

Q1.(2019)

a)

the (perpendicular) distance
from the pivot / hinge to (the line
of action of) the force is greater

so a smaller force is required

b)

$$924 = F \times 0.15$$

$$F = 6160 \text{ (N)}$$

$$6160 = k \times 0.25$$

$$k = \frac{6160}{0.25}$$

or

$$k = 24640 \text{ (N/m)}$$

$$E = \frac{\frac{1}{2} \times 6160 \times 0.25 \times 0.25}{0.25}$$

$$E = 770 \text{ (J)}$$

Q2.(2022)

a)

the point from which weight may
be considered to act

or

the point where the mass
appears to be concentrated

b)

mass of 5 tomatoes = 0.425 (kg)

mass of 1 tomato = 0.085 (kg)

$$W = (0.085 \times 9.8) = 0.833 \text{ (N)}$$

c)

$$6.0 = k \times 0.015$$

$$k = \frac{6.0}{0.015}$$

$$k = 400 \text{ (N/m)}$$

d)

deforms elastically

(so) will return to its original length / shape (after force is removed)

OR

compression is directly proportional to the force (applied) (1)

(so) gives a linear scale (1)

Q3.(2023)

a)

apply the force further away from the pivot

b)

$$v = 15 \text{ (m/s)}$$

$$24\,000 = m \times 15$$

$$m = \frac{24\,000}{15}$$

$$m = 1600 \text{ (kg)}$$

c)

distance travelled during first
3 seconds = 22.5 (m)

distance travelled during last
2 seconds = 30 (m)

total distance = 52.5 (m)

d)

stopping distance includes
thinking distance

there is an additional time
before the driver applies the
brakes.

(so) the thinking distance will
increase

e)

work is done due to friction (in
the brakes)

(causing) an increase in the
internal / thermal energy (of the
brakes)