## Year 11 Physics Assignment

Work, Energy and Momentum 2

1. An astronaut (mass 90 kg ) is standing on the outside of a stationary spacecraft (of mass 1600 kg ). If the astronaut pushes off from the spacecraft with a force of 150 N for 1.02 seconds:
a) Calculate the final momentum of the astronaut
b) State the final momentum of the spacecraft
c) Calculate the final speed of the astronaut
d) Calculate the final speed of the spacecraft
2. Calculate the change in total kinetic energy for questions 4 and 5 in assignment 1 and conclude which (if any) are elastic collisions.
3. An explosive with no initial speed breaks apart as shown below ( B and C leave at right angles to each other.
Determine the speed of fragment A.

$$
\begin{aligned}
& \begin{array}{l}
m_{A}=2.5 \mathrm{~kg} \\
v_{A}=?
\end{array} \\
& \qquad \begin{array}{l}
m_{B}=1 \mathrm{~kg} \\
v_{B}=4 \mathrm{~ms}^{-1} \\
m_{C}=0.5 \mathrm{mg}^{-1}
\end{array} \\
& \hline
\end{aligned}
$$

4. For a laugh, two foolish young boys cover themselves with glue and then run into each other at $90^{\circ}$. Determine the speed of the boys once they are stuck together.

