Topic: Multiplying polynomials

Question: Expand the expression.

$$(x + 3)(x + 2)$$

Answer choices:

A $\quad 2x^2 + 5x + 5$

B $\quad x^2 + 3x + 2$

C $\quad x^2 + 5x + 6$

D $\quad x^2 + x^2 + 3x + 2x$

Solution: C

We'll use the FOIL method to expand this, and then we'll simplify.

$$(x + 3)(x + 2)$$

$$(x)(x) + (x)(2) + (3)(x) + (3)(2)$$

$$x^2 + 2x + 3x + 6$$

$$x^2 + 5x + 6$$

Topic: Multiplying polynomials

Question: Expand the expression.

$$\left(m^{\frac{1}{3}} + y^{-\frac{1}{2}}\right)^2$$

Answer choices:

A $m^{\frac{2}{3}} + 2m^{\frac{1}{3}}y^{-\frac{1}{2}} + y^{-1}$

B $m^{\frac{1}{3}} + y^{\frac{1}{4}}$

C $m^{\frac{2}{3}} + 2m^{\frac{1}{3}}y^{-\frac{1}{2}}y^{-\frac{1}{4}}$

D $m + 2my + y$

Solution: A

First, we realize that we can rewrite the expression

$$\left(m^{\frac{1}{3}} + y^{-\frac{1}{2}}\right)^2$$

as

$$\left(m^{\frac{1}{3}} + y^{-\frac{1}{2}}\right)\left(m^{\frac{1}{3}} + y^{-\frac{1}{2}}\right)$$

We'll use the FOIL method to expand this, and then we'll simplify.

$$m^{\frac{1}{3}}\left(m^{\frac{1}{3}} + y^{-\frac{1}{2}}\right) + y^{-\frac{1}{2}}\left(m^{\frac{1}{3}} + y^{-\frac{1}{2}}\right)$$

$$m^{\frac{1}{3}}\left(m^{\frac{1}{3}}\right) + m^{\frac{1}{3}}\left(y^{-\frac{1}{2}}\right) + y^{-\frac{1}{2}}\left(m^{\frac{1}{3}}\right) + y^{-\frac{1}{2}}\left(y^{-\frac{1}{2}}\right)$$

Remember that when we have something like $m^{1/3}(m^{1/3})$ or $y^{-1/2}(y^{-1/2})$ (the first and fourth terms in this expression), we keep the base and add the exponents.

$$m^{\frac{1}{3}+\frac{1}{3}} + m^{\frac{1}{3}}y^{-\frac{1}{2}} + m^{\frac{1}{3}}y^{-\frac{1}{2}} + y^{-\frac{1}{2}+\left(-\frac{1}{2}\right)}$$

$$m^{\frac{2}{3}} + m^{\frac{1}{3}}y^{-\frac{1}{2}} + m^{\frac{1}{3}}y^{-\frac{1}{2}} + y^{-1}$$

$$m^{\frac{2}{3}} + 2m^{\frac{1}{3}}y^{-\frac{1}{2}} + y^{-1}$$

Topic: Multiplying polynomials

Question: Simplify the expression.

$$(r - 4)(r + 3)(2r + 5)$$

Answer choices:

A $\quad 2r^3 - 7r^2 - 19r - 60$

B $\quad 2r^3 + 3r^2 - 29r - 60$

C $\quad 2r^3 + 3r^2 - 19r - 60$

D $\quad 2r^3 - 7r^2 - 29r - 60$

Solution: B

Given the polynomial,

$$(r - 4)(r + 3)(2r + 5)$$

we'll use the FOIL method on just the first two terms $(r - 4)(r + 3)$.

$$(r - 4)(r + 3)$$

$$r^2 + 3r - 4r - 12$$

$$r^2 - r - 12$$

Now we'll bring in the third binomial and multiply this result by $(2r + 5)$.

$$(r^2 - r - 12)(2r + 5)$$

$$r^2(2r) - r(2r) - 12(2r) + r^2(5) - r(5) - 12(5)$$

$$2r^3 - 2r^2 - 24r + 5r^2 - 5r - 60$$

Collect like terms.

$$2r^3 + 3r^2 - 29r - 60$$