# ALGEBRAIC Proofs — SET 2

**Use the properties of equality to complete each proof.**

**1** **Given:** $6x - 2y = 14$; **Prove:** $y = 3x - 7$

| Statements | Reasons |
|---|---|
| 1. $6x - 2y = 14$ | 1. Given |
| 2. $-2y = -6x + 14$ | 2. Subtraction Property |
| 3. $y = 3x - 7$ | 3. Division Property |

**2** **Given:** $m = \frac{1}{2}(a + b)$; **Prove:** $b = 2m - a$

| Statements | Reasons |
|---|---|
| 1. $m = \frac{1}{2}(a + b)$ | 1. Given |
| 2. $2m = a + b$ | 2. Multiplication Property |
| 3. $2m - a = b$ | 3. Subtraction Property |
| 4. $b = 2m - a$ | 4. Symmetric Property |

**3** **Given:** $f + g = k + 7, k = f$; **Prove:** $g = 7$

| Statements | Reasons |
|---|---|
| 1. $f + g = k + 7$ | 1. Given |
| 2. $k = f$ | 2. Given |
| 3. $f + g = f + 7$ | 3. Substitution Property |
| 4. $g = 7$ | 4. Subtraction Property |

**4** **Given:** $p = 3q,\ p + q = r, r = 20$; **Prove:** $q = 5$

| Statements | Reasons |
|---|---|
| 1. $p = 3q$ | 1. Given |
| 2. $p + q = r$ | 2. Given |
| 3. $r = 20$ | 3. Given |
| 4. $p + q = 20$ | 4. Transitive Property |
| 5. $3q + q = 20$ | 5. Substitution Property |
| 6. $4q = 20$ | 6. Simplify |
| 7. $q = 5$ | 7. Division Property |

**5** **Given:** $2x + y = 4,\ x = y + 5$ **Prove:** $y = -2$

| Statements | Reasons |
|---|---|
| 1. $2x + y = 4$ | 1. Given |
| 2. $x = y + 5$ | 2. Given |
| 3. $2(y + 5) + y = 4$ | 3. Substitution Property |
| 4. $2y + 10 + y = 4$ | 4. Distributive Property |
| 5. $3y + 10 = 4$ | 5. Simplify |
| 6. $3y = -6$ | 6. Subtraction Property |
| 7. $y = -2$ | 7. Division Property |

**6** **Given:** $-10x - 2y = 16$; **Prove:** $y = -5x - 8$

| Statements | Reasons |
|---|---|
| 1. $-10x - 2y = 16$ | 1. Given |
| 2. $-2y = 10x + 16$ | 2. Addition Property |
| 3. $y = -5x - 8$ | 3. Division Property |

**7** **Given:** $F = \frac{9}{5}C + 32$; **Prove:** $C = \frac{5}{9}(F - 32)$

| Statements | Reasons |
|---|---|
| 1. $F = \frac{9}{5}C + 32$ | 1. Given |
| 2. $F - 32 = \frac{9}{5}C$ | 2. Subtraction Property |
| 3. $\frac{5}{9}(F - 32) = C$ | 3. Multiplication Property |
| 4. $C = \frac{5}{9}(F - 32)$ | 4. Symmetric Property |

**8** **Given:** $x + y = z,\ w + v = z,\ w = y$; **Prove:** $x = v$

| Statements | Reasons |
|---|---|
| 1. $x + y = z$ | 1. Given |
| 2. $w + v = z$ | 2. Given |
| 3. $x + y = w + v$ | 3. Substitution Property |
| 4. $w = y$ | 4. Given |
| 5. $x + y = y + v$ | 5. Substitution Property |
| 6. $x = v$ | 6. Subtraction Property |

**9** **Given:** $p + q = 25$, $r + s = 25$, $q = r$; **Prove:** $p = s$

| Statements | Reasons |
|---|---|
| 1. $p+q = 25$ | 1. Given |
| 2. $r+s = 25$ | 2. Given |
| 3. $p+q = r+s$ | 3. Substitution Property |
| 4. $q = r$ | 4. Given |
| 5. $p+r = r+s$ | 5. Substitution Property |
| 6. $p = s$ | 6. Subtraction Property |

**10** **Given:** $2e + 10 = 16 - 2h$, $e = f - h$; **Prove:** $f = 3$

| Statements | Reasons |
|---|---|
| 1. $2e + 10 = 16 - 2h$ | 1. Given |
| 2. $e = f - h$ | 2. Given |
| 3. $2(f-h) + 10 = 16 - 2h$ | 3. Substitution Property |
| 4. $2f - 2h + 10 = 16 - 2h$ | 4. Distributive Property |
| 5. $2f + 10 = 16$ | 5. Addition Property |
| 6. $2f = 6$ | 6. Subtraction Property |
| 7. $f = 3$ | 7. Division Property |

**11** **Given:** $a - 2b = 8$, $4a + 3b = 21$; **Prove:** $b = -1$

| Statements | Reasons |
|---|---|
| 1. $a - 2b = 8$ | 1. Given |
| 2. $a = 2b + 8$ | 2. Addition Property |
| 3. $4a + 3b = 21$ | 3. Given |
| 4. $4(2b+8) + 3b = 21$ | 4. Substitution Property |
| 5. $8b + 32 + 3b = 21$ | 5. Distributive Property |
| 6. $11b + 32 = 21$ | 6. Simplify |
| 7. $11b = -11$ | 7. Subtraction Property |
| 8. $b = -1$ | 8. Division Property |