xp, yp).
E is the point where the ball pops out when it is fired, coordinates (xe, ye).



This is a simplified picture of the body of the cannon shown with its "bounding box". The point is to illustrate the difference between the real length of the cannon (len) and the sum L1+L2.

The angle shown as b is also helpful when drawing the shape. When the cannon is aimed at angle a, the heading for the bottom line is (a-b). Don't forget that all angles are computed in radians.

```
xc = xg
yc = yg - r

b = asin((w1-w2)/2/(L1+L2))

xp = xc - L1 * sin(a-b)
yp = yc + L1 * cos(a-b)

len = (L1+L2) * cos(b)
```

Finally, to find the point E, we need two extra values:
- d is the distance between points P and E
- g is the angle from point P to point E if the cannon lies flat as in the third diagram.

```
d = sqrt(len*len + w1*w1/4)
g = asin(w1/2/d)

xe = xp + d * sin(a-g)
ye = yp - d * cos(a-g)
```