c) (BC) and (AM) are perpendicular (given)

So, $a_{(BC)} \times a_{(AM)} = -1$

$\left(-\frac{1}{7}(2m+4) = -1\right) \times (-1)$

$(2m+4) = 7$

$2m = 3$

$\boxed{m = \frac{3}{2}}$

4a) To show that M is midpt [BC]

let Q be midpt of [BC].

then $x_Q = \frac{x_B + x_C}{2}$ | $y_Q = \frac{y_B + y_C}{2}$

$= \frac{5}{2}$ | $= \frac{3}{2}$

$Q\left(\frac{5}{2} ; \frac{3}{2}\right)$ which are same as coordinates of M

→ Thus, M is midpt of [BC].

b) $BC = \sqrt{(x_C - x_B)^2 + (y_C - y_B)^2}$

$= \sqrt{7^2 + 1^2}$

$BC = \sqrt{50}$

$\boxed{BC = 5\sqrt{2}}$ units

$AM = \sqrt{(x_M - x_A)^2 + (y_M - y_A)^2}$

$= \sqrt{\left(\frac{5}{2} - 2\right)^2 + \left(\frac{3}{2} + 2\right)^2}$

$= \sqrt{\frac{1}{4} + \frac{49}{4}}$

$= \sqrt{\frac{50}{4}}$

$AM = \frac{5\sqrt{2}}{2}$ units of length

Now, $\frac{AM}{BC} = \frac{\frac{5\sqrt{2}}{2}}{\frac{5\sqrt{2}}{1}}$

$\frac{AM}{BC} = \frac{1}{2}$

Thus, $\boxed{AM = \frac{BC}{2}}$