Exercise 2K

Question 1:
$125a^3 + b^3 + 64c^3 - 60abc$
$= (5a)^3 + (b)^3 + (4c)^3 - 3\ (5a)\ (b)\ (4c)$
$= (5a + b + 4c)\ [(5a)^2 + b^2 + (4c)^2 - (5a)\ (b) - (b)\ (4c) - (5a)\ (4c)]$
$[\because a^3 + b^3 + c^3 - 3abc = (a+ b + c)\ (a^2 + b^2 + c^2 - ab - bc - ca)]$
$= (5a + b + 4c)\ (25a^2 + b^2 + 16c^2 - 5ab - 4bc - 20ac).$

Question 2:
$a^3 + 8b^3 + 64c^3 - 24abc$
$= (a)^3 + (2b)^3 + (4c)^3 - 3\ a\ 2b\ 4c$
$= (a + 2b + 4c)\ [a^2 + 4b^2 + 16c^2 - 2ab - 8bc - 4ca).$

Question 3:
$1 + b^3 + 8c^3 - 6bc$
$= 1 + (b)^3 + (2c)^3 - 3\ (b)\ (2c)$
$= (1 + b + 2c)\ [1 + b^2 + (2c)^2 - b - b\ 2c - 2c]$
$= (1 + b + 2c)\ (1 + b^2 + 4c^2 - b - 2bc - 2c).$

Question 4:
$216 + 27b^3 + 8c^3 - 108bc$
$= (6)^3 + (3b)^3 + (2c)^2 - 3\ 6\ 3b\ 2c$
$= (6 + 3b + 2c)\ [(6)^2 + (3b)^2 + (2c)^2 - 6\ 3b - 3b\ 2c - 2c\ 6]$
$= (6 + 3b + 2c)\ (36 + 9b^2 + 4c^2 - 18b - 6bc - 12c).$

Question 5:
$27a^3 - b^3 + 8c^3 + 18abc$
$= (3a)^3 + (-b)^3 + (2c)^3 + 3(3a)\ (-b)\ (2c)$
$= [3a + (-b) + 2c]\ [(3a)^2 + (-b)^2 + (2c)^2 - 3a\ (-b) - (-b)\ (2c) - (2c)\ (3a)]$
$= (3a - b + 2c)\ (9a^2 + b^2 + 4c^2 + 3ab + 2bc - 6ca).$

********** END **********