Expressions, equations and identities

Starter

1. **(Review of last lesson)**
Expand and simplify: (a) $(3x-1)(4x+5)$ (b) $3(5x+2)(x-4)$

Working: (a) $(3x-1)(4x+5) = 12x^2+15x-4x-5$
$= 12x^2+11x-5$

(b) $3(5x+2)(x-4) = 3(5x^2-20x+2x-8)$
$= 3(5x^2-18x-8)$
$= 15x^2-54x-24$

2. **(Review of last lesson)**
Expand and simplify (a) $(x-4)^2$ (b) $(4x+3)^2$

Working: (a) $(x-4)^2 = x^2-8x+16$

(b) $(4x+3)^2 = 16x^2+24x+9$

3. **(Review of last lesson)** Expand and simplify $(3x-5)(x-4)-(x-5)^2$

Working: $(3x-5)(x-4)-(x-5)^2 = 3x^2-5x-12x+20-(x^2-10x+25)$
$= 2x^2-7x-5$

E.g. 1 Decide whether the following are equations, expressions, identities or formulae:

(a) $(x+1)^2 \equiv x^2+2x+1$ (b) $7y+10$ (c) $V=IR$
(d) $7x+11=x-9$ (e) $x^2-3x+10$ (f) $A=\pi r^2$
(g) $x(x+1)=x^2+x$ (h) $x^2-7x=0$

Working:

(a) $(x+1)^2 \equiv x^2+2x+1$ **Identity — expand the brackets and the expression on the LHS is the same as the expression on the RHS.**

(b) $7y+10$ **Expression — no equals symbol.**

(c) $V=IR$ **Formula seen in physics.**

(d) $7x+11=x-9$ **Equation — the expression on the LHS is not the same as that on the RHS (it is only true for specific values)**

(e) $x^2-3x+10$ **Expression — no equals symbol**

(f) $A=\pi r^2$ **Formula — area of a circle formula.**

(g) $x(x+1)=x^2+x$ **Identity — expand the bracket on the RHS and the expression is the same as n the RHS. Ideally the $\equiv$ should be used.**

(h) $x^2-7x=0$ **Equation — it is only true for specific values.**

E.g. 2 Find the values of a and b that turn these statements into identities (i.e. true for all values of x):

(a) $ax^2 + bx + c \equiv 4x^2 + 7x + 9$

(b) $x^2 + ax + b \equiv x^2 + 3x + 2x + 1$

(c) $ax + b \equiv 2(x + 4) + 3(x + 1)$

Working:

(a) $ax^2 + 7x + b \equiv 4x^2 + 7x + 3$

Equating coefficients of x^2: $a = 4$

Equating the constant term: $b = 3$

(b) $x^2 + ax + b \equiv x^2 + 3x + 2x + 1$

The RHS can be simplified to $x^2 + 5x + 1$

So $x^2 + ax + b \equiv x^2 + 5x + 1$

Equating coefficients of x: $a = 5$

Equating the constant term: $b = 1$

(c) $ax + b \equiv 2(x + 4) + 7(x + 1)$

The RHS can be simplified to $2x + 8 + 7x + 7 = 9x + 15$

So $ax + b \equiv 9x + 15$

Equating coefficients of x: $a = 9$

Equating the constant term: $b = 15$

E.g. 3 Write the '=' or the '≡' symbol in the box to make each statement mathematically correct.

(a) $4x - 8 \square x - 3$ (b) $4x - 8 \square 2(2x - 4)$

Working:

(a) $4x - 8 \square x - 3$

The expression on the LHS is not the same as the one on the RHS so it is only true for specific values. Hence, we need the '=' symbol

(b) By expanding the bracket on the RHS we get $4x - 8$, which is the same expression as on the LHS. Hence, we need the '≡' symbol.

Explanation: Expressions, equation, formula and identities

Solutions to Starter and E.g.s

Exercise

9-1 class textbook:	p105 M4.6 Qu 1-8
A*-G class textbook:	No exercise
9-1 homework book:	p37 M4.6 Qu 1-8
A*-G homework book:	No exercise