

## Practice

### Factoring – Difference of Squares, Grouping

Answer these problems, then check your answers using the key on the next page. If you missed something, look at the solutions after the answer key, and if you still don't understand, watch the review video again.

#1) Factor this expression completely:  $x^2 - 49$

#2) Factor this expression completely:  $x^2 - 64y^2$

#3) Factor this expression completely:  $3x^2 - 27$

#4) Factor this expression completely:  $4w^2 - 25r^2$

#5) Factor this expression completely:  $x^4 - 81y^4$

#6) Factor this expression completely:  $12x^2y^4 - 27q^6$

#7) Factor this expression completely:  $8x^3 - 18xy^2$

#8) Factor this expression completely:  $2xy + 3y + 8x + 12$

#9) Factor this expression completely:  $xy^2 - 9x + y^3 - 9y$

#10) Factor this expression completely:  $k^2 - 5k - mk + 5m$

**Answers:**

#1)  $(x+7)(x-7)$

#2)  $(x+8y)(x-8y)$

#3)  $3(x+3)(x-3)$

#4)  $(2w+5r)(2w-5r)$

#5)  $(x^2+9y^2)(x+3y)(x-3y)$

#6)  $3(2xy^2+3q^3)(2xy^2-3q^3)$

#7)  $2x(2x+3y)(2x-3y)$

#8)  $(2x+3)(y+4)$

#9)  $(y+3)(y-3)(x+y)$

#10)  $(k-5)(k-m)$

**Solutions:**

#1) Factor this expression completely:  $x^2 - 49$

$$(x)^2 - (7)^2$$
$$\boxed{(x+7)(x-7)}$$

check:

$$(x+7)(x-7)$$
$$x^2 - 7x + 7x - 49$$
$$x^2 - 49 \checkmark$$

#2) Factor this expression completely:  $x^2 - 64y^2$

$$(x)^2 - (8y)^2$$
$$\boxed{(x+8y)(x-8y)}$$

check:

$$(x+8y)(x-8y)$$
$$x^2 - 8xy + 8xy - 64y^2$$
$$x^2 - 64y^2 \checkmark$$

#3) Factor this expression completely:  $3x^2 - 27$

GCF:  $3(x^2 - 9)$

$$3(x^2 - (3)^2)$$
$$\boxed{3(x+3)(x-3)}$$

check:

$$3(x+3)(x-3)$$
$$3(x^2 - 3x + 3x - 9)$$
$$3(x^2 - 9)$$
$$3x^2 - 27 \checkmark$$

#4) Factor this expression completely:  $4w^2 - 25r^2$

$$(2w)^2 - (5r)^2$$
$$\boxed{(2w+5r)(2w-5r)}$$

check:

$$(2w+5r)(2w-5r)$$
$$4w^2 - 10rw + 10rw - 25r^2$$
$$4w^2 - 25r^2 \checkmark$$

#5) Factor this expression completely:  $x^4 - 81y^4$

$$(x^2)^2 - (9y^2)^2$$
$$(x^2 + 9y^2)(x^2 - 9y^2)$$
$$(x^2 + 9y^2)(x^2 - (3y)^2)$$
$$\boxed{(x^2 + 9y^2)(x+3y)(x-3y)}$$

check:

$$(x^2 + 9y^2)(x+3y)(x-3y)$$
$$(x^2 + 9y^2)(x^2 - 3xy + 3xy - 9y^2)$$
$$(x^2 + 9y^2)(x^2 - 9y^2)$$
$$x^4 - 9x^2y^2 + 9x^2y^2 - 81y^4$$
$$x^4 - 81y^4 \checkmark$$

#6) Factor this expression completely:  $12x^2y^4 - 27q^6$

$$\begin{aligned} \text{GCF: } & 3(4x^2y^4 - 9q^6) \\ & 3((2xy^2)^2 - (3q^3)^2) \\ & \boxed{3(2xy^2 + 3q^3)(2xy^2 - 3q^3)} \end{aligned}$$

check:

$$\begin{aligned} & 3(2xy^2 + 3q^3)(2xy^2 - 3q^3) \\ & 3(4x^2y^4 - 6xy^2q^3 + 6xy^2q^3 - 9q^6) \\ & 3(4x^2y^4 - 9q^6) \\ & 12x^2y^4 - 27q^6 \checkmark \end{aligned}$$

#7) Factor this expression completely:  $8x^3 + 18xy^2$

$$\begin{aligned} \text{GCF: } & 2x(4x^2 + 9y^2) \\ & 2x((2x)^2 + (3y)^2) \\ & \boxed{2x(2x+3y)(2x-3y)} \end{aligned}$$

check:

$$\begin{aligned} & 2x(2x+3y)(2x-3y) \\ & 2x(4x^2 - 6xy + 6xy - 9y^2) \\ & 2x(4x^2 - 9y^2) \\ & 8x^3 - 18xy^2 \checkmark \end{aligned}$$

#8) Factor this expression completely:  $2xy + 3y + 8x + 12$

$$\begin{aligned} & (2xy + 3y) + (8x + 12) \\ & y(2x+3) + 4(2x+3) \\ & \boxed{(2x+3)(y+4)} \end{aligned}$$

check:

$$\begin{aligned} & (2x+3)(y+4) \\ & 2xy + 8x + 3y + 12 \checkmark \end{aligned}$$

#9) Factor this expression completely:  $xy^2 - 9x + y^3 - 9y$

$$\begin{aligned} & (xy^2 - 9x) + (y^3 - 9y) \\ & x(y^2 - 9) + y(y^2 - 9) \\ & \text{difference of squares} \rightarrow (y^2 - 9)(x+y) \\ & (y^2 - 3^2)(x+y) \\ & \boxed{(y+3)(y-3)(x+y)} \end{aligned}$$

check:

$$\begin{aligned} & (y+3)(y-3)(x+y) \\ & (y^2 - 3y + 3y - 9)(x+y) \\ & (y^2 - 9)(x+y) \\ & xy^2 + y^3 - 9x - 9y \checkmark \end{aligned}$$

#10) Factor this expression completely:  $k^2 - 5k - mk + 5m$

$$\begin{aligned} & (k^2 - 5k) + (-mk + 5m) \\ & k(k-5) - m(k-5) \\ & \boxed{(k-5)(k-m)} \end{aligned}$$

check:

$$\begin{aligned} & (k-5)(k-m) \\ & k^2 - km - 5k + 5m \checkmark \end{aligned}$$