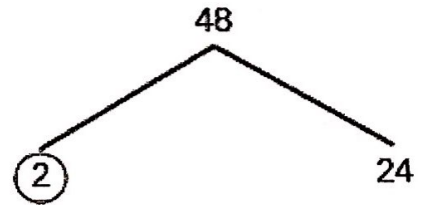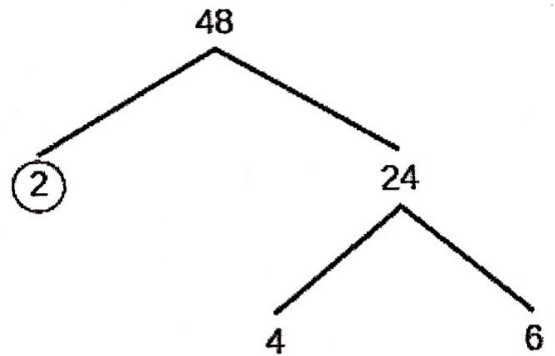# Prime Factorization
Factor Tree Notes

We can start our tree using any
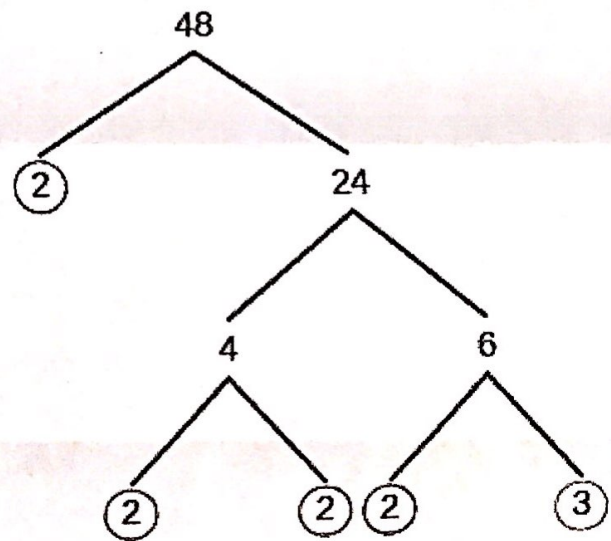factor pair of 48. Let's use 2 and 24.

We circle the 2 because it is prime, and
so that branch is complete.

Now we will factor 24. Let's use 4 and 6.

Neither factor is prime, so we do not circle either.
We factor the 4, using 2 and 2.
We factor 6, using 2 and 3.

We circle the 2s and the 3 since they are prime.
Now all of the branches end in a prime.
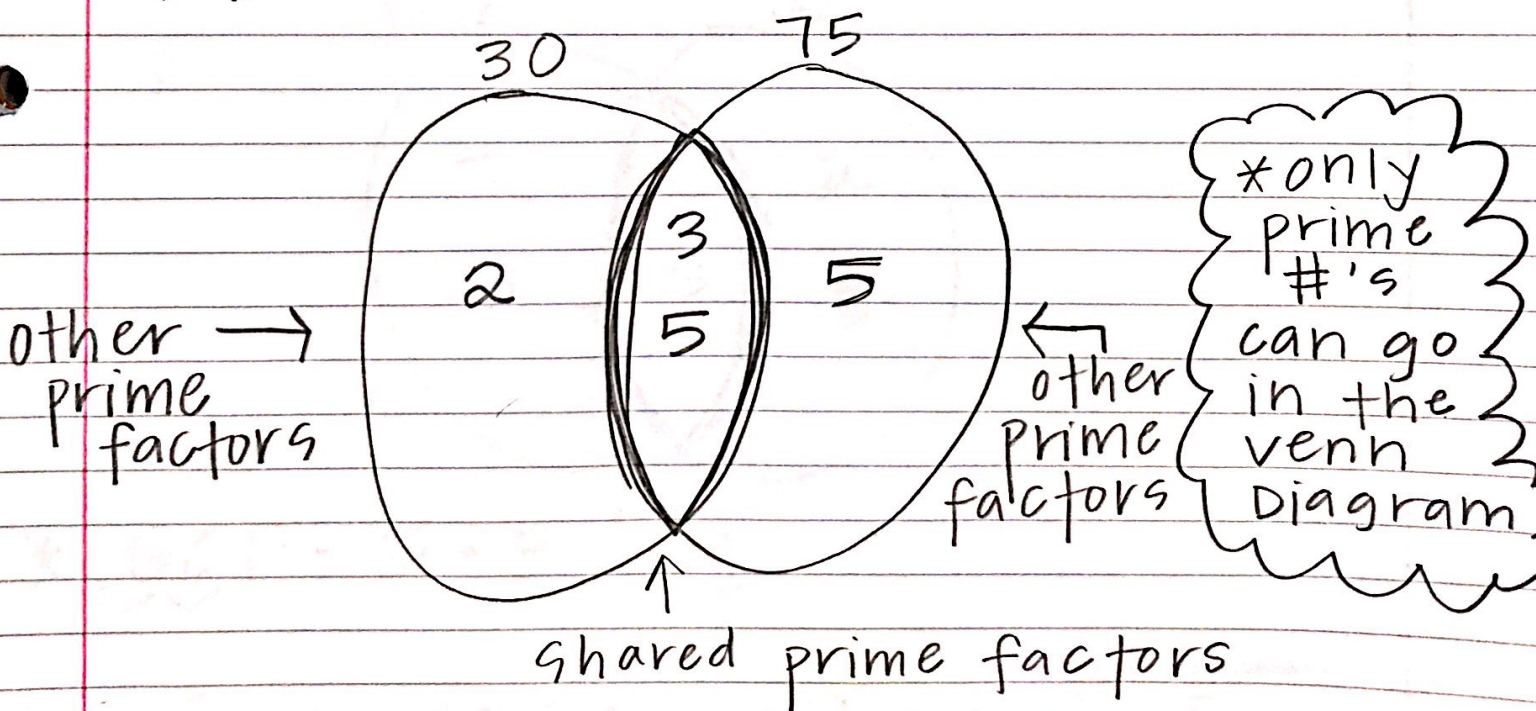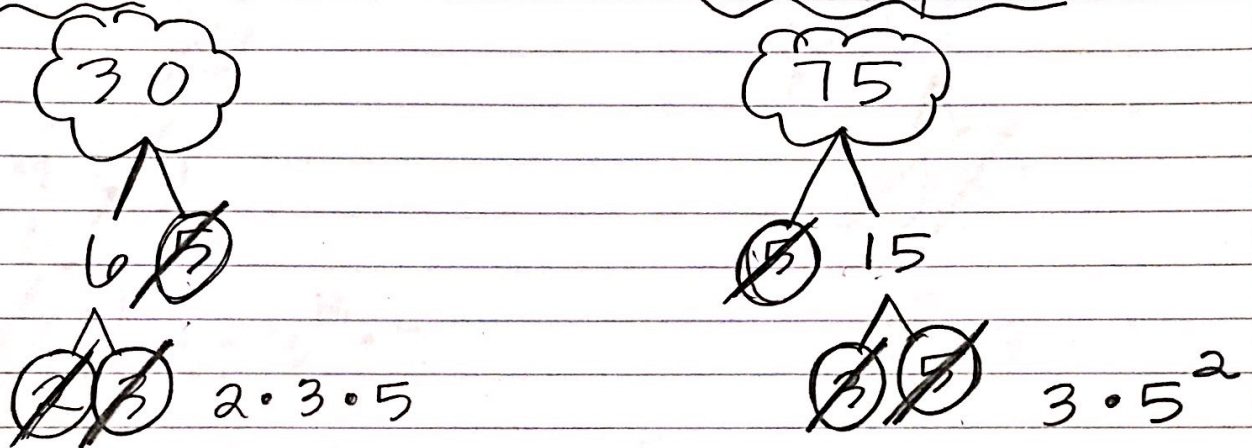Write the product of the circled numbers.

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

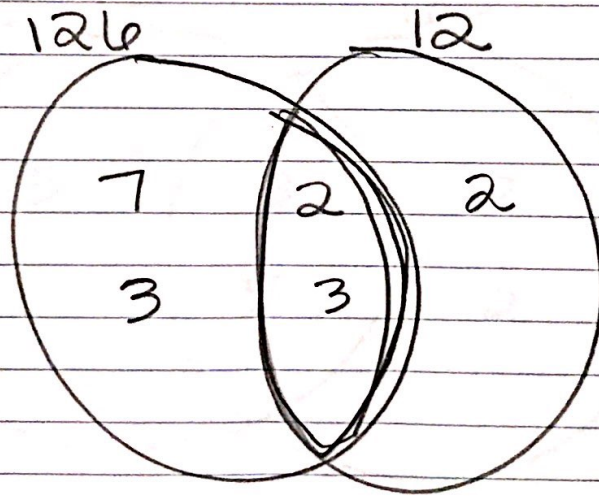Simplify the prime factorization of 48.
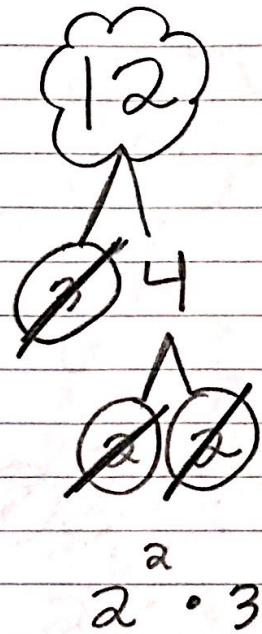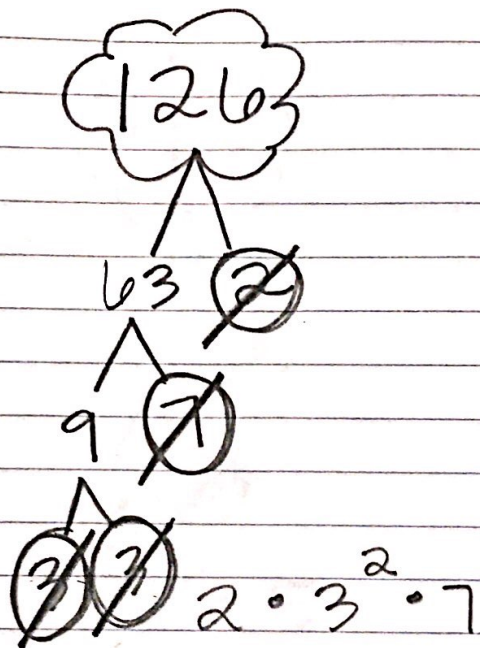
$2^4 \cdot 3$

GCF & LCM

* GCF - Greatest common FACTOR
* LCM - Least common Multiple

30
6 5
2 3   2 · 3 · 5

75
5 15
3 5 $3 · 5^2$

30   75

other →
prime
factors

2   3 5   5

other ←
prime
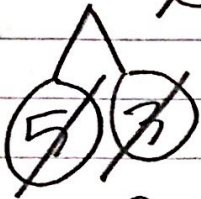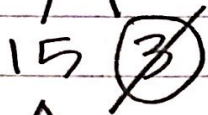factors

shared prime factors

*only prime #'s can go in the venn Diagram
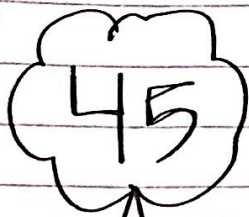
* GCF - Multiply the #'s in the middle
3 · 5 = 15   GCF = 15

* LCM - Multiply ALL #'s in the venn Diagram
2 · 3 · 5 · 5 = 150   LCM = 150

8

(126)

63 2̶

9 7̶

3̶ 3̶ $2 \cdot 3^2 \cdot 7$

(12)

4̶ 4

2̶ 2̶ $2^2 \cdot 3$

126   12

7   2   2
3   3

* GCF – $2 \cdot 3 =$ [6]

* LCM – $7 \cdot 3 \cdot 2 \cdot 2 \cdot 3 =$ [252]

(45)

(60)

15 ~~3~~

6   10

~~5~~ ~~3~~

~~2~~ ~~3~~   ~~2~~ ~~5~~

$3^2 \cdot 5$

$2^2 \cdot 3 \cdot 5$

45   60

3   3   2

5   2
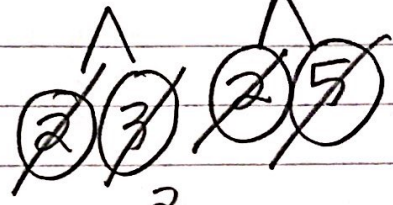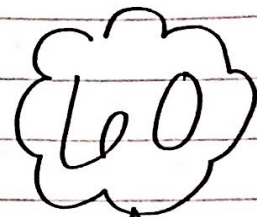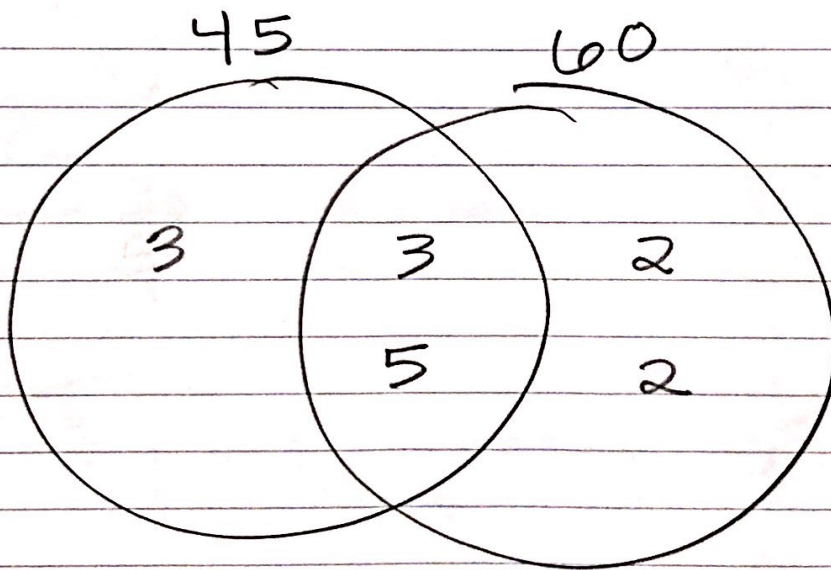
* GCF = 3 · 5 = 15

* LCM = 3 · 3 · 5 · 2 · 2 = 180

Distributive property

* The <u>Distributive</u> <u>Property</u> states that multiplying a number by a group of numbers added together is the same as doing each multiplication separately.

<u>Old way</u>   vs. <u>Distributive Property</u>

$$5(4 + 11)$$

$$5(15)$$

$$\boxed{75}$$

$$5(4 + 11)$$

$$5(4) + 5(11)$$

$$20 + 55$$

$$\boxed{75}$$

ex: $4(2 + 3)$

$$4(2) + 4(3)$$

$$8 + 12$$

$$\boxed{20}$$

ex: $4(9 - 6)$

$$4(9) - 4(6)$$

$$36 - 24$$

$$\boxed{12}$$

* Use the GCF from two addends to rewrite the sum using the Distributive Property.

ex: $15 + 25$ $\qquad$ GCF: 5

$$5(3 + 5)$$

ex: $14 + 42$ $\qquad$ GCF: 14

$$14(1 + 3)$$

→ $7\left(\dfrac{2}{2} + \dfrac{6}{2}\right)$
$\times 2$

still have something in common

$$14(1 + 3)$$

ex: $12 - 24$ $\qquad$ GCF: 12

$$12(1 - 2)$$

12