THE ROYAL SOCIETY

Be A Crash Test Investigator

Royal Society Partnership Grant – Be a Road Crash Investigator

Lockerbie Academy & Police Scotland

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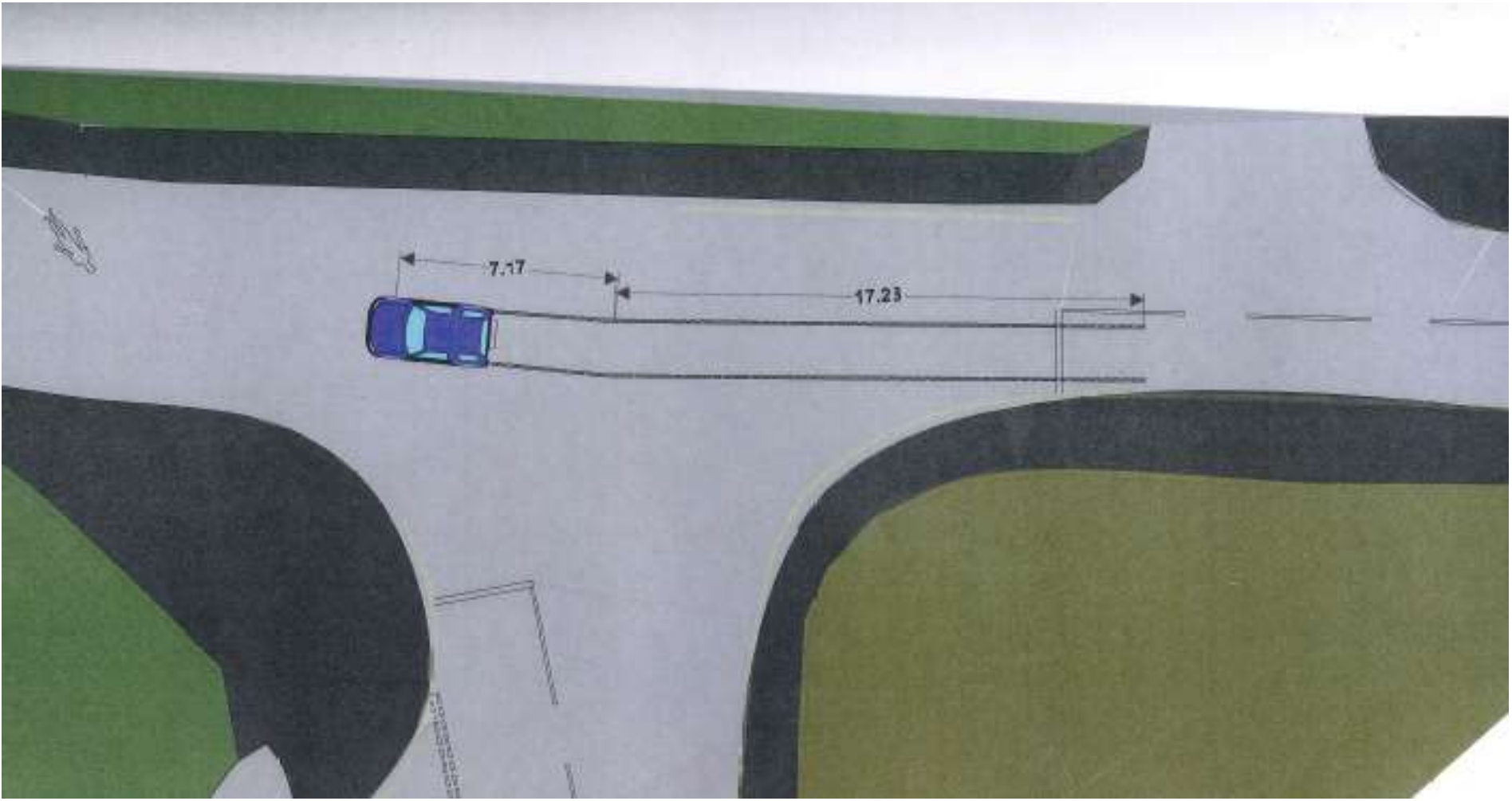
7.17
17.23

Theory

- Initial Velocity: $u(ms^{-1})$
- *Final Velocity:* $v(ms^{-1})$
- *Acceleration:* $a\ (ms^{-1})$
- *Displacement:* $s\ (m)$
- *Equation 1:* $\boldsymbol{v^2 = u^2 + 2as}$

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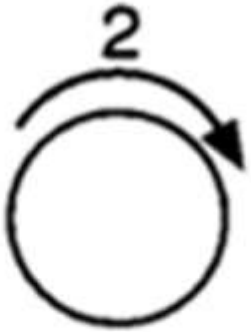
1

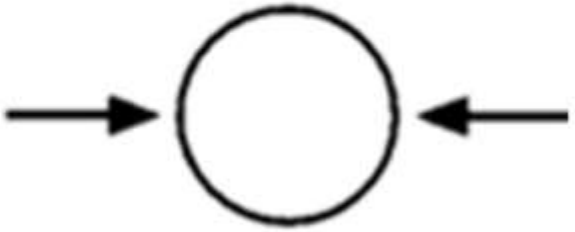
Maximum braking
Peak efficiency
no marks

2



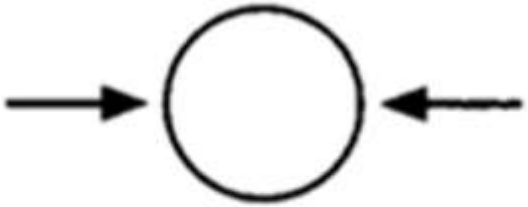
Maximum braking
Wheels begin to lock
No marks

3



Sliding friction
Locked wheels
'Shadow marks'

4



Sliding friction
Locked wheels
'Skid marks'

Skid Marks

- 17.29m before hitting the pedestrian
- 7.17m after hitting the pedestrian before stopping.
- Total skid mark length = 24.45m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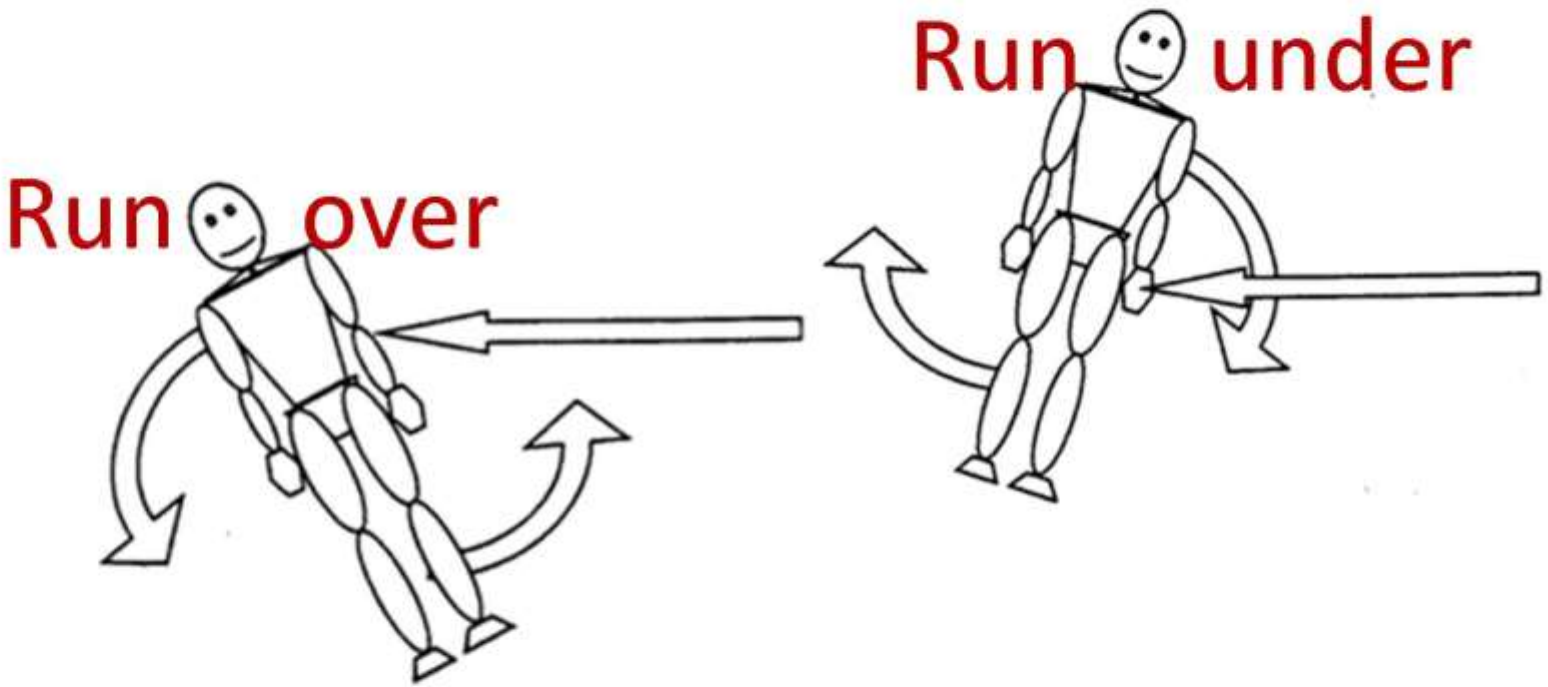
Run Over or Run Under?.....

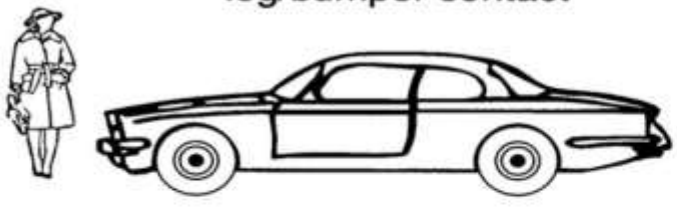


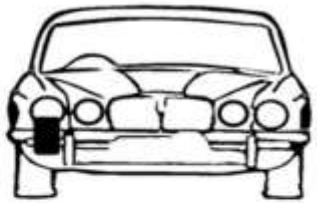
....it depends on your centre of mass in relation to the strike.

DAMAGE INDICATING

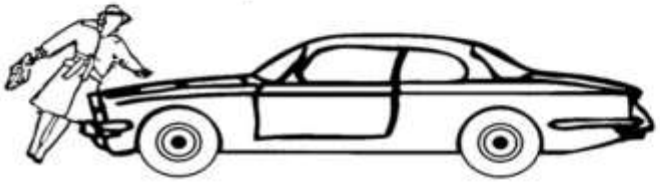
PEDESTRIAN DIRECTION

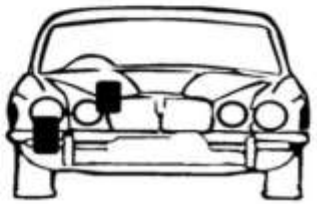
leg/bumper contact



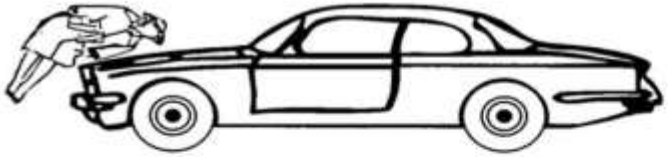


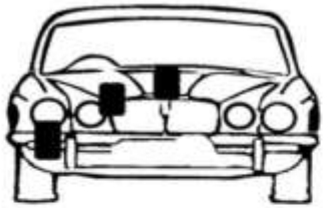
hip/bonnet contact



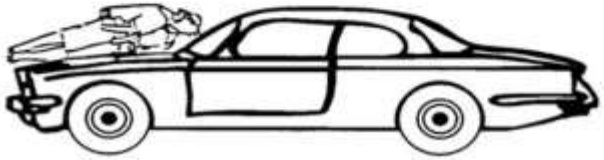


torso/bonnet contact

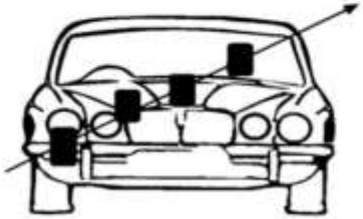




head/windscreen contact



direction of travel



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Super
Children car

Acceleration

$-6.80 ms^{-2}$, $-7.01 ms^{-2}$

- Initial velocity u =?
- Final velocity v = 0 ms^{-1}
- Acceleration a = -6.80 ms^{-2}

  (negative acceleration as slowing down)
- Displacement s = 24.45m
  - $v^2 = u^2 + 2as$
  - $0 = u^2 + 2(-6.80 \times 24.45)$
  - $u^2 = 332.52$
  - $u = 18.23 ms^{-1}$ Or 41 mph.

Impact

- Initial velocity u =?
- Final velocity v = 0 ms-1
- Deceleration a = 6.80 ms^{-2}
- Displacement s = 7.17m

- $v^2 = u^2 + 2as$
- $0 = u^2 + 2(-6.80 \times 7.17)$
- $u^2 = 95.512$
- $u = 9.87\ ms^{-1}$ Or 22 mph.


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