Algebra 1
Lesson 9.4A
Greatest Common Factor

Example 1. Prime Factorization and Factor Trees

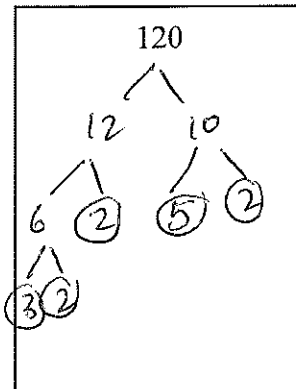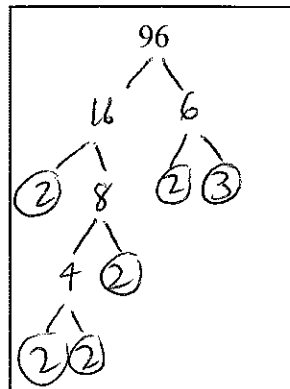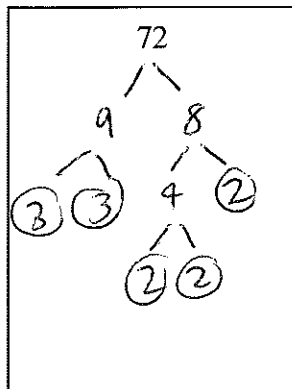(a) What is the prime factorization of 72?

$$2^3 \cdot 3^2$$

(b) What is the prime factorization of 96?

$$2^5 \cdot 3$$

(c) What is the prime factorization of 120?

$$2^3 \cdot 3 \cdot 5$$

(d) What is the Greatest Common Factor of 72, 96 and 120?

$$2^3 \cdot 3 = 24$$

Example 2. Prime Factorization

(a) Find the prime factorization of $28x^2y^3$.

$$2^2 \cdot 7 \cdot x^2 \cdot y^3$$

(b) Find the prime factorization of $42xy^2z$.

$$2 \cdot 3 \cdot 7 \cdot x \cdot y^2 \cdot z$$

(c) Find the prime factorization of $56x^2y^2z^2$.

$$2^3 \cdot 7 \cdot x^2 \cdot y^2 \cdot z^2$$

(d) Find the GCF of $28x^2y^3$, $42xy^2z$, $56x^2y^2z^2$.

$$2 \cdot 7 \cdot x \cdot y^2 = 14xy^2$$

(e) Factor the GCF out of the polynomial $(28x^2y^3 + 42xy^2z + 56x^2y^2z^2)$

$$14xy^2(2xy + 3z + 4xz^2)$$

Example 3. Factoring out the GCF

(a) $3x^2 - 9x$

$$3x(x-3)$$

(b) $2x^4 + 4x^3 + 8x^2$

$$2x^2(x^2 + 2x + 4)$$

(c) $12y^2z - 32xyz + 6x^2yz^2$

$$2yz(6y - 16x + 3x^2z)$$

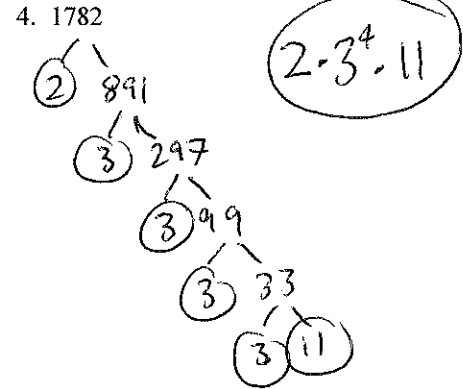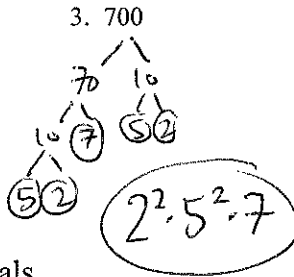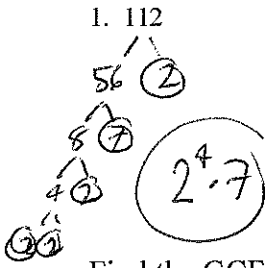(d) $10ab^3 + 15ac^2$

$$5a(2b^3 + 3c^2)$$

(e) $3y(x + 5) - 5(x + 5)$

$$(x+5)(3y-5)$$

GCF   leftovers

Assignment.

Find the prime factorization of each number.

1. 112

56 ②
8 ⑦
4 ②
②②

$2^4 \cdot 7$

2. 45

9 ⑤
③③

$3^2 \cdot 5$

3. 700

70 10
10 ⑦ ⑤②
⑤②

$2^2 \cdot 5^2 \cdot 7$

4. 1782

② 891
③ 297
③ 99
③ 33
③ ⑪

$2 \cdot 3^4 \cdot 11$

Find the GCF of the following monomials.

5. $9a^2b^2$, $15ab^3$

$3ab^2$

6. $-98xyz$, $70x^2z$

$-14xz$

7. $32x^2y$, $56yz^3$

$8y$

8. $68abc^2$, $51ac^2$

$17ac^2$

Factor the GCF out of each polynomial.

9. $3x^2 + 6x$

$3x(x+2)$

10. $11y^3 - 33y^2$

$11y^2(y-3)$

11. $18r^2s^2 - 12r^4s$

$6r^2s(3s - 2r^2)$

12. $x(a-b) + 3(a-b)$

$(a-b)(x+3)$

13. $60ab - 96a^2c^3 + 108a^2b^3c$

$12ab(5-8ac^3+9ab^2c)$
$12a(5b - 8ac^3 + 9ab^3c)$

14. $16x^3 - 64x$

$16x(x^2 - 4)$

15. $39r^3st^2 - 65st^2 + 91rst$

$13st(3r^3t - 5t + 7r)$

16. $8y^3 + 14y^2$

$2y^2(4y + 7)$

17. $2x^4 - 18x^3 + 12x$

$2x(x^3 - 9x^2 + 6)$

18. $36a^2 + 24ab - 48ab$

$12a(3a + 2b - 4b)$

19. $4x^5 + 8x^4 + 2x^3$

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

20. $21y^5 + 12y^3 - 9y$

$3y(7y^4 + 4y^2 - 3)$