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MATHS

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Algebraic Expressions and Identities

Example

1. Identify the terms, their coefficients for each of the following expressions.

$5xyz^2 - 3zy$

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2. Identify the terms, their coefficients for each of the following expressions.

$1 + x + x^2$

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3. Identify the terms, their coefficients for each of the following expressions.

$4x^2y^2 - 4x^2y^2z^2$

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4. Identify the terms, their coefficients for each of the following expressions.

$3 - pq + qr - rp$

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5. Identify the terms, their coefficients for each of the following expressions.

$\frac{x}{2} + \frac{y}{2} - xy$

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6. Identify the terms, their coefficients for each of the following expressions.

$0.3a - 0.6ab + 0.5b$

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7. Classify the following polynomials monomials, binomials, tribomials. Which polynomials do not fit in any of these three categories?

$x+y,\ 1000,\ x+x^2+x^3+x^4,\ 7+y+5x,\ 2y-3y^2,\ 2y-3y^2+4y^3,\ 5x-4y+3xy,$
$4z-15z^2, ab+bc+cd+da,\ pqr,\ p^2q+pq^2,\ 2p+2q$

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8. Add the following:

ab-bc, bc-ca, ca-ab

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9. Add the following:

a-b+ab, b-c+bc, c-a + ac

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10. Add the following:

$2p^2q^2 - 3pq + 4, 5 + 7pq - 3p^2q^2$

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11. Add the following: l2 + m2, m2 + n2, n2 + l2, 2lm + 2mn + 2nl

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12. Subtract 4a - 7ab + 3b + 12 from 12a - 9ab + 5b -3

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13. Subtract 3xy + 5yz- 7zx from 5xy - 2yz -2zx + 10xyz

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14. Subtract $4p^2q - 3pq + 5pq^2 - 8p + 7q - 10$ from $18 - 3p - 11 + 5pq - 2pq^2 + 5p^2q$

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15. Find the product of the following pairs of monomials.

4,7p

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16. Find the product of the following pairs of monomials.

-4p,7p

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17. Find the product of the following pairs of monomials.

-4p, 7pq

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18. Find the product of the following pairs of monomials.

$4p^3, \ -3p$

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19. Find the product of the following pairs of monomials.

4p,0

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20. Find the areas of rectangles with the following pairs of monomals as their lengths and breadths respectively.

$(p, q), (10m, 5n), (20x^2, 5y^2), (4x, 3x^2), (3mn, 4np)$

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21. Complete the table of products.

First monomial → / Second monomial ↓	$2x$	$-5y$	$3x^2$	$-4xy$	$7x^2y$	$-9x^2y^2$
$2x$	$4x^2$	...	...	...	...	...
$-5y$	...	...	$-5x^2y$	...	...	...
$3x^2$	...	...	...	...	...	...
$-4xy$	...	...	...	...	...	...
$7x^2y$	...	...	...	...	...	...
$-9x^2y^2$	...	...	...	...	...	...

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22. Obtain the volume of rectangular boxes with the following length, breadth and height respectively.

$5a, 3a^2, 7a^4$

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23. Obtain the volume of rectangular boxes with the following length, breadth and height respectively.

$2p, 4q, 8r$

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24. Obtain the volume of rectangular boxes with the following length, breadth and height respectively.

$xy, 2x^2y, 2xy^2$

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25. Obtain the volume of rectangular boxes with the following length, breadth and height respectively.

a, 2b,3c

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26. Obtain the product of

xy, yz, zx

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27. Obtain the product of

$a, \ -a^2, a^3$

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28. Obtain the product of

$2, 4y, 8y^2, 16y^3$

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29. Obtain the product of

$a, 2b, 3c, 6abc$

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30. Obtain the product of

$m, -mn, mnp$

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31. Carry out the multiplication of the expressions in each of the following pair.

4p,q+r

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32. Carry out the multiplication of the expressions in each of the following pair.

ab,a-b

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33. Carry out the multiplication of the expressions in each of the following pair.

$a + b, 7a^2b^2$

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34. Carry out the multiplication of the expressions in each of the following pair.

$a^2 - 9, 4a$

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35. Carry out the multiplication of the expressions in each of the following pair.

pq + qr + rp,0

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36. Complete the table.

	First expression	Second expression	Product
(i)	a	$b+c+d$	.....
(ii)	$a+y-5$	$5xy$	.....
(iii)	p	$6p^2-7p+5$	.....
(iv)	$4p^2q^2$	p^2-q^2	.....
(v)	$a+b+c$	abc	.....

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37. Find the product.

$(a^2) \times (2a^{22})$x (4a^26)`

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38. Find the product.

$\left(\frac{2}{3}xy\right) \times \left(\frac{-9}{10}x^2y^2\right)$

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39. Find the product.

$\left(-\frac{10}{3}pq^3\right)\right) \times \left(\frac{6}{5}p^3q\right)\right)$

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40. Find the product.

$x \times x^2 \times x^3 \times x^4$

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41. Simplify 3 x (4x-5) +3 and find its values for

$x = \frac{1}{2}$

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42. Simplify $a\left(a^2+a+1\right)+5$ and find its value for

a = 0

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43. Simplify $a\left(a^2+a+1\right)+5$ and find its value for

a=1

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44. Simplify $a\left(a^2+a+1\right)+5$ and find its value for

a = -1

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45. Add : p(p-q),q(q-r) and (r-p)

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46. Add : 2x(z-x-y) and 2y(z-y-x)

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47. Subtract : 3l(l - 4m + 5n) from 4l(10n - 3m + 2l)

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48. Subtract : 3a(a+b+c)-2b(a-b+c) from 4c(-a + b +c)

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49. Multiply the binomials.

(2x+5) and (4x -3)

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50. Multiply the binomials.

(y-8) and (3y -4)

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51. Multiply the binomials.

(2.5l - 0.5m) and (2.5l + 0.5m)

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52. Multiply the binomials.

(a+3b) and (x + 5)

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53. Multiply the binomials.

$(2pq + 3q^2)$ and $(3pq - 2q^2)$

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54. Multiply the binomials.

$\left(\frac{3}{4}a^2 + 3b^2\right)$ and $4\left(a^2 - \frac{2}{3}b^2\right)$

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55. Find the product:

(5-2x)(3+x)

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56. Find the product:

(x + 7y) (7x-y)

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57. Find the product:

$\left(a^2+b\right)\left(a+b^2\right)$

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58. Find the product:

$$(p^2 - q^2)(2p + q)$$

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59. Simplify.

$$(x^2 - 5)(x + 5) + 25$$

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60. Simplify.

$$\left(a^2+5\right)\left(b^3+3\right)+5$$

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61. Simplify.

$$\left(t+s^2\right)\left(t^2-s\right)$$

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62. Simplify.

(a+b)(c-d) + (a-b)(c+d) +2 (ac + bd)

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63. Simplify.

$(x + y)(2x + y) + (x + 2y)(x - y)$

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64. Simplify.

$(x + y)\left(x^2 - xy + y^2\right)$

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65. Simplify.

$(1.5x - 4y)(1.5x + 4y + 3) - 4.5x + 12y$

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66. Simplify.

$(a + b + c)(a + b + c)$

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67. Use a suitable identity to get each of the following products

$(x+3)(x+3)$

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68. Use a suitable identity to get each of the following products

$(2y+5)(2y+5)$

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69. Use a suitable identity to get each of the following products

$(2a-7)(2a-7)$

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70. Use a suitable identity to get each of the following products

$$\left(3a - \frac{1}{2}\right)\left(3a - \frac{1}{2}\right)$$

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71. Use a suitable identity to get each of the following products

$$(1.1m - 0.4)(1.1m + 0.4)$$

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72. Use a suitable identity to get each of the following products

$(a^2 + b^2)(-a^2 + b^2)$

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73. Use a suitable identity to get each of the following products

$(6x - 7)(6x + 7)$

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74. Use a suitable identity to get each of the following products

$(-a+c)(-a+c)$

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75. Use a suitable identity to get each of the following products

$\left(\frac{x}{2}+\frac{3y}{4}\right)$
$\left(\frac{x}{2}+\frac{3y}{4}\right)$

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76. Use a suitable identity to get each of the following products

$(7a - 9b)(7a - 9b)$

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77. Use the identity $(x + a)(x + b) = x^2 + (a + b)x + ab$ to find the following products.

$(x + 3)(x + 7)$

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78. Use the identity $(x+a)(x+b) = x^2 + (a+b)x + ab$ to find the following products.

$(4x+5)(4x+1)$

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79. Use the identity $(x+a)(x+b) = x^2 + (a+b)x + ab$ to find the following products.

$(4x-5)(4x-1)$

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80. Use the identity $(x+a)(x+b) = x^2 + (a+b)x + ab$ to find the following products.

$(4x+5)(4x-1)$

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81. Use the identity $(x+a)(x+b) = x^2 + (a+b)x + ab$ to find the following products.

$(2x+5y)(2x+3y)$

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82. Use the identity $(x+a)(x+b) = x^2 + (a+b)x + ab$ to find the following products.

$(2a^2 + 9)(2a^2 + 5)$

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83. Use the identity $(x+a)(x+b) = x^2 + (a+b)x + ab$ to find the following products.

$(xyz - 4)(xyz - 2)$

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84. Find the following squares by using the identities.

$(b-7)^2$

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85. Find the following squares by using the identities.

$(xy+3z)^2$

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86. Find the following squares by using the identities.

$(6x^2 - 5y)^2$

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87. Find the following squares by using the identities.

$\left(\frac{2}{3}m + \frac{3}{2}n\right)^2$

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88. Find the following squares by using the identities.

$(0.4p - 0.4q)^2$

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89. Find the following squares by using the identities.

$(2xy + 5y)^2$

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90. Simplify:

$$(a^2 - b^2)^2$$

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91. Simplify:

$$(3x + 5)^2 - (2x - 5)^2$$

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92. Simplify:

$$(7m - 8n)^2 + (7m + 8n)^2$$

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93. Simplify:

$(4m + 5n)^2 + (5m + 4n)^2$

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94. Simplify:

$(2.5p - 1.5q)^2 - (1.5p - 2.5q)^2$

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95. Simplify:

$(ab + bc)^2 - 2ab^2c$

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96. Simplify:

$(m^2 - n^2m)^2 + 2m^3n^2$

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97. Show that:

$(3x + 7)^2 - 84x = (3x - 7)^2$

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98. Show that:

$$(9p - 5q)^2 + 180pq = (9p + 5q)^2$$

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99. Show that:

$$\left(\frac{4}{3}m - \frac{3}{4}n\right)^2 + 2mn = \frac{16}{9}m^2 + \frac{9}{16}n^2$$

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100. Show that:

$(4pq + 3q)^2 - (4pq - 3q)^2 = 48pq^2$

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101. Show that:

$(a - b)(a + b) + (b - c)(b + c) + (c - a)(c + a) = 0$

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102. Using identities, evaluate.

71^2

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103. Using identities, evaluate.

99^2

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104. Using identities, evaluate.

102^2

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105. Using identities, evaluate.

998^2

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106. Using identities, evaluate.

5.2^2

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107. Using identities, evaluate.

297×303

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108. Using identities, evaluate.

78×82

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109. Using identities, evaluate.

8.9^2

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110. Using identities, evaluate.

10.5×9.5

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111. Using (x+a)(x+b) = x^2 + (a+b)x + ab, find

103 x 104

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112. Using `(x+a)(x+b) = x^2 + (a+b)x + ab, find 5.1 x

5.2

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113. Using (x+a)(x+b) = x^2 + (a+b)x + ab, find

103 x 98

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114. Using (x+a)(x+b) = x^2 + (a+b)x + ab, find

9.7 x 9.8

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115. Give five examples of expressions containing one variable and five example of expressiosn containing two variables.

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116. Show on the number line

$x, x-4, 2x+1, 3x-2$

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117. Classify the following polynomials as monomials, binomials, trinomials.

$-z+5, x+y+z, y+z+100, ab-ac, 17$

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118. Identify the co-efficient of each term in the expression :

$x^2y^2-10x^2y+5xy^2-20$

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119. Write two terms which are like

$7xy$

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120. Write two terms which are like

$4mn^2$

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121. Write two terms which are like

21

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122. Construct

3 binomials with x as a variable,

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123. Construct

3 binomials with x and y as a variable,

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124. Construct

3 binomials with x and y as a variable,

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125. Construct

2 polynomials with 4 or more terms.

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126. Can you think of two more such situations, where we may need to multiply algebraic

expressions?

127. Find $4x \times 5y \times 7z$. First find $4x \times 5y$ and multiply it by 7z or first find $5y \times 7z$ and multiply it by 4x: Is the result the same? What do you observe? Does the order in which you carry out the multiplication matter?

128. Find the product.

$2x(3x + 5xy)$

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129. Find the product.

$a^2(2ab - 5c)$

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130. Find the product:

$\left(4p^2 + 5p + 7\right) \times 3p$

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131. Verify the identify (x+a)(x+b) = x2 +(a+b)x+ab, for a =2,b=3, x=5

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132. If a =-2, b=0, find the value of $(a+b)^2$ and a^2-ab+b^2

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133. If a =0, b =3, find the value of $\frac{a^2+2ab+b^2}{a^2-2ab+b^2}$

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