<table>
<tr><th>Q</th><th>Scheme</th><th>Mark</th><th>Notes</th></tr>
<tr><td>4a</td><td colspan="3">If the division of the shape involves non-standard shapes (e.g. a trapezium) the centres of mass must be quoted correctly or a correct method used to find the position to score any marks.</td></tr>
<tr><td></td><td>
<table>
<tr><td>rectangle</td><td>-triangle</td><td>+triangle</td></tr>
<tr><td>$20a^2$</td><td>$-\frac{9}{2}a^2$</td><td>$\frac{9}{2}a^2$</td></tr>
<tr><td>$2a$</td><td>$3a$</td><td>$2a$</td></tr>
</table>
or
<table>
<tr><td>rectangle</td><td>rectangle</td><td>Double triangle</td></tr>
<tr><td>$3a^2$</td><td>$8a^2$</td><td>$9a^2$</td></tr>
<tr><td>$\frac{1}{2}a$</td><td>$2a$</td><td>$2a$</td></tr>
</table>
or
<table>
<tr><td>rectangle</td><td>trapezium</td><td>triangle</td></tr>
<tr><td>$5a^2$</td><td>$\frac{21}{2}a^2$</td><td>$\frac{9}{2}a^2$</td></tr>
<tr><td>$\frac{1}{2}a$</td><td>$\frac{48}{21}a$</td><td>$2a$</td></tr>
</table>
</td><td>B1

B1</td><td>Correct mass ratios for a correct division of the folded template and correct total of $20a^2$
Correct distances from AD seen or implied.
B0B1 is possible if they have incorrect masses but a full set of correct distances. e.g. if they use the second alternative but have not doubled the triangle. Or they might have a correct split with an error in one of the areas or an incorrect (or missing) total

or equivalent</td></tr>
<tr><td></td><td>Moments about AD or a parallel axis.</td><td>M1</td><td>Dimensionally consistent.
All terms for a correct division of L and no extras.
Accept as part of a vector equation</td></tr>
<tr><td></td><td>$40a^3-\frac{27}{2}a^3+9a^3=20a^2d$
or $\frac{3}{2}a^3+16a^3+18a^3=20a^2d$
or $\frac{2}{2}a^3+\frac{48}{2}a^3+9a^3=20a^2d$</td><td>A1</td><td>Correct unsimplified equation for their axis. Allow for correct component in a vector equation.</td></tr>
<tr><td></td><td>$d=\frac{71}{40}a$ *</td><td>A1*</td><td>Obtain given answer from correct working. Need at least one line of working to collect like terms e.g.
$20d=\frac{71}{2}a$ Final answer must be as printed i.e. $d=\ldots$.</td></tr>
<tr><td></td><td></td><td>[5]</td><td></td></tr>
<tr><td>4b</td><td>Moments about S</td><td>M1</td><td>A complete method to get an equation in W and F only.
Need all terms and no extras.
Dimensionally consistent.</td></tr>
<tr><td colspan="4">NB If they start by finding the centre of mass for the system they do not score marks until they form the moments equation.
If they are clearly using moments about A (e.g. d and 4a used as distances in their equation) this is M0 unless they include the reaction at S and resolve to form the required equation.
If they say they are using moments about S and have just one incorrect distance allow M1A1A0A0</td></tr>
<tr><td></td><td>$4W\times\frac{31}{40}a+W\times 3a=F\times 5a$
or $\left(4W+W\right)\left(2.22a-a\right)=5aF$</td><td>A1

A1</td><td>Unsimplified equation with at most one error
Correct unsimplified equation</td></tr>
<tr><td></td><td>$F=\frac{61}{50}W$</td><td>A1</td><td>Accept 1.22W or 1.2W</td></tr>
<tr><td></td><td></td><td>[4]</td><td></td></tr>
<tr><td></td><td></td><td>(9)</td><td></td></tr>
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