

b) $(4n - 2)(-2n^2 - 4n - 5)$
 $= 4n(-2n^2 - 4n - 5) - 2(-2n^2 - 4n - 5)$
 $= 4n(-2n^2) + 4n(-4n) + 4n(-5) - 2(-2n^2) - 2(-4n) - 2(-5)$
 $= -8n^3 + (-16n^2) + (-20n) - (-4n^2) - (-8n) - (-10)$
 $= -8n^3 - 16n^2 - 20n + 4n^2 + 8n + 10$
 $= -8n^3 - 16n^2 + 4n^2 - 20n + 8n + 10$
 $= -8n^3 - 12n^2 - 12n + 10$

Multiply each term in the trinomial by each term in the binomial.

Verify. Substitute $n = 2$.

Left side

$$\begin{aligned} & (4n - 2)(-2n^2 - 4n - 5) \\ &= (4 \times 2 - 2)((-2) \times 2^2 - 4 \times 2 - 5) \\ &= (8 - 2)(-8 - 8 - 5) \\ &= (6)(-21) \\ &= -126 \end{aligned}$$

Right side

$$\begin{aligned} & -8n^3 - 12n^2 - 12n + 10 \\ &= (-8) \times 2^3 - 12 \times 2^2 - 12 \times 2 + 10 \\ &= -64 - 48 - 24 + 10 \\ &= -126 \end{aligned}$$

The numbers match, so the product is likely correct.

Check

1. Expand, then simplify and verify.

$$\begin{aligned} (3n - 1)(4n^2 - 6n - 2) &= 3n(\underline{\hspace{2cm}}) - 1(\underline{\hspace{2cm}}) \\ &= 3n(\underline{\hspace{2cm}}) + 3n(\underline{\hspace{2cm}}) + 3n(\underline{\hspace{2cm}}) - 1(\underline{\hspace{2cm}}) - 1(\underline{\hspace{2cm}}) - 1(\underline{\hspace{2cm}}) \\ &= \underline{\hspace{2cm}}n^3 + (\underline{\hspace{2cm}}n^2) + (\underline{\hspace{2cm}}n) - (\underline{\hspace{2cm}}n^2) - (\underline{\hspace{2cm}}n) - (\underline{\hspace{2cm}}) \\ &= \underline{\hspace{2cm}}n^3 - \underline{\hspace{2cm}}n^2 - \underline{\hspace{2cm}}n - \underline{\hspace{2cm}}n^2 + \underline{\hspace{2cm}}n + \underline{\hspace{2cm}} \\ &= \underline{\hspace{2cm}}n^3 - \underline{\hspace{2cm}}n^2 - \underline{\hspace{2cm}}n^2 - \underline{\hspace{2cm}}n + \underline{\hspace{2cm}}n + \underline{\hspace{2cm}} \\ &= \underline{\hspace{2cm}} - \underline{\hspace{2cm}} + \underline{\hspace{2cm}} \end{aligned}$$

Verify. Substitute $n = 2$.

Left side

$$\begin{aligned} & (3n - 1)(4n^2 - 6n - 2) \\ &= (\underline{\hspace{2cm}} \times 2 - \underline{\hspace{2cm}})(\underline{\hspace{2cm}} \times 2^2 - \underline{\hspace{2cm}} \times 2 - \underline{\hspace{2cm}}) \\ &= (\underline{\hspace{2cm}} - \underline{\hspace{2cm}})(\underline{\hspace{2cm}} - \underline{\hspace{2cm}} - \underline{\hspace{2cm}}) \\ &= (\underline{\hspace{2cm}})(\underline{\hspace{2cm}}) \\ &= \underline{\hspace{2cm}} \end{aligned}$$

Right side

$$\begin{aligned} & \underline{\hspace{2cm}} - \underline{\hspace{2cm}} + \underline{\hspace{2cm}} \\ &= \underline{\hspace{2cm}} \times 2^3 - \underline{\hspace{2cm}} \times 2^2 + \underline{\hspace{2cm}} \\ &= \underline{\hspace{2cm}} - \underline{\hspace{2cm}} + \underline{\hspace{2cm}} \\ &= \underline{\hspace{2cm}} \end{aligned}$$

The numbers match, so the product is likely correct.

Practice

1. Expand, then simplify.

a) $(5n)(3n^2 + 2n + 1)$
 $= 5n(\underline{\hspace{2cm}}) + 5n(\underline{\hspace{2cm}}) + 5n(\underline{\hspace{2cm}})$
 $= \underline{\hspace{2cm}}$

Multiply each term in the $\underline{\hspace{2cm}}$ by $\underline{\hspace{2cm}}$.