<table>
<tr><td>Question Number</td><td>Scheme</td><td>Marks</td></tr>
<tr><td>1</td><td>
<table>
<tr><td>a</td><td>b</td><td>c</td><td>(abc)</td></tr>
<tr><td>6</td><td>1</td><td>3</td><td>(18)</td></tr>
<tr><td>4</td><td>2</td><td>4</td><td>(32)</td></tr>
<tr><td>2</td><td>3</td><td>5</td><td>(30)</td></tr>
</table>
Any one correct row for $b = 1$, $b = 2$ or $b = 3$.
Products do not need to be found for this mark.
</td><td>B1</td></tr>
<tr><td></td><td>Attempts the product abc for at least 2 valid combinations.</td><td>M1</td></tr>
<tr><td></td><td>Finds all three valid combinations with correct products seen and somewhere/shows why this is exhaustive and concludes. *</td><td>A1*</td></tr>
<tr><td></td><td></td><td>(3 marks)</td></tr>
</table>

Note that in most cases the M1 can only follow B1 but there may be some exceptions.

Numerical approach using the table:

B1: Any one correct row for $b = 1$, $b = 2$ or $b = 3$. Products do not need to be found for this mark.
M1: Attempts the product *abc* for at least 2 valid combinations.
A1*: Requires:

- All three valid combinations with correct products
- No other combinations shown unless they are crossed out or e.g. have a cross at the end of the row or are discounted in some way
- A (minimal) conclusion e.g. the product of *a*, *b* and *c* is even, hence proven, QED, hence it is even, each product stated as even, etc.

Algebraic/logic approach:

B1: Uses the information to obtain a correct equation connecting *a* and *b* e.g. $a + 2b = 8$, $a = 8 - 2b$
M1: States *a* must be even and considers the product *abc* in some way
A1*: States e.g. *abc* is even with a reason e.g. "even × anything is even"

Pure Algebraic approach:

B1: Uses the information to obtain a correct equation connecting *a* and *b* e.g. $a + 2b = 8$, $a = 8 - 2b$
M1: $abc = (8-2b)b(b+2)$

Attempts the product of *a*, *b* and *c* in terms of *b* (or some other letter)

A1*: $abc = 2(4-b)b(b+2)$ which is even, hence proven, QED etc.

Concludes *abc* is even and makes a (minimal) conclusion. There must be no algebraic errors.

NB using this approach "$abc = -2b^3 + 4b^2 + 16b$ which is even hence proven" is not sufficient – they would need to say e.g. which is even + even + even or factor out the 2.

Question Number	Scheme	Marks
2(a)	$\mathrm{f}(\frac{5}{4}) = (2-k\times\frac{5}{4})^5 = \frac{243}{32} \Rightarrow (2-k\times\frac{5}{4}) = \sqrt[5]{\frac{243}{32}} \Rightarrow k = ...$	M1
	$\frac{3}{2} \Rightarrow \frac{5k}{4} = \frac{1}{2} \Rightarrow k = \frac{2}{5}$ *	A1*
		(2)
(b)	$\pm {}^5C_1 \times 2^4 \times \left(\pm\frac{2}{5}x\right)$ or $\pm {}^5C_2 \times 2^3 \times \left(\pm\frac{2}{5}x\right)^2$	M1
	$32 - 32x + \frac{64}{5}x^2$	A1A1
		(3)
(c)	$\mathrm{f}'(x) = -32 + \frac{128}{5}x + ... \Rightarrow \mathrm{f}'(0) = ...$	M1
	$\mathrm{f}'(0) = -32$	A1ft
		(2)
		(7 marks)

(a)

M1: Substitutes $x = \frac{5}{4}$ into $\mathrm{f}(x)$, equates to $\frac{243}{32}$ and attempts to make *k* the subject by taking the 5^{th} root of both sides.

A1*: $k = \frac{2}{5}$ with no errors and sufficient working shown.

Accept as a minimum $(2-k\times\frac{5}{4})^5 = \frac{243}{32} \Rightarrow (2-k\times\frac{5}{4}) = \frac{3}{2} \Rightarrow k = \frac{2}{5}$

Note that **<u>just</u>** $(2-k\times\frac{5}{4})^5 = \frac{243}{32} \Rightarrow k = \frac{2}{5}$ scores no marks as the minimum for the M mark requires taking the 5^{th} root of both sides.

Alternative by verification:

M1: $k = \frac{2}{5},\ x = \frac{5}{4} \Rightarrow (2-\frac{2}{5}\times\frac{5}{4})^5 = \left(\frac{3}{2}\right)^5 = \frac{243}{32}$

Substitutes $k = \frac{2}{5}$ and $x = \frac{5}{4}$ and attempts to raise **an evaluated** $2 - kx$ to the power of 5

A1: Hence $k = \frac{2}{5}$

Fully correct work and makes a (minimal) conclusion e.g. Hence proven, QED, Therefore true, etc.

Note that **<u>just</u>** $(2-\frac{2}{5}\times\frac{5}{4})^5 = \frac{243}{32}$ or $(2-\frac{2}{5}\times\frac{5}{4})^5 = (2-\frac{1}{2})^5 = \frac{243}{32}$ scores no marks as the $2-\frac{2}{5}\times\frac{5}{4}$ or $2-\frac{1}{2}$ must be evaluated for the M mark.