General editorial guidelines for authors contributing to the FHSST project

- Chapters should begin with a brief introduction and motivation for the chapter.
- With regards general editing:
  - Units and indices: write $m.s^{-1}$ or m/s not $\frac{m}{s}$, and use maths mode (i.e. km not km)
  - Notation: Vectors should be capped with arrows (i.e. $\overrightarrow{F}$), while F denotes a magnitude only
  - Use boldface to highlight directions of vectors.
- All important definitions should be placed in a definition box:

  Latex Source:

```
\begin{center}
\psshadowbox{
\begin{tabular}{c}
\textbf{Definition:} {\em Displacement} is defined as the magnitude
and direction\\
of the straight line joining one's starting point to one's final\\
point.
\end{tabular}
}
\end{center}
```

  Output:

> **Definition:** *Displacement* is defined as the magnitude and direction of the straight line joining one's starting point to one's final point.

- Put very important comments in a margin box:

  Latex Source:

```
\marginpar{
\psshadowbox{
\begin{tabular}{c}
Using vectors is \\
an important \\
skill you \textbf{MUST}\\
 master!
\end{tabular}
}
}
```

  Output:

Using vectors is
an important
skill you **MUST**
master!

- Put text boxes around important equations together with key:

  Latex Source:

```
\begin{center}
\psshadowbox{
\begin{tabular}{rl}
\multicolumn{2}{c}{$\overrightarrow{p} = m\overrightarrow{v}$}\\
\\
$\overrightarrow{p}$&: momentum ($kg.m.s^{-1}$ + direction)\\
                   $m$&: mass ($kg$)\\
$\overrightarrow{v}$&: velocity ($m.s^{-1}$ + direction)\\
\end{tabular}
}
\end{center}
```

  Output:

$$\overrightarrow{p} = m\overrightarrow{v}$$

$\overrightarrow{p}$	: momentum ($kg.m.s^{-1}$ + direction)
m	: mass (kg)
$\overrightarrow{v}$	: velocity ($m.s^{-1}$ + direction)

- Typical exam-type questions should be included as worked examples. Worked examples should be added using the physics worked example environment **pwex**. A title must be specified for the worked example and answers should be broken down into logical steps each beginning with the **step** command. Keep the explanations of each step concise without loss of clarity (we don't want to scare learners off with lengthy solutions– it looks intimidating):

  Latex Source:

```
\begin{pwex}{Subtracting vectors algebraically I}
\textbf{Question:} Suppose that a tennis ball is thrown horizontally
towards a wall at $3m.s^{-1}$ to the right. After striking the wall,
the ball returns to the thrower at $2m.s^{-1}$. Determine the change
in velocity of the ball.

\textbf{Answer:}
\step
Remember that velocity is a vector. The change in the velocity of the
ball is equal to the difference between the ball's initial and final
velocities:
\begin{eqnarray*}
  \Delta\overrightarrow{v} & = & \overrightarrow{v}_{final} -
  \overrightarrow{v}_{initial}
\end{eqnarray*}

Since the ball moves along a straight line (i.e. left and right), we
can use the algebraic technique of vector subtraction just discussed.

\step
Let's make to the right the \textbf{positive}
direction. This means that to the left becomes the \textbf{negative}
direction.

\step
With right positive:
\begin{eqnarray*}
  \overrightarrow{v}_{initial} & = & +3m.s^{-1} \\
   & and & \\
  \overrightarrow{v}_{final} & = & -2m.s^{-1}
\end{eqnarray*}

\step
Thus, the change in velocity of the ball is:

\begin{eqnarray*}
  \Delta\overrightarrow{v} & = & (-2m.s^{-1}) - (+3m.s^{-1}) \\
  & = & (-5)m.s^{-1}
\end{eqnarray*}
```

```
Remember that in this case \underline{right means positive} so:
\begin{eqnarray*}
  \Delta\overrightarrow{v} & = & 5m.s^{-1} \rm{\bf \ to \ the \ \emph{left}}
\end{eqnarray*}

\end{pwex}
```

Output:

Worked Example 1

Subtracting vectors algebraically I

Question: Suppose that a tennis ball is thrown horizontally towards a wall at $3m.s^{-1}$ to the right. After striking the wall, the ball returns to the thrower at $2m.s^{-1}$. Determine the change in velocity of the ball.

Answer:

Step 1 :

Remember that velocity is a vector. The change in the velocity of the ball is equal to the difference between the ball's initial and final velocities:

$$\Delta\overrightarrow{v} = \overrightarrow{v}_{final} - \overrightarrow{v}_{initial}$$

Since the ball moves along a straight line (i.e. left and right), we can use the algebraic technique of vector subtraction just discussed.

Step 2 :

Let's make to the right the **positive** direction. This means that to the left becomes the **negative** direction.

Step 3 :

With right positive:

$$\begin{aligned} \overrightarrow{v}_{initial} &= +3m.s^{-1} \\ & \textit{and} \\ \overrightarrow{v}_{final} &= -2m.s^{-1} \end{aligned}$$

Step 4 :

Thus, the change in velocity of the ball is:

$$\begin{aligned} \Delta\overrightarrow{v} &= (-2m.s^{-1}) - (+3m.s^{-1}) \\ &= (-5)m.s^{-1} \end{aligned}$$

Remember that in this case <u>right means positive</u> so:

$$\Delta\overrightarrow{v} = 5m.s^{-1} \textbf{ to the } \textit{left}$$

- Remember to include interesting facts in your chapters. Use a **psshadowbox** for this:

  Latex Source:

```
\vspace{3mm}
\psshadowbox{
\begin{tabular}{l}
  \textbf{Interesting fact}: The word ‘electron’ comes from the Greek
          word for \\
          amber! The ancient Greeks observed that if you rubbed a
          piece of amber,\\
          you could use it to pick up bits of straw. (Attractive
          electrostatic force!)\\
\end{tabular}
}
\vspace{3mm}
```

  Output:

  Interesting fact: The word ‘electron’ comes from the Greek word for amber! The ancient Greeks observed that if you rubbed a piece of amber, you could use it to pick up bits of straw. (Attractive electrostatic force!)

- Each chapter should have a conclusion.

- Each chapter should end with a summary of the important definitions, quantities and equations introduced in the chapter:

  Latex Source:

```
\section{Summary of Important Quantities, Equations and Concepts}

\begin{table}[b]
\begin{center}
\begin{tabular}{|c|c|ccc|c|}\hline \hline
  Quantity & Symbol &
  \multicolumn{3}{c|}{S.I. Units}
  & Direction\\ \hline
  Momentum & $\overrightarrow{p}$ & \multicolumn{3}{c|}{$kg.m.s^{-1}$}
  & \checkmark\\ \hline
  Mass & $m$ & \multicolumn{3}{c|}{$kg$} & --- \\\hline
  Velocity & $\overrightarrow{u}$,$\overrightarrow{v}$ &
```

```
  \multicolumn{3}{c|}{$m.s^{-1}$} & \checkmark \\ \hline
  Change in momentum & $\Delta \overrightarrow{p}$ &
  \multicolumn{3}{c|}{$kg.m.s^{-1}$} & \checkmark\\ \hline
  Force & $\overrightarrow{F}$ & $kg.m.s^{-2}$ & \textbf{or} & $N$ & \checkmark \\\hline
  Impulse & --- & $kg.m.s^{-1}$ & \textbf{or} & $N.s$ & \checkmark\\ \hline\hline
\end{tabular}
\end{center}
\caption{Summary of the symbols and units of the quantities used in \textbf{Momentum} }
\end{table}

\begin{description}
\item[Momentum] The {\em momentum} of an object is defined as its
mass multiplied by its velocity.
\item[Momentum of a System] The {\em total momentum of a system}
  is the sum of the momenta of each of the objects in the system.
\item[Principle of Conservation of Linear Momentum:] ‘The total linear
  momentum of an isolated system is constant’ or ‘In an isolated
  system the total momentum before a collision (or explosion) is equal
  to the total momentum after the collision (or explosion)’.
\item[Law of Momentum:] The applied resultant force acting on an
  object is equal to the rate of change of the object’s momentum and
  this force is in the direction of the change in momentum.
\end{description}
```

Output:

0.1 Summary of Important Quantities, Equations and Concepts

Momentum The *momentum* of an object is defined as its mass multiplied by its velocity.

Momentum of a System The *total momentum of a system* is the sum of the momenta of each of the objects in the system.

Principle of Conservation of Linear Momentum: 'The total linear momentum of an isolated system is constant' or 'In an isolated system the total momentum before a collision (or explosion) is equal to the total momentum after the collision (or explosion)'.

Law of Momentum: The applied resultant force acting on an object is equal to the rate of change of the object's momentum and this force is in the direction of the change in momentum.

Quantity	Symbol	S.I. Units	Direction
Momentum	$\overrightarrow{p}$	$kg.m.s^{-1}$	✓
Mass	m	kg	—
Velocity	$\overrightarrow{u}, \overrightarrow{v}$	$m.s^{-1}$	✓
Change in momentum	$\Delta\overrightarrow{p}$	$kg.m.s^{-1}$	✓
Force	$\overrightarrow{F}$	$kg.m.s^{-2}$ **or** N	✓
Impulse	—	$kg.m.s^{-1}$ **or** $N.s$	✓

Table 1: Summary of the symbols and units of the quantities used in **Momentum**