

Chapter 3 – Problem Solving**- CIRCLE your Final Answers -**

1) Expand: $7xy(2x^3 - 4xy + 3y)$

$$= 14x^4y - 28x^2y^2 + 21xy^2$$

2) Expand and Simplify: $(4x - 3)^2$

$$= (4x - 3)(4x - 3) \quad \text{now FOIL!}$$

$$= 16x^2 - 12x - 12x + 9$$

$$= 16x^2 - 24x + 9$$

3) Expand and Simplify: $(4d - 1)(7d^2 + 16d - 4)$

$$= 28d^3 + 64d^2 - 16d - 7d^2 - 16d + 4$$

$$= 28d^3 + 57d^2 - 32d + 4$$

4) Expand and Simplify: $(4p - 7q)(4p + 7q)$

FOIL

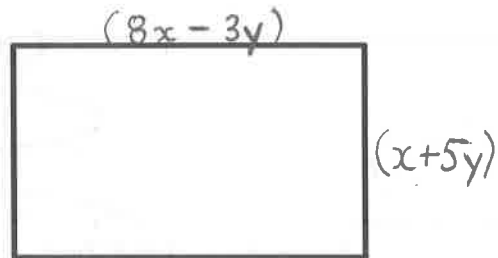
$$= 16p^2 + 28pq - 28pq - 49q^2$$

$$= 16p^2 - 49q^2$$

- 5) What is the area of a rectangle with a **length** of $(8x - 3y)$ and a **width** of $(x + 5y)$

(Area written as a polynomial is SIMPLEST form)

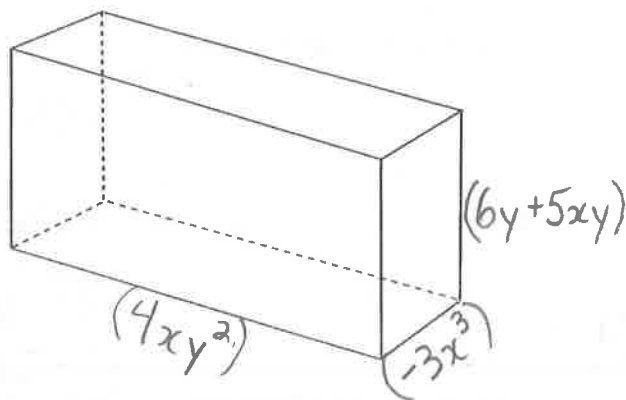
$$\begin{aligned} \text{Area of rectangle} &= l \times w \\ &= (8x - 3y)(x + 5y) \quad \text{FOIL!} \\ &= 8x^2 + 40xy - 3xy - 15y^2 \end{aligned}$$



$$\text{Area} = 8x^2 + 37xy - 15y^2$$

- 6) What is the volume of a rectangular prism with a **length** of $(4xy^2)$, a **width** of $(-3x^3)$, and **height** of $(6y + 5xy)$ (Volume written as a polynomial is SIMPLEST form)

$$\begin{aligned} \text{Volume of rect. prism} &= l \times w \times h \\ &= (4xy^2)(-3x^3)(6y + 5xy) \\ &= -12x^4y^2(6y + 5xy) \end{aligned}$$



$$\text{Volume} = -72x^4y^3 - 60x^5y^3$$

- 7) Factor:

$$\frac{5x^2}{5} - \frac{80y^2}{5}$$

$$= 5(x^2 - 16y^2)$$

$$= 5(x + 4y)(x - 4y)$$

GCF of 5!

now, diff of squares!

$$\begin{aligned} \sqrt{x^2} &= x \\ \sqrt{16y^2} &= 4y \end{aligned}$$

- 8) Factor:

$$\frac{-x^3}{-x} - \frac{4x^2}{-x} + \frac{21x}{-x}$$

$$= -x(x^2 + 4x - 21)$$

$$\begin{aligned} \frac{7}{7}x - \frac{3}{7} &= -21 \\ \frac{7}{7} + \frac{-3}{7} &= +4 \end{aligned}$$

$$= -x(x + 7)(x - 3)$$

GCF of -x! (we want first term in brackets to be positive)

now, $a=1$, so "simple way"!

9) Factor: $3x^2 + 36 + 24x$ reorder!
 $= 3x^2 + 24x + 36$ ← GCF of 3!
 $= 3(x^2 + 8x + 12)$ ← now, $a=1$, so "simple way"
 $\frac{6 \times 2 = 12}{6 + 2 = 8}$
 $= 3(x+6)(x+2)$

10) Factor: $8x^2 - 20x - 12$ GCF of 4!
 $= 4(2x^2 - 5x - 3)$ ← now, $a=2$, so decomp!
 $= 4(2x^2 + 1x - 6x - 3)$
 $= 4[x(2x+1) - 3(2x+1)]$
 $= 4(2x+1)(x-3)$

$\frac{-6 \times 1 = -6}{-6 + 1 = -5}$
 $\frac{-6 \times 1 = -6}{-6 + 1 = -5}$

11) Factor: $18x^2 - 24xy + 8y^2$ GCF of 2!
 $= 2(9x^2 - 12xy + 4y^2)$ ← now, $a=9$, decomp!
 $= 2(9x^2 - 6xy - 6xy + 4y^2)$
 $= 2[3x(3x-2y) - 2y(3x-2y)]$
 $= 2(3x-2y)(3x-2y)$

$\frac{-6 \times -6 = 36}{-6 + -6 = -12}$

12) Factor: $2w^4 - 32$ identical binomials → $= 2(3x-2y)^2$
 $= 2(w^4 - 16)$ GCF of 2!
 $= 2(w^2 + 4)(w^2 - 4)$ diff of squares
 $= 2(w^2 + 4)(w+2)(w-2)$ another diff of squares!
 $\sqrt{w^4} = w^2$
 $\sqrt{16} = 4$
 $\sqrt{w^2} = w$
 $\sqrt{4} = 2$

13) Factor: $\frac{15x^3y^4}{5x^2y^4} - \frac{25x^2y^5}{5x^2y^4} + \frac{50x^4y^7}{5x^2y^4}$ GCF of $5x^2y^4$!
 $= 5x^2y^4(3x - 5y + 10x^2y^3)$

* that's all you can factor for this one

Turn over for SUPER CHALLENGE QUESTIONS!



SUPER CHALLENGE QUESTIONS

14) Factor COMPLETELY!

$$\begin{aligned} & 21x^4 - 56x^2 + 35 \\ &= 7(3x^4 - 8x^2 + 5) \\ &= 7(3x^4 - 3x^2 - 5x^2 + 5) \\ &= 7[3x^2(x^2 - 1) - 5(x^2 - 1)] \\ &= 7(x^2 - 1)(3x^2 - 5) \\ &= 7(x+1)(x-1)(3x^2 - 5) \end{aligned}$$

GCF of 7!

now decomp!

$$\begin{array}{r} -3 \\ \times \\ -5 \\ \hline 15 \end{array} \quad \begin{array}{l} (3)(5) \end{array}$$

$$\begin{array}{r} -3 \\ + \\ -5 \\ \hline -8 \end{array}$$

but... $(x^2 - 1)$ is a
diff of squares!

$$\begin{array}{l} \sqrt{x^2} = x \\ \sqrt{1} = 1 \end{array}$$

15) Factor COMPLETELY!

$$\begin{aligned} & 5y^4 - 65y^2 + 180 \\ &= 5(y^4 - 13y^2 + 36) \\ &= \begin{array}{r} -9 \\ \times \\ -4 \\ \hline 36 \\ -9 \\ + \\ -4 \\ \hline -13 \end{array} \\ &= 5(y^2 - 9)(y^2 - 4) \\ &= 5(y+3)(y-3)(y+2)(y-2) \end{aligned}$$

GCF of 5!

"a" now = 1,
so simple way!

but, both of these
are diff of squares!

$$\begin{array}{l} \sqrt{y^2} = y \\ \sqrt{9} = 3 \end{array}$$

$$\begin{array}{l} \sqrt{y^2} = y \\ \sqrt{4} = 2 \end{array}$$