Warm-up 2/14

Write out the prime factorization of the following numbers.

1. 204   2. 459

3. What is the GCF of 204 and 459?

Factor the following using GCF.

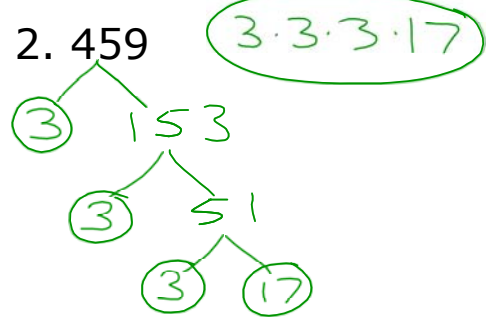4. $12x^3y^2 + 3x^2y$ 5. $-14x^4 - 12x^3 - 2x^2$

Warm-up 2/14

Write out the prime factorization of the following numbers.

1. 204 $2 \cdot 2 \cdot 3 \cdot 17$

$$2 \overline{)204}$$
$$2 \overline{)102}$$
$$3 \overline{)51}$$
$$17$$

2. 459 $3 \cdot 3 \cdot 3 \cdot 17$

3 — 153
3 — 51
3 — 17

3. What is the GCF of 204 and 459?

$2 \cdot 2 \cdot 3 \cdot 17$
$3 \cdot 3 \cdot 3 \cdot 17$

$3 \cdot 17 = 51$

Factor the following using GCF.

4. $12x^3y^2 + 3x^2y$

$2 \cdot 2 \cdot 3 \cdot x \cdot x \cdot x \cdot y \cdot y$
$3 \cdot x \cdot x \cdot y$

$3x^2y(4xy + 1)$

$3x^2y(4xy + 1)$

$12x^3y^2 + 3x^2y$ ✓

5. $-14x^4 - 12x^3 - 2x^2$

$2 \cdot 7 \cdot x \cdot x \cdot x \cdot x$
$-2 \cdot 2 \cdot 3 \cdot x \cdot x \cdot x$
$-2 \cdot x \cdot x$

$-2x^2(7x^2 + 6x + 1)$

$-2x^2(7x^2 + 6x + 1)$
$-14x^4 - 12x^3 - 2x^2$ ✓

Quiz

Factoring with GCF

$-14x^4 - 12x^3 - 2x^2$

$-2 \cdot 7 \cdot x \cdot x \cdot x \cdot x$

$-2 \cdot 2 \cdot 3 \cdot x \cdot x \cdot x$

$-2 \cdot x \cdot x$

$-2 \cdot x \cdot x$
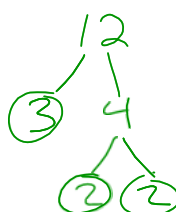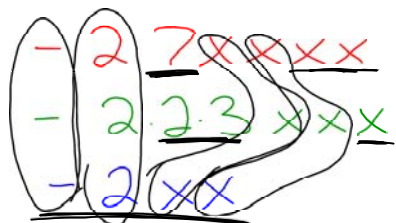
$-2x^2(7x^2 + 6x + 1)$

$-14x^4 - 12x^3 - 2x^2 \checkmark$

12
3 4
2 2

Factoring out a Common Binomial

$7(x - 3) - 2x(x - 3)$

$(x-3)(7-2x)$ $7(x-3) - 2x(x-3)$

$-t^3 (t^2 + 4) + (t^2 + 4)$

$(t^2+4)(-t^3+1)$ $(t^2+4)(-t^3) \neq 1(t^2+4)$

$4x(z^2 - 7) + 9(2z^3 + 1)$

<u>Try These!!</u>

5. 4s(s + 6) - 5(s + 6)

6. 3x(y + 4) - 2y(x + 4)

7. 7x(2x + 3) - (2x + 3)

Try These!!

5. $4s(s + 6) - 5(s + 6)$

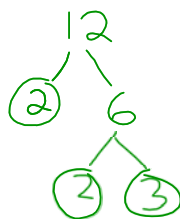$(s+6)(4s-5)$

6. $3x(y + 4) - 2y(x + 4)$

$(y+4)(3x-2y)$ ~~(crossed out)~~

7. $7x(2x + 3) - (2x + 3)$

$(2x+3)(7x-1)$

Factoring by Grouping

$(3h^4 - 2h^3) + (12h - 8)$

$3hhhh$
$-2hhh$

$2 \cdot 2 \cdot 3h$
$-2 \cdot 2 \cdot 2$

$h^3(3h - 2) + 4(3h - 2)$

$(3h - 2)(h^3 + 4)$

12
2   6
2 3

	$3h$	-2
h^3	$3h^4$	$-2h^3$
4	$12h$	-8

$3h^4 - 2h^3 + 12h - 8$ ✓

Factoring by Grouping

$(12a^3 - 9a^2) + (20a - 15)$

$\frac{2 \cdot 2 \cdot 3 \, a \, a \, a}{-3 \cdot 3 \, a \, a}$ $\frac{2 \cdot 2 \cdot 5 \, a}{-3 \cdot 5}$

20
  4   5
2 2
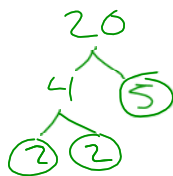
$3a^2(4a - 3) + 5(4a - 3)$

$(4a - 3)(3a^2 + 5)$

	$4a$	-3
$3a^2$	$12a^3$	$-9a^2$
5	$20a$	-15

$12a^3 - 9a^2 + 20a - 15 \checkmark$

$4r^3 + 24r + r^2 + 6$

Factoring by Grouping

$(12a^3 - 9a^2) + (20a - 15)$

$2 \cdot 2 \cdot 3 \cdot a \cdot a \cdot a$　　$2 \cdot 2 \cdot 5 \cdot a$
$-3 \cdot 3 \cdot a \cdot a$　　　　$-3 \cdot 5$

$3a^2(4a - 3) + 5(4a - 3)$

$(4a - 3)(3a^2 + 5)$

check

	$4a$	-3
$3a^2$	$12a^3$	$-9a^2$
$+5$	$20a$	-15

$12a^3 - 9a^2 + 20a - 15 \checkmark$

$(4r^3 + 24r) + (r^2 + 6)$

$2 \cdot 2 \cdot r \cdot r \cdot r$　　$r \cdot r$
$2 \cdot 2 \cdot 2 \cdot 3 \cdot r$　　$2 \cdot 3$

$4r(r^2 + 6) + 1(r^2 + 6)$

$(r^2 + 6)(4r + 1)$

check

	$4r$	$+1$
r^2	$4r^3$	$+r^2$
$+6$	$24r$	6

$4r^3 + r^2 + 24r + 6 \checkmark$

11

Try These! (check your answers)
Factor.

1. $6b^3 + 8b^2 + 9b + 12$

2. $4r^3 + 24r + r^2 + 6$

Try These! (check your answers)

Factor.

1. $(6b^3 + 8b^2) + (9b + 12)$

$(3b+4)(2b^2+3)$

$\dfrac{2 \cdot 3 \cdot b b b}{2 \cdot 2 \cdot 2 b b}$ 　　$\dfrac{3 \cdot 3 b}{2 \cdot 2 \cdot 3}$

$2b^2(3b+4) \; + \; 3(3b+\;)$

$(3b+4)(2b^2+3)$

check

	3b	4
$2b^2$	$6b^3$	$8b^2$
3	$9b$	12

$6b^3 + 8b^2 + 9b + 12 \checkmark$

2. $4r^3 + 24r + r^2 + 6$

$(r^2+6)(4r+1)$

$\dfrac{2 \cdot 2 \cdot r r r}{2 \cdot 2 \cdot 2 \cdot 3 r}$ 　　$\dfrac{r \; r}{2 \; 3}$

$4r(r^2+6) \; + 1(r^2+6)$

$(r^2+6)(4r+1)$

check

	r^2	6
$4r$	$4r^3$	$24r$
1	r^2	6

$4r^3 + r^2 + 24r + 6 \checkmark$

Factoring with opposites

$(3x^3 - 15x^2)(- 2x + 10)$

$$3xxx$$
$$-3\ 5xx$$

$$-2x$$
$$2\cdot 5$$
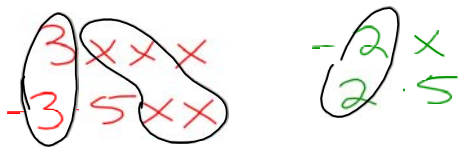
$3x^2(x - 5) + 2(-x + 5)$

$3x^2(x-5) - 2(x-5)$

$(x-5)(3x^2-2)$

$(10x^3 - 15x^2)(- 8x + 12)$

$$25xxx$$
$$-3\ 5xx$$
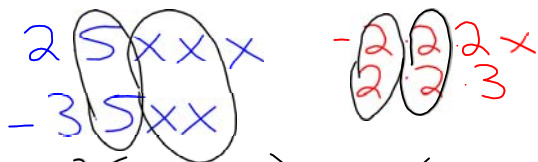
$$-2\ 2\ 2x$$
$$2\ 2\ 3$$

$5x^2(2x-3) + 4(-2x+3)$

$5x^2(2x-3) - 4(2x-3)$

$(2x-3)(5x^2-4)$

	x	$- 5$
$3x^2$	$3x^3$	$-15x^2$
-2	$-2x$	$+10$

$3x^3\ 15x^2 - 2x + 10$ ✓

$$8$$
$$2\quad 4$$
$$2\ 2$$

$$2\underline{|12}$$
$$2\underline{|6}$$
$$3$$

	$2x$	-3
$5x^2$	$10x^3$	$-15x^2$
-4	$- 8x$	$+12$

$10x^3 - 15x^2 - 8x + 12$ ✓

Try These! (check your answers)

Factor.

1. $-6b^3 + 8b^2 + 9b - 12$

2. $4r^3 - 24r - r^2 + 6$

Try These! (check your answers)

Factor.　　　　　　　　　　　$(2b^2 - 3)(-3b+4)$

1. $(-6b^3 + 8b^2) + (9b - 12)$

$-2 \cdot 3 \cdot b \cdot b \cdot b$　　　　$3 \cdot 3 \cdot b$
$2 \cdot 2 \cdot 2 \cdot b \cdot b$　　　　$-2 \cdot 2 \cdot 3$

$-1(2b^2(-3b+4)) + 3(3b-4)$

$-2b^2(3b-4) + 3(3b-4)$

$(3b-4)(-2b^2+3)$

Check

	$3b$	-4
$-2b^2$	$-6b^3$	$+8b^2$
3	$9b$	-12

$-6b^3 + 8b^2 + 9b - 12$ ✓

2. $4r^3 - 24r(-r^2 + 6)$

$2 \cdot 2 \cdot r \cdot r \cdot r$　　　$-r \cdot r$
$-2 \cdot 2 \cdot 2 \cdot 3 \cdot r$　　　$2 \cdot 3$

$4r(r^2-6) + {}^{-1}(-r^2+6)$

$4r(r^2 \cdot 2) - 1(r^2-6)$

$(r^2-6)(4r-1)$

Check

	r^2	-6
$4r$	$4r^3$	$-24r$
-1	$-r^2$	$+6$

$4r^3 - r^2 - 24r + 6$ ✓

Homework

Worksheet #1-6