The Maths Society

$$2x^2 + 5x + 3 = (2x + 3)(x + 1)$$

$$k(a + b) = k \times a + k \times b$$

$$(a + b)(c + d) = a \times c + a \times d + b \times c + b \times d$$

Factorisation

$$x^3 + 3x^2 - 6x - 18 = 0$$

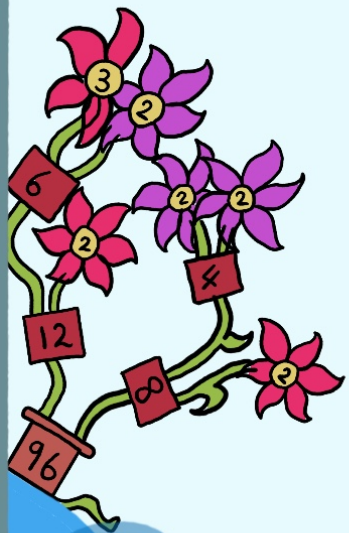
$$x^2(x + 3) \quad -6(x + 3)$$

Formula

$$2(x+y) = \underbrace{2x + 2y}$$

Product of factors

- **2** is an Integer
- **x** is a Variable
- **2x + 2y** together is an Expression



Question 1

Factorise completely.

$12x^2 + 15xy - 9x$ [2]

$3x(4x + 5y - 3)$

Question 2

Expand the brackets and simplify.

$(5 - n)(3 + n)$ [2]

$15 + 5n - 3n + n^2$

$n^2 + 2n + 15$

Question 3

Factorise completely.

$12n^2 - 4mn$ [2]

$4n(3n - m)$

Question 4

Factorise.

$14x - 21y$ [1]

$7(2x - 3y)$

Question 5

Factorise completely. [2]

$4x^2 - 8xy$

$4x(x - 2y)$

Question 6

[1]

(a) Simplify.

$$\frac{4(x-6)}{(x-6)}$$

$4x - 24$

(b) Expand the brackets and simplify.

$(x+4)^2 + 5(3x+2)$ [3]

$x^2 + 8x + 16 + 15x + 10$

$x^2 + 23x + 26$

Question 7

Expand the brackets and simplify.

$4(5w+3) - 2(w-1)$ [2]

$20x + 12 - 2w + 2$

$18x + 14$

Question 8

Factorise.

(a) $m^3 + m$ [1]

$m(m^2+1)$

(b) $25 - y^2$ [1]

$(5-y)(5+y)$

(c) $x^2 + 3x - 28$ [2]

$(x+7)(x-4)$

Question 9

$y = x^2 + 7x - 5$ can be written in the form $y = (x + a)^2 + b$.

Find the value of a and the value of b. [3]

$x^2 + 2ax + a^2 + b$

$2a = 7$ $\quad a^2 + b = -5$

$a = \frac{7}{2}$ $\quad \frac{49}{4} + b = -5$

$b = \frac{-20 - 49}{4}$

$= -\frac{69}{4} = -17\frac{1}{4}$

$y = (x + \frac{7}{2})^2 - \frac{69}{4}$

Question 10

Factorise $2x - 4xy$. [2]

$2x(1 - 2y)$

Question 11

Factorise

(a) $9w^2 - 100$, [1]

$(3w - 10)(3w + 10)$

(b) $mp + np - 6mq - 6nq$. [2]

$p(m+n) - 6q(m+n)$

$(m+n)(p-6q)$

Question 1

Factorise completely.

$2x - 4x^2$ [2]

$2x(1 - 2x)$

Question 2

Expand and simplify.

$x(2x + 3) + 5(x - 7)$ [2]

$2x^2 + 3x + 5x - 35$

$2x^2 + 8x - 35$

Question 3

Factorise completely.

$9x^2 - 6x$ [2]

$3x(3x - 2)$

Question 4

Factorise $2x^2 - 5x - 3$. [2]

$(2x+1)(x-3)$ $2 \times 1 = 2$, $1 \times -3 = -3$, $+x - 6x$

Question 5

Factorise $14p^2 + 21pq$. [2]

$7p(2p + 3q)$

Question 6

Factorise completely.

(a) $ax + ay + bx + by$ [2]

$a(x+y) + b(x+y)$

$(x+y)(a+b)$

(b) $3(x-1)^2 + (x-1)$ [2]

$(x-1)[3x-3+1]$

$(x-1)(3x-2)$

Question 7

Factorise Completely.

$15a^3 - 5ab$ [2]

$5a(3a^2 - b)$

Question 8

Factorise completely.

(a) $a + b + at + bt$ [2]

$(a+b)(1+t)$

(b) $x^2 - 2x - 24$ [2]

$(a-6)(a+4)$

Question 9

Factorise completely.

$12xy - 3x^2$ [2]

$3x(4y - x)$

Question 10

Factorise completely.

$ap + bp - 2a - 2b$ [2]

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

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

Question 1

Factorise completely.

$kp + 3k + mp + 3m$ [2]

$k(p+3) + m(p+3)$

$(p+3)(k+m)$

Question 2

Factorise completely.

$15p^2 + 24pt$ [2]

$3p(5p+8t)$

Question 3

(a) Find the value of $7p - 3q$ when $p = 8$ and $q = -5$. [2]

$56 + 15 = 71$

(b) Factorise completely.

$3uv + 9vw$ [2]

$3v(u+3w)$

Question 4

Factorise completely $ax + bx + ay + by$. [2]

$(x+y)(a+b)$

Question 5

Factorise completely.

$p^2x - 4q^2x$ [3]

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

Question 6

Factorise completely.

$2xy - 4yz$ [2]

$2y(x - 2z)$

Question 7

Factorise

(a) $4x^2 - 9$, [1]

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

(b) $4x^2 - 9x$, [1]

$x(4x - 9)$

(c) $4x^2 - 9x + 2$. [2]

$4 \times 2 = 8$, $-1 - 8 = -9$, $1 \times -2 = -2$

$(4x - 1)(x - 2)$

Question 8

(a) $7ac + 14a$, [1]

$7a(c + 2)$

(b) $12ax^3 + 18xa^3$. [2]

$6ax(2x^2 + 3a^2)$

Question 9

(a) Factorise completely $12x^2 - 3y^2$. [2]

$3(4x^2 - y^2) = 3(2x - y)(2x + y)$

(b) (i) Expand $(x - 3)^2$. [2]

$x^2 - 6x + 9$

(ii) $x^2 - 6x + 10$ is to be written in the form $(x - p)^2 + q$. [2]

Find the values of p and q.

$x^2 - 2px + p^2 + q$

$2p = 6$, $p = 3$

$p^2 + q = 10$, $9 + q = 10$

$q = 1$

$(x - 3)^2 + 1$