

Solutions

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1. Factor each expression.

a) $4 - 8x$

$$\begin{aligned} \text{GCF} &= 4 \\ &= 4(1 - 2x) \end{aligned}$$

c) $3m^2n^3 - 9m^3n^4$

$$\begin{aligned} \text{GCF} &= 3m^2n^3 \\ &= 3m^2n^3(1 - 3mn) \end{aligned}$$

b) $6x^2 - 5x$

$$\begin{aligned} \text{GCF} &= x \\ &= x(6x - 5) \end{aligned}$$

d) $28x^2 - 14xy$

$$\begin{aligned} \text{GCF} &= 14x \\ &= 14x(2x - y) \end{aligned}$$

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2. Factor each expression.

a) $x^2 - x - 6$
 $-3 \times 2 = -6$
 $-3 + 2 = -1$
 $= (x - 3)(x + 2)$

c) $x^2 - 9x + 20$
 $-5 \times -4 = 20$
 $-5 + -4 = -9$
 $= (x - 5)(x + 4)$

	x	-5
x	x^2	$-5x$
4	$4x$	20

b) $x^2 + 7x + 10$
 $2 \times 5 = 10$
 $2 + 5 = 7$
 $= (x + 2)(x + 5)$

d) $3y^2 + 18y + 24$
 Common factor = 3
 $= 3(y^2 + 6y + 8)$
 $2 \times 4 = 8$
 $2 + 4 = 8$
 $= 3(y + 2)(y + 4)$

	y	2
y	y^2	$2y$
4	$4y$	8

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3. Factor.

a) $6y^2 - y - 2$
 $ac = 6(-2) = -12$
 $-4 \times 3 = -12$ $-4 + 3 = -1$
 $= 6y^2 - 4y + 3y - 2$
 $= 2y(3y - 2) + 1(3y - 2)$
 $= (3y - 2)(2y + 1)$

c) $5a^2 + 7a - 6$
 $ac = 5(-6) = -30$
 $10 \times -3 = -30$ $10 + -3 = 7$
 $= 5a^2 + 10a - 3a - 6$
 $= 5a(a + 2) - 3(a + 2)$
 $= (a + 2)(5a - 3)$

b) $12x^2 + x - 1$
 $ac = 12(-1) = -12$
 $4 \times -3 = -12$ $4 + -3 = 1$

	$3x$	1
$4x$	$12x^2$	$4x$
-1	$-3x$	-1

 $= (3x + 1)(4x - 1)$

original "c" value
NOT ac

d) $12x^2 - 18x - 12$
 Common factor = 6
 $= 6(2x^2 - 3x - 2)$
 $ac = 2(-2) = -4$
 $-4 \times 1 = -4$ $-4 + 1 = -3$

	x	-2
$2x$	$2x^2$	$-4x$
1	x	-2

 $= 6(x - 2)(2x + 1)$

Don't forget the common factor

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<p>1. Factor. b) $25x^2 - 49$</p> $\sqrt{25x^2} = 5x$ $\sqrt{49} = 7$ $\Rightarrow (5x+7)(5x-7)$	<p>3. Factor. b) $36x^2 - 25$</p> $\sqrt{36x^2} = 6x$ $\sqrt{25} = 5$ $\Rightarrow (6x+5)(6x-5)$	<p>4. Factor. b) $3x^3y^2 - 9x^2y^4 + 3xy^3$</p> $\text{GCF} = 3xy^2$ $= 3xy^2(x^2 - 3xy^2 + y)$
<p>6. Factor. c) $x^8 - 1$</p> <p>Think of x^8 as $(x^4)^2$</p> $\Rightarrow (x^4)^2 - 1$ $\sqrt{(x^4)^2} = x^4$ $\sqrt{1} = 1$ $\Rightarrow (x^4+1)(x^4-1)$ <p>However, this is also a difference of squares</p> $\sqrt{x^4} = x^2$ $\sqrt{1} = 1$ $\Rightarrow (x^4-1) = (x^2+1)(x^2-1)$ <p>and again!</p> $\sqrt{x^2} = x = (x+1)(x-1)$ $\sqrt{1} = 1$ <p>Fully factored gives $(x^4+1)(x^2+1)(x+1)(x-1)$</p>	<p>d) $9(y-1)^2 - 25$</p> <p>Think of $(y-1)$ as X</p> $\Rightarrow 9X^2 - 25$ $\sqrt{9X^2} = 3X \quad \sqrt{25} = 5$ $\Rightarrow (3X+5)(3X-5)$ <p>Sub back $y-1 = X$</p> $\Rightarrow (3(y-1)+5)(3(y-1)-5)$ $= (3y-3+5)(3y-3-5)$ $= (3y+2)(3y-8)$	

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