# Chhetri Academy

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**GCSE MATHS**

Algebra

**Edexcel 1MA1 | Subtopic collection Topic 13**

# Factorising

## Higher tier

Past paper question booklet

| 70 | 2003-2025 | Higher |
| --- | --- | --- |
| question groups | available papers | tier |

### Before you begin

1. Show working and use units where appropriate.
2. Use extra paper if you need more space.
3. Print at actual size (100%) for measurement questions.

**Name** _____ **Date** _____

Whole questions are retained for context; some parts cover other points. Legacy sources are labelled.

**4.** (a) Expand and simplify

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

.....

**(2)**

(b) Factorise

$$y^2 + y$$

.....

**(1)**

**17.** (a) Factorise

$$9x^2 - 6x + 1$$

.....

**(2)**

(b) Simplify

$$\frac{6x^2 + 7x - 3}{9x^2 - 6x + 1}$$

.....

**(3)**

**7.** (a) Simplify $k^5 \div k^2$

.....
**(1)**

(b) Expand and simplify

(i) $4(x+5)+3(x-7)$

.....
**(4)**

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

.....
**(1)**

(c) Factorise $(p+q)^2+5(p+q)$

.....
**(1)**

(d) Simplify $(m^{-4})^{-2}$

.....
**(1)**

(e) Simplify $2t^2 \times 3r^3t^4$

.....
**(2)**

Do not write here

**19.** (a) (i) Factorise $2x^2 - 35x + 98$

.....

(ii) Solve the equation $2x^2 - 35x + 98 = 0$

.....

**(3)**

A bag contains $(n + 7)$ tennis balls.
$n$ of the balls are yellow.
The other 7 balls are white.

John will take at random a ball from the bag.
He will look at its colour and then put it back in the bag.

(b) (i) Write down an expression, in terms of $n$, for the probability that John will take a white ball.

.....

Bill states that the probability that John will take a white ball is $\frac{2}{5}$

(ii) Prove that Bill's statement cannot be correct.

**(3)**

Blank

After John has put the ball back into the bag, Mary will then take at random a ball from the bag.
She will note its colour.

(c) Given that the probability that John and Mary will take balls with **different** colours is $\frac{4}{9}$,
prove that $2n^2 - 35n + 98 = 0$

**(5)**

(d) Using your answer to part (a) (ii) or otherwise, calculate the probability that John and Mary will both take white balls.

.....

**(2)**

**Page Total**

**6.** (a) Simplify $a^3 \times a^4$

.....
**(1)**

(b) Simplify $3x^2y \times 5xy^3$

.....
**(2)**

(c) Simplify $\dfrac{(x-1)^2}{x-1}$

.....
**(1)**

(d) Factorise $a^2 - 9b^2$

.....
**(2)**

**(Total 6 marks)**

**Q6**

blank

**21.** (a) Expand $x(3 - 2x^2)$

.....

**(2)**

(b) Factorise completely $12xy + 4x^2$

.....

**(2)**

(c) Simplify $\dfrac{20a^2}{4ab^2}$

.....

**(2)**

(d) Simplify $\dfrac{x-3}{x^2-9}$

.....

**(2)**

**Q21**

**(Total 8 marks)**

blank

**9.** (a) Factorise completely $3a^2 - 6a$

.....

**(2)**

(b) Make $q$ the subject of the formula $P = 2q + 10$

$q =$ .....

**(2)**

(c) Expand and simplify $(y + 3)(y - 4)$

.....

**(2)**

(d) Factorise $4p^2 - 9q^2$

.....

**(2)**

**Q9**

**(Total 8 marks)**

**16.** (a) Factorise fully $4x^2 - 6xy$

.....

**(2)**

(b) Factorise $x^2 + 5x - 6$

.....

**(2)**

**Q16**

**(Total 4 marks)**

**10.** (a) Simplify $3a + 4c - a + 3c$

.....

**(2)**

(b) Expand $y(2y - 3)$

.....

**(1)**

(c) Factorise $x^2 - 4x$

.....

**(2)**

(d) Expand and simplify $2(x + 3) + 3(2x - 1)$

.....

**(2)**

(e) Solve $3(x + 2) = 8$

$x =$ .....

**(2)**

**Q10**

**(Total 9 marks)**

**3.** (a) $p = 2$
$q = -4$

Work out the value of $3p + 5q$

.....
**(2)**

(b) Factorise $3m - 6$

.....
**(1)**

**Q3**

**(Total 3 marks)**

Blank

**17.** (a) Factorise $3x + 12$

.....

**(1)**

(b) Solve $4(2x - 3) = 5x + 7$

$x =$ .....

**(3)**

(c) Expand and simplify $(y + 4)(y + 5)$

.....

**(2)**

(d) Factorise fully $8x^2 + 12xy$

.....

**(2)**

**Q17**

**(Total 8 marks)**

**19.** (a) Factorise $x^2 - 7x + 10$

.....

**(2)**

(b) Solve $x^2 - 7x + 10 = 0$

$x =$ .....

or $x =$ .....

**(1)**

**(Total 3 marks)**

Blank

**Q19**

Blank

**16.** (a) Expand and simplify $3(x + 5) + 2(5x - 6)$

.....

**(2)**

(b) Simplify $\frac{2x+4}{2}$

.....

**(1)**

(c) Factorise $5x + 10$

.....

**(1)**

(d) Factorise fully $x^2y + xy^2$

.....

**(2)**

**Q16**

**(Total 6 marks)**

**10** (a) Factorise fully $20w^2y + 24wy^3$

.....

**(2)**

(b) Factorise $m^2 + 3m - 40$

.....

**(2)**

**(Total for Question 10 is 4 marks)**

**11** (a) Expand $3(x + 2)$

.....

**(2)**

(b) Factorise completely $12\ x^3y - 18\ xy^2$

.....

**(2)**

(c) Expand and simplify $(2x - 3)(x + 4)$

.....

**(2)**

(d) Simplify $5x^4y^3 \times 2x^3y^2$

.....

**(2)**

**(Total for Question 11 is 8 marks)**

**15.** (a) Expand $x(x + 2)$

.....

**(2)**

(b) Expand and simplify $(x + 3)(x – 4)$

.....

**(2)**

(c) Factorise completely $2y^2 – 4y$

.....

**(2)**

(d) Factorise $x^2 – 9$

.....

**(1)**

**(Total 7 marks)**

**Q15**

**2** (a) Simplify $3y + 2x - 4 + 5x + 7$

.....

**(1)**

(b) Factorise $2x^2 - 4x$

.....

**(2)**

(c) Expand and simplify $11 - 3(x+2)$

.....

**(2)**

(d) Expand and simplify $(x-6)(3x+7)$

.....

**(2)**

**(Total for Question 2 is 7 marks)**

**20.** (a) Factorise $2x^2 - 9x + 4$

.....

**(2)**

Hence, or otherwise,

(b) solve $2x^2 - 9x + 4 = (2x - 1)^2$

.....

**(4)** **Q20**

**(Total 6 marks)**

**14.** (a) Factorise $6x + 4$

.....

**(1)**

(b) Factorise fully $9x^2y - 15xy$

.....

**(2)**

**(Total 3 marks)**

Blank

**Q14**

**23.** (a) Factorise $x^2 + px + qx + pq$

.....

**(2)**

(b) Factorise $m^2 - 4$

.....

**(1)**

(c) Write as a single fraction in its simplest form $\frac{2}{x-4} - \frac{1}{x+3}$

.....

**(3)**

**(Total 6 marks)**

Q23

**2** (a) Simplify $5f \times 4g$

.....

**(1)**

(b) Expand and simplify $9a + 3(8 - 2a)$

.....

**(2)**

(c) Simplify $c^2 \times c^6$

.....

**(1)**

(d) Simplify $(x^5)^3$

.....

**(1)**

(e) Factorise $7y + 21$

.....

**(1)**

**(Total for Question 2 is 6 marks)**

**12** (a) Factorise $e^2 - 100$

.....

**(1)**

(b) Factorise $2x^2 - 7x - 15$

.....

**(2)**

(c) Simplify $\dfrac{(g-7)^9}{(g-7)^3}$

.....

**(1)**

**(Total for Question 12 is 4 marks)**

**5** (a) Simplify $2e - 8f + 6e + 3f$

.....

**(2)**

(b) Factorise $4t + 10$

.....

**(1)**

(c) Expand and simplify $3 + 2(p - 1)$

.....

**(2)**

(d) Factorise $ax + bx + ay + by$

.....

**(2)**

**(Total for Question 5 is 7 marks)**

**8** (a) Expand $3(2y - 5)$

.....

**(1)**

(b) Factorise completely $8x^2 + 4xy$

.....

**(2)**

(c) Make $h$ the subject of the formula

$$t = \frac{gh}{10}$$

$h =$ .....

**(2)**

**(Total for Question 8 is 5 marks)**

**16** (a) Simplify $(m^{-2})^5$

.....

**(1)**

(b) Factorise $x^2 + 3x - 10$

.....

**(2)**

**(Total for Question 16 is 3 marks)**

**14** (a) Expand and simplify $(p + 9)(p - 4)$

.....

**(2)**

(b) Solve $\frac{5w - 8}{3} = 4w + 2$

$w =$ .....

**(3)**

(c) Factorise $x^2 - 49$

.....

**(1)**

(d) Simplify $(9x^8y^3)^{\frac{1}{2}}$

.....

**(2)**

**(Total for Question 14 is 8 marks)**

**6** (a) Factorise $10a + 5$

.....

**(1)**

(b) Expand and simplify $5(x + 7) + 3(x - 2)$

.....

**(2)**

(c) Factorise completely $3a^2b + 6ab^2$

.....

**(2)**

**(Total for Question 6 is 5 marks)**

**12** (a) Expand and simplify $(x + 5)(x - 8)$

.....

**(2)**

(b) Factorise $x^2 - 16$

.....

**(1)**

**(Total for Question 12 is 3 marks)**

**14** (a) Factorise $x^2 + 7x$

.....

**(1)**

(b) Factorise $y^2 - 10y + 16$

.....

**(2)**

*(c) (i) Factorise $2t^2 + 5t + 2$

.....

(ii) $t$ is a positive whole number.

The expression $2t^2 + 5t + 2$ can never have a value that is a prime number.

Explain why.

.....

.....

.....

**(3)**

**(Total for Question 14 is 6 marks)**

**14** (a) Factorise $x^2 + 5x + 4$

.....

**(2)**

(b) Expand and simplify $(3x - 1)(2x + 5)$

.....

**(2)**

(c) Write as a single fraction $\frac{1}{2x} + \frac{1}{5x} - \frac{1}{3x}$

.....

**(2)**

**(Total for Question 14 is 6 marks)**

**20** (a) (i) Factorise $x^2 - 12x + 27$

.....

(ii) Solve the equation $x^2 - 12x + 27 = 0$

.....

**(3)**

(b) Factorise $y^2 - 100$

.....

**(1)**

**(Total for Question 20 is 4 marks)**

**11** (a) Expand and simplify $3(x + 4) + 2(5x - 1)$

.....

**(2)**

(b) Expand and simplify $(2x + 1)(x - 4)$

.....

**(2)**

(c) Factorise completely $6y^2 - 9xy$

.....

**(2)**

**(Total for Question 11 is 6 marks)**

**9** (a) Factorise $3t + 12$

.....

**(1)**

(b) (i) Expand and simplify $7(2x + 1) + 6(x + 3)$

.....

(ii) Show that when $x$ is a whole number

$$7(2x + 1) + 6(x + 3)$$

is always a multiple of 5

**(3)**

**(Total for Question 9 is 4 marks)**

**19** (a) Factorise $6 + 9x$

.....

**(1)**

(b) Factorise $y^2 - 16$

.....

**(1)**

(c) Factorise $2p^2 - p - 10$

.....

**(2)**

**(Total for Question 19 is 4 marks)**

## Question 35



**12** Simplify fully $(x + 5)^2 - (x - 5)^2$

.....

**(Total for Question 12 is 2 marks)**

**4** (a) Simplify $4y + 2x - 3 + 3x + 8$

.....

**(2)**

(b) Factorise fully $9x^2 - 6xy$

.....

**(2)**

(c) Expand $4(x + 2)$

.....

**(1)**

(d) Expand and simplify $(x - 5)(x + 3)$

.....

**(2)**

**(Total for Question 4 is 7 marks)**

**21** (a) Factorise $4x^2 - 9$

.....

**(1)**

(b) Make $m$ the subject of

$$g - 3m = am + 5$$

.....

**(3)**

**(Total for Question 21 is 4 marks)**

**12** (a) Factorise fully $6ab + 10ac$

.....

**(2)**

(b) Expand and simplify $(x - 5)(x + 7)$

.....

**(2)**

(c) Simplify $\dfrac{2m^2t^6}{m^4t^2}$

Give your answer in its simplest form.

.....

**(2)**

(d) Factorise $y^2 - 16$

.....

**(1)**

(e) Simplify $(h^2)^{-3}$

.....

**(1)**

**(Total for Question 12 is 8 marks)**

**20** Solve, by factorising, the equation $8x^2 - 30x - 27 = 0$

.....

**(Total for Question 20 is 3 marks)**

**20** Solve, by factorising, the equation $8x^2 - 30x - 27 = 0$

.....

**(Total for Question 20 is 3 marks)**

**6** (a) Expand $2m(m + 3)$

.....

**(1)**

(b) Factorise fully $3xy^2 - 6xy$

.....

**(2)**

**(Total for Question 6 is 3 marks)**

**10** (a) Expand and simplify $(2x + 1)(x + 3)$

.....

**(2)**

(b) Factorise fully $4x^2 + 8xy$

.....

**(2)**

**(Total for Question 10 is 4 marks)**

**12** (a) Factorise $3e^2 + 5e$

.....

**(1)**

(b) Solve $7(k - 3) = 3k - 5$

$k =$ .....

**(3)**

(c) Expand and simplify $(2x + 3)(x - 8)$

.....

**(2)**

(d) Solve $\frac{7 - 3f}{4} = 2$

$f =$ .....

**(3)**

**(Total for Question 12 is 9 marks)**

**3** $f = 3g + 7h$

(a) Work out the value of $f$ when $g = -5$ and $h = 2$

$f =$ .....

**(2)**

(b) Factorise $3x + 6$

.....

**(1)**

(c) Expand and simplify $5(y - 2) + 2(y - 3)$

.....

**(2)**

(d) Simplify $m^5 \times m^3$

.....

**(1)**

(e) Simplify $\frac{p^6}{p^2}$

.....

**(1)**

**(Total for Question 3 is 7 marks)**

**11** (a) Simplify $2x^3y^5 \times 3x^2y^3$

.....

**(2)**

(b) Expand and simplify $(2x - 3)(3x - 1)$

.....

**(2)**

(c) Factorise completely $8x^3y^5 - 12x^4y^2$

.....

**(2)**

(d) Factorise $2e - 4f + ex - 2fx$

.....

**(2)**

**(Total for Question 11 is 8 marks)**

**8** (a) Simplify $6g - 5h - 4g + 2h$

.....

**(2)**

(b) Factorise $y^2 - 2y$

.....

**(1)**

(c) Simplify fully $\dfrac{p^3 \times p^4}{p^2}$

.....

**(2)**

**(Total for Question 8 is 5 marks)**

**7** (a) Expand and simplify $3(y - 2) + 2(y + 5)$

.....

**(2)**

(b) Simplify $\frac{w^5}{w^3}$

.....

**(1)**

(c) Factorise $5x + 20$

.....

**(1)**

**(Total for Question 7 is 4 marks)**

**15** (a) Factorise $y^2 - 5y - 14$

.....

**(2)**

(b) Expand and simplify $(2\sqrt{5} + 1)(3\sqrt{5} - 1)$

.....

**(2)**

(c) Write $\frac{6}{\sqrt{12}}$ in the form $\sqrt{n}$, where $n$ is an integer.

.....

**(2)**

**(Total for Question 15 is 6 marks)**

**10** (a) Expand $x(x + 2)$

.....

**(1)**

(b) Expand and simplify $3(y + 2) + 4(x - 1)$

.....

**(2)**

(c) Expand and simplify $(2t - 3)(t + 5)$

.....

**(2)**

(d) Factorise fully $8a^2 + 12a$

.....

**(2)**

(e) Factorise $y^2 - y - 2$

.....

**(2)**

**(Total for Question 10 is 9 marks)**

**8** (a) Factorise $12e + 4$

.....

**(1)**

(b) Expand $5(3c - 2d)$

.....

**(1)**

(c) Simplify $7a^3b^{-2} \times 4ab^5$

.....

**(2)**

(d) Factorise $x^2 - 49$

.....

**(1)**

(e) Expand and simplify $(2y + 7)(y - 3)$

.....

**(2)**

**(Total for Question 8 is 7 marks)**

**4** (a) Simplify $p^2 \times p^5$

.....

**(1)**

(b) Simplify $g^6 \div g^4$

.....

**(1)**

(c) Simplify $(k^3)^2$

.....

**(1)**

(d) Expand and simplify $3(m + 4) - 2(4m + 1)$

.....

**(2)**

(e) Factorise $n^2 - 7n$

.....

**(1)**

**(Total for Question 4 is 6 marks)**

**2** (a) Simplify $3a \times 5b \times 2c$

.....

**(1)**

(b) Factorise $3y + 6$

.....

**(1)**

(c) Expand $x(x - 3)$

.....

**(1)**

**(Total for Question 2 is 3 marks)**

**12** (a) Factorise $2ax - 2ay + bx - by$

.....

**(2)**

(b) Expand and simplify $(n + 2)^2 + (n - 3)^2$

.....

**(3)**

**(Total for Question 12 is 5 marks)**

**12** (a) Simplify fully $\dfrac{n^7 \times n^3}{n^6}$

.....

**(2)**

(b) Expand and simplify $x(x - 2) + 2x(x + 3)$

.....

**(2)**

(c) Factorise $5y - 15$

.....

**(1)**

(d) Factorise fully $18ab + 27ab^2$

.....

**(2)**

**(Total for Question 12 is 7 marks)**

**19** (a) Expand and simplify $(y + 2)(y + 5)$

.....

**(2)**

(b) Factorise $e^2 + e - 12$

.....

**(2)**

(c) Solve $3x^2 - x - 1 = 0$
Give your solutions correct to 2 decimal places.

.....

**(3)**

**(Total for Question 19 is 7 marks)**

**2** (a) Expand and simplify $7a + 4(a - 2b)$

.....

**(2)**

(b) Simplify $n^6 \times n^5$

.....

**(1)**

(c) Factorise $5x + 10$

.....

**(1)**

**(Total for Question 2 is 4 marks)**

**20** (a) Simplify $(x^{-2})^{-3}$

.....

**(1)**

(b) Factorise $2y^2 - 5y - 3$

.....

**(2)**

**(Total for Question 20 is 3 marks)**

**8** (a) Simplify $ab - 5g + 5ab - 2g$

.....

**(2)**

(b) Factorise $6m - 9$

.....

**(1)**

(c) Simplify $t^8 \div t^3$

.....

**(1)**

(d) Factorise fully $2x^2y + 4xy^2$

.....

**(2)**

(e) Expand and simplify $(w - 5)^2$

.....

**(2)**

**(Total for Question 8 is 8 marks)**

## Question 59

June 2018 | 1MA1/1H | Original Q15

**15** (a) Factorise $a^2 - b^2$

.....

**(1)**

(b) Hence, or otherwise, simplify fully $(x^2 + 4)^2 - (x^2 - 2)^2$

.....

**(3)**

**(Total for Question 15 is 4 marks)**

## Question 60

November 2018 | 1MA1/1H | Original Q10

**10** (a) Simplify $\dfrac{x-1}{5(x-1)^2}$

.....

**(1)**

(b) Factorise fully $50 - 2y^2$

.....

**(2)**

**(Total for Question 10 is 3 marks)**

## Question 61

November 2019 | 1MA1/1H | Original Q13

**13** (a) Write $\frac{5}{x+1} + \frac{2}{3x}$ as a single fraction in its simplest form.

.....

**(2)**

(b) Factorise $(x + y)^2 + 3(x + y)$

.....

**(1)**

**(Total for Question 13 is 3 marks)**

## Question 62



**1** (a) Expand and simplify $(x + 5)(x - 9)$

.....

**(2)**

(b) Factorise fully $9x^2 + 6x$

.....

**(2)**

**(Total for Question 1 is 4 marks)**

## Question 63



**1** (a) Simplify $(x^3)^5$

.....

**(1)**

(b) Expand and simplify $4(x + 3) + 7(4 - 2x)$

.....

**(2)**

(c) Factorise fully $15x^3 + 3x^2y$

.....

**(2)**

**(Total for Question 1 is 5 marks)**

**14** (a) Factorise fully $4p^2 - 36$

.....

**(2)**

(b) Show that $(m + 4)(2m - 5)(3m + 1)$ can be written in the form $am^3 + bm^2 + cm + d$ where $a$, $b$, $c$ and $d$ are integers.

**(3)**

**(Total for Question 14 is 5 marks)**

## Question 65

June 2023 | 1MA1/3H | Original Q15

**15** (a) Factorise $a^2 - b^2$

.....

**(1)**

(b) Show that $2^{40} - 1$ is the product of two consecutive odd numbers.

**(2)**

**(Total for Question 15 is 3 marks)**

## Question 66

November 2023 | 1MA1/1H | Original Q17

**17** (a) Factorise $6x^2 - 5x - 4$

.....

**(2)**

(b) Hence, or otherwise, solve $6x^2 - 5x - 4 < 0$

.....

**(2)**

**(Total for Question 17 is 4 marks)**

**1** (a) Expand and simplify $3(2y - 5) + 7(y + 2)$

.....

**(2)**

(b) Factorise fully $6x^2 + 15x$

.....

**(2)**

(c) Make $g$ the subject of the formula $f = 3g + 11$

.....

**(2)**

**(Total for Question 1 is 6 marks)**

## Question 68

June 2024 | 1MA1/3H | Original Q15

**15** (a) Simplify fully $\dfrac{(a-3)^2}{5(a-3)}$

.....

**(1)**

(b) Factorise $3k^2 + 11k - 4$

.....

**(2)**

(c) Simplify fully $\dfrac{4-x^2}{x^2+3x} \div \dfrac{x+2}{x+3}$

.....

**(3)**

**(Total for Question 15 is 6 marks)**

## Question 69



**11** Kate was asked to factorise $x^2 + 5x + 6$ in the form $(x + a)(x + b)$

Kate says,

"The sum of $a$ and $b$ must be 6 and the product of $a$ and $b$ must be 5"

(a) Explain what is wrong with Kate's statement.

.....

.....

.....

**(1)**

(b) Factorise fully $2m^2 - 2$

.....

**(2)**

(c) Factorise fully $ax + bx - ay - by$

.....

**(2)**

**(Total for Question 11 is 5 marks)**

**2** Ben is trying to make $m$ the subject of $p = \frac{m}{3} + 5$

Here is his working.

$$p - 5 = \frac{m}{3}$$

$$3 \times p - 5 = m$$

$$m = 3p - 5$$

Ben's answer is wrong.

(a) What mistake has Ben made?

.....

.....

.....

**(1)**

(b) Factorise fully $2x^3y + 4xy^2$

.....

**(2)**

**(Total for Question 2 is 3 marks)**