5) Compare AB and BC

$AB = \dfrac{6+4\sqrt{3}}{3+\sqrt{3}}$, $BC = 1+\sqrt{3}$

$AB = \dfrac{(6+4\sqrt{3})(3-\sqrt{3})}{(3+\sqrt{3})(3-\sqrt{3})} = \dfrac{18-6\sqrt{3}+12\sqrt{3}-12}{6}$

$= \dfrac{6+6\sqrt{3}}{6} = \dfrac{6(1+\sqrt{3})}{6}$

$= 1+\sqrt{3}$

thus, $AB = BC = 1+\sqrt{3}$ cm

is $AC \stackrel{?}{=} 2AB$

$2+2\sqrt{3} \stackrel{?}{=} 2(1+\sqrt{3})$

$2+2\sqrt{3} = 2+2\sqrt{3}$

Thus, B is the midpoint of [AC] since A, B and C are collinear ($AC = AB+BC$) and $AB = BC$ (proved). C

2nd exercise

1) a) $MO = 3\sqrt{45} - 4\sqrt{20} - \sqrt{80} + \sqrt{125} - \sqrt{4}$

$= 3\sqrt{3^2 \times 5} - 4\sqrt{2^2 \times 5} - \sqrt{4^2 \times 5} + \sqrt{5^2 \times 5} - \sqrt{2^2}$

$= 9\sqrt{5} - 8\sqrt{5} - 4\sqrt{5} + 5\sqrt{5} - 2$

$= 2\sqrt{5} - 2$ cm

where $a = 2$ and $b = -2$.

b) $MN = \dfrac{2\sqrt{5}+2}{3+\sqrt{5}} = \dfrac{(2\sqrt{5}+2)(3-\sqrt{5})}{(3+\sqrt{5})(3-\sqrt{5})} = \dfrac{6\sqrt{5}-10+6-2\sqrt{5}}{4}$

$= \dfrac{4\sqrt{5}-4}{4}$

$= \sqrt{5}-1$ cm