```
1.import pylab as pl
2.from math import sqrt
3.Mt={}
4.Mt['glass']={}
5.Mt['glass']['T']=8
6.Mt['ceramic']={}
7.Mt['ceramic']['T']=200
8.Mt['wood']={}
9.Mt['wood']['T']=3400
10.Mt['metal']={}
11.Mt['metal']['T']=145000
12.Mt['composite']={}
13.Mt['composite']['T']=60000
14.Mt['rubber']={}
15.Mt['rubber']['T']=200000
16.
17.print("Calculating for Min. Velocity",list(Mt.keys()))
18.print()
19.
20.Masses=[0.0907,0.1360,0.1814,0.2267]
21.Areas=[0.15999968,0.002032,0.007874]
22.
23.pl.interactive(True)
24
25.iplt=0
26.for mat in Mt.keys():
27.    T=Mt[mat]['T']
28.    Mt[mat]['Vmin']=[]
29.    print(" Material=",mat," Toughness=",T,":")
30.    for    Area in    Areas:
31.        print("  Area=",Area)
32.        Vmines=[]
33.        for Mass in Masses:
34.            Vmin=sqrt(2*Area*T/Mass)
35.            Mt[mat]['Vmin'].append(Vmin)
36.            Vmines.append(Vmin)
37.            print(" Mass=",Mass," Min. Velocity=",Vmin)
38.        print(Masses)
39.        print(Mt[mat]['Vmin'])
40.        pl.subplot(2,3,iplt+1)
41.        #pl.plot(Masses,Mt[mat]['Vmax'],'ko')
42.        #pl.plot(Masses,Mt[mat]['Vmax'])
43.        pl.plot(Masses,Vmines,'ko')
```

```
        pl.plot(Masses,Vmines)
    pl.xlabel('Mass(kg)')
    pl.ylabel('Min Velocity m/s')
    pl.title(mat)
    iplt+=1

print(Mt)

input("Type A and return to finish")
```