Factoring a GCF

Recall Greatest Common Factor

$180 = 18 \times 10$ $240 = 24 \times 10$

$\quad = 3 \times 3 \times 2 \times 2 \times 5$ $\quad = 3 \times 2 \times 2 \times 2 \times 2 \times 5$ $GCF = 3 \times 2 \times 2 \times 5$

$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad = 60$

What about $9x^2y^4$ and $18xy^7$?

Each have a 9, at least 1 x and at least 4 y's $GCF = 9xy^4$

Factoring a GCF

This is always the first step in simplifying – we are taking out the common factor and returning the expression to its bracket form *(reverse of dive-bombing)*

Basic question: What was the question originally?

1)   Factor the following

a) $x^2 - 5x$

both terms have a x

$\qquad\qquad = x(x - 5)$

b) $3x - 30$

both terms have a 3

$\qquad\qquad = 3(x - 10)$

And we also have to consider variables and coefficients at the same time

c) $16x^2 - 24x$

both terms have a 8 and x

$\qquad\qquad = 8x(2x - 3)$

d) $7x^3 - 14x^2$

both terms have a 7 and x^2

$\qquad\qquad = 7x^2(x - 2)$

e) $13x^2 + 39x - 26$

all terms have a 13

$\qquad\qquad = 13(x^2 + 3x - 2)$

f) $54x^3 + 6x^2$

both terms have a 6 and x^2

$\qquad\qquad = 6x^2(3x + 1)$

Notice the 1!

g) $18x^3y^7 - 3x^2y^{10}$

both terms have a 3 and x^2 and y7

$\qquad\qquad = 3x^2y^7(6x - y^3)$

h) $96x^3y^2z^2 - 18xy^2z^5 - 36x^2y^2z^6$

all terms have a 6 , x, y^2,z^2

$\qquad\qquad = 6xy^2z^2(16x^2 - 3z^3 - 6xz^4)$

GCFs can be binomials too

i) $8x(4x - 5) - 7(4x - 5)$

both terms have a (4x -5) $= (4x - 5)(8x - 7)$

j) $6x^2(2x - y) - (2x - y)$

both terms have a (2x- y) $= (2x - y)(6x^2 - 1)$

k) $(3 - x)x^2 + (3 - x)9$

both terms have a (3-x) $= (3 - x)(x^2 + 9)$

> **Assignment = worksheet**

Factoring and GCFs

Where do tadpoles in the Pawn shop come from?

4	10	2	8	1	9	13	7	11	14	6	15	12	3	5

1) $3x^2 + 18x + 9$

2) $2x^2 + 10x + 12$

3) $7x^2 + 14x + 35$

4) $5x^2 - 20x + 10$

5) $6x^2 + 9x - 21$

6) $n^3 + n^2 + n$

7) $n^4 - n^3 + n^2$

8) $2n^3 - n^2 - 5n$

9) $3n^2 + 9n$

10) $7n^2 - 28n$

11) $4k^3 - 32k$

12) $6k^3 + 10k^2$

13) $5k^3 + 15k^2 + 10k$

14) $4k^3 - 20k^2 + 4$

15) $4k^4 + 18k^3 - 6k^2$

Answers:
- (D) $3(2x^2 + 3x - 7)$
- (L) $3(2x^2 + 4x - 5)$
- (A) $3(x^2 + 6x + 3)$
- (P) $5(x^2 - 2x + 5)$
- (F) $5(x^2 - 4x + 2)$
- (O) $2(x^2 + 5x + 6)$
- (B) $7(x^2 + x + 6)$
- (E) $7(x^2 + 2x + 5)$

Answers:
- (S) $n(2n^2 - 2n - 6)$
- (O) $n^2(n^2 - n + 1)$
- (I) $7n(n + 5)$
- (F) $3n(n + 3)$
- (E) $n^2(n^2 - 2n + 3)$
- (A) $n(n^2 + n + 1)$
- (M) $n(2n^2 - n - 5)$
- (R) $7n(n - 4)$

Answers:
- (P) $4k(k^3 - 5k^2 + 1)$
- (R) $5k(k^2 + 3k + 2)$
- (S) $4(k^3 - 8k^2 + 2)$
- (G) $4k(k^2 - 8)$
- (L) $5k(k^2 + 4k + 1)$
- (W) $2k^2(2k^2 + 9k - 3)$
- (T) $2k^2(3k - 9)$
- (N) $2k^2(3k + 5)$

1. What do you get when you cross a chicken with a centipede?

$\overline{5}\ \overline{8}\ \overline{11}\ \overline{14}\ \overline{12}\ \overline{2}\ \overline{14}\ \overline{1}\ \overline{10}\ \overline{13}\ \overline{11}\ \overline{6}\ \overline{7}\ \overline{4}\ \overline{13}$

2. What do you get when you cross a mink with an octopus?

$\overline{12}\ \overline{7}\ \overline{3}\ \overline{12}\ \overline{11}\ \overline{3}\ \overline{9}\ \overline{12}\ \overline{14}\ \overline{10}\ \overline{13}$

Answers
- (E) $4x^2(x^2 + 5x + 3)$
- (L) $3(x^4 + 6x^2 + 11)$
- (O) $7x(2x^2 - x - 5)$
- (U) $3(2x^2 + 3x + 9)$
- (C) $7x(7x^3 - 2x^2 - 4)$
- (K) $5x(5x^2 - 8x + 2)$
- (B) $7x(7x^3 + 2x^2 - 3)$
- (D) $5x(x^2 + 6x - 3)$
- (I) $3(x^4 + 4x^2 - 11)$
- (H) $6ab^2(4b^2 - 3b - 2)$
- (X) $2(a^2 + 6ab + 3b^2)$
- (S) $7ab(b^4 - 8)$
- (M) $3ab^2(a + 5b)$
- (R) $6ab^2(4b^2 + 2b - 3)$
- (N) $4a^2b^2(2a^2b^2 - 9ab + 2)$
- (A) $2a^2b(3a^2 - 5ab - 3b^2)$
- (F) $6a(a^2 - 3b)$
- (T) $4a^2b^2(2a^2b^2 - 7ab + 1)$

1) $6x^2 + 9x + 27$

2) $5x^3 + 30x^2 - 15x$

3) $14x^3 - 7x^2 - 35x$

4) $25x^3 - 40x^2 + 10x$

5) $4x^4 + 20x^3 + 12x^2$

6) $3x^4 + 12x^2 - 33$

7) $49x^4 - 14x^3 - 28x$

8) $2a^2 + 12ab + 6b^2$

9) $6a^3 - 18ab$

10) $3a^2b^2 + 15ab^3$

11) $8a^4b^4 - 28a^3b^3 + 4a^2b^2$

12) $6a^4b - 10a^3b^2 - 6a^2b^3$

13) $7ab^5 - 56ab$

14) $24ab^4 + 12ab^3 - 18ab^2$

Did you hear about...

A	B	C	D	E
F	G	H	I	J
K	L	M	N	???

A $x(x-2) + 3(x-2)$

B $a(2a+5) + 2(2a+5)$

C $n(3n-1) - 5(3n-1)$

D $2b(r+4) - 3(r+4)$

E $(x^2+1)k + (x^2+1)4$

F $(5c-d)(2c) + (5c-d)(4d)$

G $k^2(x+3) - 7(x+3)$

H $w^2(3w-1) + (3w-1)$

I $2d(5-n^2) + (5-n^2)$

J $5t^2(t+7) - (t+7)$

K $3u^2(u^2+v^2) - v^2(u^2+v^2)$

L $(a-2b)3a - (a-2b)5b$

M $6h(x^3-4) - (x^3-4)$

N $(y^2+3)y^2 + (y^2+3)3$

ANSWERS

$(6-h)(x^3-4)$ MISS	$(2b-3)(r+4)$ HUNTED
$(5t^2-1)(t+7)$ MADE	$(5c-d)(2c-d)$ WHEN
$(6h-1)(x^3-4)$ ON	$(x+3)(x-2)$ THE
$(a-2b)(5a+3b)$ BEAR	$(a+2)(5a-2)$ HE
$(2d+1)(5-n^2)$ RANGER	$(x^2+1)(k+4)$ BEAR
$(a-2b)(3a-5b)$ PUT	$(k^2-7)(x+3)$ THE
$(w^2+1)(3w-1)$ FOREST	$(a+2)(2a+5)$ MAN
$(2d-5)(5-n^2)$ SHOOT	$(k-2)(x+3)$ DEER
$(3u^2-v^2)(u^2+v^2)$ HIM	$(n-5)(3n-1)$ WHO
$(y^2+3)^2$ CLOTHES	$(2b+4)(r-3)$ SHOT
$(u^2+3v^2)(u^2+v^2)$ A	$(5c-d)(2c+4d)$ UNTIL

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a)

b)

c)

d)

e)

f)