



Revision
Worksho...

$$\begin{array}{r} 1x + y \\ 3y + 5x \\ \hline 6x + 4y \end{array}$$

Grade 9 Mathematics

Revision Workshop on 4th June 2026

$$= 6x + 4y$$

1. Simplify the following algebraic expressions:

a. $2x + 3y - 9x + y$

$$= -7x + 4y$$

b. $3x^2y \times -2x^3y^5$

$$= -6x^2x^3y^1y^5 = -6x^5y^6$$

c. $3a^2b + 5b^2a - 4ba^2 + 6ab^2$

$$= -a^2b + 11ab^2$$

d. $3xy + 2x(5y)$

$$= 3xy + 10xy = 13xy$$

e. $4x^2 + \frac{10x^3}{5x}$

$$= 4x^2 + 2x^2 = 6x^2$$

f. $4(x+1)$

$$= 4x + 4$$

Double
2 + 3
4 + 6 = 10

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

$$= 3x^2 - 6x - 2x + 2 = 3x^2 - 8x + 2$$

h. $\frac{12x+20}{4}$

$$= \frac{12x}{4} + \frac{20}{4} = 3x + 5$$

i. $2x - (x-5) + \frac{4x+8}{2}$

$$= 2x - x + 5 + \frac{4x}{2} + \frac{8}{2} = x + 5 + 2x + 4 = 3x + 9$$

j. $2x(x^2-3) + 5x^2(x-1)$

$$= 2x^3 - 6x + 5x^3 - 5x^2 = 7x^3 - 5x^2 - 6x$$



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inspired by the love of Christ

$$(a+b)(c+d) \quad \text{FOIL}$$

Quick reminder on multiplying polynomials (more than one term) by one another

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

$$(a+b)(c+d+e) = ac + ad + ae + bc + bd + be$$

$$\begin{aligned}
 &= (a+b)c + (a+b)d \\
 &= c(a+b) + d(a+b) \\
 &= ca + cb + da + db
 \end{aligned}$$

$$ac + ad + ae + bc + bd + be$$

2. Simplify the following algebraic expressions:

a. $(x+2)(x+5)$

$$= x^2 + 5x + 2x + 10$$

$$= x^2 + 7x + 10$$

c. $2(x+1)(x+6)$

$$= 2(x^2 + 6x + x + 6)$$

$$= 2(x^2 + 7x + 6)$$

$$= 2x^2 + 14x + 12$$

$$(2x+2)(x+6)$$

$$= 2x^2 + 12x + 2x + 12$$

$$= 2x^2 + 14x + 12$$

e. $(x+3)^2$

$$x^2 + 3x + 3x + 9$$

$$x^2 + 6x + 9$$

g. $2(x+1)^2 - (x-2)(x+5)$

$$= 2(x+1)(x+1) - (x^2 + 5x - 2x - 10)$$

$$= 2(x^2 + x + x + 1) - x^2 - 5x + 2x + 10$$

$$= 2x^2 + 2x + 2x + 2 - x^2 - 3x + 10$$

i. $(x+2)(x^2 - 2x + 4)$

$$= x^3 - 2x^2 + 4x + 2x^2 - 4x + 8$$

$$= x^3 + 8$$

b. $(x+3)(x-6)$

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

$$= x^2 - 3x - 18$$

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

$$= 4x^2 - 6x + 6x - 9$$

$$= 4x^2 - 9$$

f. $(x+3)(x-5) - (x+1)^2$

$$= (x+3)(x-5) - (x+1)(x+1)$$

$$= x^2 - 5x + 3x - 15 - (x^2 + x + x + 1)$$

$$= x^2 - 2x - 15 - (x^2 + 2x + 1)$$

$$= x^2 - 2x - 15 - x^2 - 2x - 1$$

$$-4x - 16$$

$$= ac + ad + ae + bc + bd + be$$

h. $(a+b)(c+d+e)$

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

$$= (a+b)(a^2 + ab + ba + b^2)$$

$$= (a+b)(a^2 + 2ab + b^2)$$

$$= a^3 + 2a^2b + ab^2 + a^2b + ab^2 + b^3$$

$$= a^3 + 3a^2b + 3ab^2 + b^3$$

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A quick reminder about factorising!

- Highest common factor
- Grouping
- Difference Of Two Squares (D.O.T.S.)
- Trinomial

$$4x + 8x^2 + 12bx$$

$$= 4x(1 + 2x + 3b)$$

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

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

$$ab + ac + gb + gc$$

$$2(x+3)$$

$$2x + 6$$

$$3(x+5) + c(x+5)$$

$$= (x+5)(3+c)$$

$$9(2-x) + b(x-2)$$

$$= 9(2-x) - b(2-x)$$

switcheroo ☺

$$\frac{\checkmark ab + \checkmark ac + \checkmark gb + \checkmark gc}{a(b+c) + g(b+c)}$$

$$\frac{(b+c)(a+g)}{(b+c)(a+g)}$$

$$\boxed{x^2 - b^2}$$

$$(x+b)(x-b)$$

$$x^2 - \cancel{bx} + \cancel{bx} - b^2$$

$$\begin{aligned} p^2 - 9 \\ = p^2 - 3^2 \\ = (p+3)(p-3) \end{aligned}$$

$$\begin{aligned} &= \checkmark g(2-x) - \checkmark b(2-x) \\ &= (2-x)(g-b) \end{aligned}$$

switcheroo ☺

$$\begin{aligned} &= \frac{4a-8}{4(a-2)} + \frac{2b-ab}{b(2-a)} \\ &= 4(a-2) - b(a-2) \\ &= (a-2)(4-b) \end{aligned}$$

$$\frac{q^2 - p^2}{(q-p)(q+p)}$$

$$\begin{aligned} &2q^2 - 8 \\ &= 2(q^2 - 4) \\ &= 2(q^2 - 2^2) \\ &= 2(q+2)(q-2) \end{aligned}$$

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3. Factorise the following fully:

a. $3ax + 9ab$
 $= 3a(x + 3b)$

b. $\frac{12x^2y^3 + 4x^2y + 20x^3y^2}{4x^2y(3y^2 + 1 + 5xy)}$

c. $\frac{4(x+3) + b(3+x)}{(x+3)(4+b)}$

d. $\frac{3a+6+ax+2a}{3(a+2) + a(x+2)}$

e. $4(g-2) + 3c(2-g)$
 $= 4(g-2) - 3c(g-2)$
 $= (g-2)(4-3c)$

f. $\frac{2a+ag+10+5g+rg+2r}{a(2+g) + 5(2+g) + r(g+2)}$
 $= (2+g)(a+5+r)$

g. $\frac{2x-6+3a-xa}{2(x-3) + a(3-x)}$
 $= 2(x-3) - a(x-3)$
 $= (x-3)(2-a)$
 $= (x+u)(x-u)$

h. $\frac{3(g-e) + b(g-e)}{(g-e)(3+b)}$
 $g+2 = 2+g$
 $4+3 = 3+4$

i. $x^4 - 1$
 $= (x^2+1)(x^2-1)$
 $= (x^2+1)(x-1)(x+1)$

j. $\frac{3b^2-12}{3(b^2-4)}$
 $= 3(b^2-4)$
 $= 3(b+2)(b-2)$

l. $\frac{2b^2-200}{2(b^2-100)}$
 $= 2(b-10)(b+10)$

m. $\frac{x^2-9+3a-ax}{(x-3)(x+3) + a(3-x)}$
 $= (x-3)(x+3) - a(x-3)$

n. $5g^4c - 80c$
 $= 5c(g^4-16)$
 $= 5c(g^2+4)(g^2-4)$

$$= (x-3)(x+3) + a(3-x)$$

$$= (x-3)(x+3) - a(x-3)$$

$$o. \quad x^2 + 7x + 6 = (x-3)(x+3-a) \quad p.$$

$$= (x+6)(x+1)$$

$$q. \quad g^2 - 2g - 8$$

$$= (g+2)(g-4)$$

$$= 5c(g^4 - 16) \checkmark$$

$$= 5c(g^2 + 4)(g^2 - 4) \checkmark$$

$$= 5c(g^2 + 4)(g-2)(g+2) \checkmark$$

$$x^2 - 4x + 3$$

$$= (x-3)(x-1)$$

$$r. \quad h^2 + 2h - 8$$

$$= (h+4)(h-2)$$

s. $x^2 - 3x - 10$

$$= (x+2)(x-5) \rightarrow$$

u. $2x^2 + 2x - 12$

$$= 2(x^2 + x - 6) \\ = 2(x+3)(x-2) \rightarrow$$

w. $g^2 - 7g - 18$

$$= (g+2)(g-9) \rightarrow$$

y. $b^2 - 11b + 24$

$$= (b-3)(b-8) \rightarrow$$

4. Simplify the following fractions:

a. $\frac{x^2 - x - 12}{2x^2 - 18}$

$$= \frac{(x+3)(x-4)}{2(x+3)(x-3)} \\ = \frac{x-4}{2(x-3)} \rightarrow$$

c. $\frac{ax + 2a + 2b + bx}{a^2 - b^2}$

$$= \frac{a(x+2) + b(2+x)}{(a+b)(a-b)}$$

$$= \frac{(x+2)(a+b)}{(a+b)(a-b)}$$

$$= \frac{x+2}{a-b} \rightarrow$$

t. $2x^2 + 2x - 12$

$$= 2(x^2 + x - 6) \\ = 2(x+3)(x-2) \rightarrow$$

v. $ab^2 - ab - 90a$

$$= a(b^2 - b - 90) \\ = a(b+9)(b-10) \rightarrow$$

x. $3x^2 + 15x - 72$

$$= 3(x^2 + 5x - 24) \\ = 3(x+8)(x-3) \rightarrow$$

z. $16a - ax^2 + x^2 - 2x - 8$

$$= a(16 - x^2) + (x+2)(x-4) \\ = a(4-x)(4+x) - (x+2)(4-x) \\ = (4-x)(a(4+x) - (x+2)) \rightarrow$$

b. $\frac{9x - 3x}{x^2 - 9}$

$$= \frac{3(3-x)}{(x+3)(x-3)} = \frac{-3(x-3)}{(x+3)(x-3)} = \frac{-3}{x+3} \rightarrow$$

d. $\frac{x^2 - 4}{4 - 2x}$

$$= \frac{(x+2)(x-2)}{2(2-x)}$$

$$= \frac{(x+2)(x-2)}{-2(x-2)}$$

$$= \frac{x+2}{-2} \rightarrow$$

Solve the following equations:

a. $3x + 2 = 23$

$$3x = 21$$

$$x = 7 \checkmark$$

c. $3(x+2) + 6 = 27$

$$3x + 6 + 6 = 27$$

$$3x = 15$$

$$x = 5 \checkmark$$

$$3(x+2) = 21$$

$$x+2 = 7$$

$$x = 5 \checkmark$$

e. $\frac{x}{3} + 5 = x - 3$

$$x + 15 = 3x - 9$$

$$24 = 2x$$

g. $\frac{2x+1}{3} + \frac{x}{2} = x+1$

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

$$7x+2 = 6x+6$$

$$x = 4 \checkmark$$

i. $x^2 - 7x = -10$

$$x^2 - 7x + 10 = 0$$

$$(x-5)(x-2) = 0$$

$$x = 5 \text{ or } 2$$

b. $4x + 7 = 2x + 21$

$$2x + 7 = 21$$

$$2x = 14$$

$$x = 7 \checkmark$$

d. $3x + 5 = 2x + 7 + x$

$$3x + 5 = 3x + 7$$

$$5 = 7 \text{ (No solutions)}$$

f. $2(x+2) + 3 = 2x + 7$

$$2x + 4 + 3 = 2x + 7$$

$$2x + 7 = 2x + 7$$

$$7 = 7$$

h. $x^2 + 5x - 50 = 0$

$$(x+10)(x-5) = 0$$

$$x = -10 \text{ or } 5$$

j. $(x+2)(x-3) = 6$

$$x^2 - x - 6 = 6$$

$$x^2 - x - 12 = 0$$

$$(x+3)(x-4) = 0$$

$$x = -3 \text{ or } 4$$

$$x^2 + 7x + 6$$

$$(x+6)(x+1)$$

$$x^2 - 13x + 22$$

$$(x-2)(x-11)$$

$$x^2 - |x - 12|$$

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

$$x^2 + |x - 90|$$

$$(x + 10)(x - 9)$$

