

Some possible solutions

$$1) \quad 2m + 2n = 2(m+n)$$

$$2) \quad (2n+1)(2m+1) = 4mn + 2n + 2m + 1 \\ = 2(2mn + m + n) + 1$$

$$3) \quad 2m \times 2n = 4mn = 2(2mn)$$

$$4) \quad 2m - 2n = 2(m-n)$$

$$5) \quad n + (n+1) + (n+2) = 3n + 3 = 3(n+1)$$

$$6) \quad n + (n+1) + (n+2) + (n+3) = 4n + 6 \\ = 4(n+1) + 2$$

$$7) \quad n + (n+1) + (n+2) + (n+3) + (n+4) = 5n + 10 \\ = 5(n+2)$$

$$8) \quad n \quad (n+1) \quad (n+2)$$

$$n(n+2) = n^2 + 2n$$

$$(n+1)^2 = n^2 + 2n + 1$$

$$n^2 + 2n + 1 > n^2 + 2n$$

$$9) \quad n \quad (n+1) \quad (n+2) \quad (n+3)$$

$$(n+1)(n+2) = n^2 + 3n + 2$$

$$n(n+3) = n^2 + 3n$$

$$10) \quad n^2 + (n+1)^2$$

$$n^2 + n^2 + 2n + 1 = 2n^2 + 2n + 1 = 2(n^2 + n) + 1$$

$$11) \quad n^2 + (n+1)^2 + (n+2)^2$$

$$n^2 + n^2 + 2n + 1 + n^2 + 4n + 4 = 3n^2 + 6n + 5$$

$$= (3n^2 + 6n + 6) - 1$$

$$= 3(n^2 + 2n + 2) - 1$$

$$12) \quad \text{Q6 } 4n + 6$$

$$(n+2)(n+3) - n(n+1)$$

$$n^2 + 5n + 6 - n^2 - n = 4n + 6$$

$$13) \quad \left[\frac{n + (n+1) + (n+2) + (n+3) + (n+4)}{5} \right]^2 = \left(\frac{5n+10}{5} \right)^2$$

$$= (n+2)^2 = \boxed{n^2 + 4n + 4}$$

$$\frac{n^2 + (n+1)^2 + (n+2)^2 + (n+3)^2 + (n+4)^2}{5} = \frac{5n^2 + 20n + 30}{5}$$

$$\boxed{n^2 + 4n + 6}$$

$$14) \quad n(n+1) + (n+1)(n+2) = n^2 + n + n^2 + 3n + 2$$

$$= 2n^2 + 4n + 2$$

$$= 2(n^2 + 2n + 1)$$

$$= 2(n+1)^2$$