

8-23-17 1st Trig

Prime numbers

- Can't be divided by anything other than 1 and itself
- Only has 2 factors

2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, ...

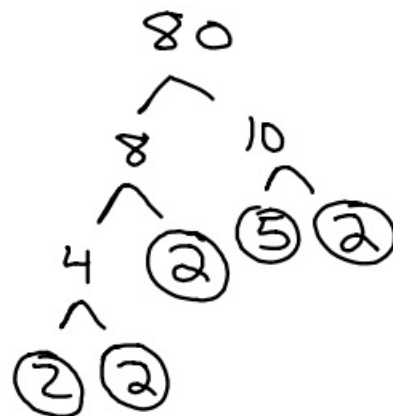
Prime factorization

- All #s can be written as the product of prime #s.

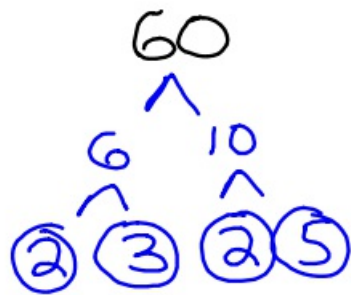
Ex: $80 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 5$

$18 = 2 \cdot 3 \cdot 3$

Factor Trees



$80 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 5$



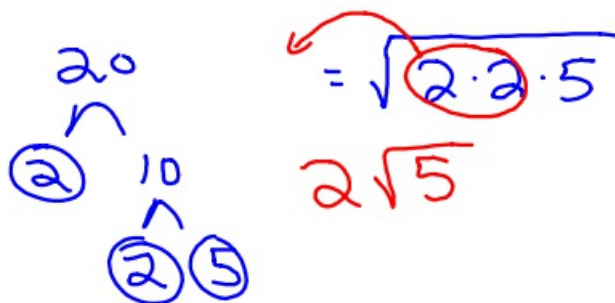
$$60 = 2 \cdot 2 \cdot 3 \cdot 5$$

Simplify $\frac{4}{10} = \frac{2}{5}$

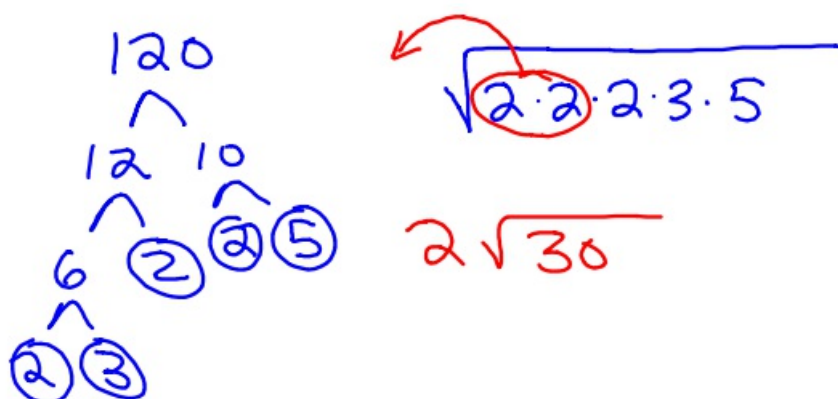
We like to simplify $\sqrt{\quad}$

$$\sqrt{20} \approx 4.47\dots$$

① Simplify $\sqrt{20}$



② Simplify $\sqrt{120}$



③ Simplify $\sqrt{300}$

$$\begin{array}{c} 300 \\ \wedge \\ ③ \quad 100 \\ \wedge \\ 10 \quad 10 \\ \wedge \quad \wedge \\ ② \quad ⑤ \quad ② \quad ⑤ \end{array} \quad \begin{array}{c} 5 \cdot 2 \sqrt{2 \cdot 2 \cdot 3 \cdot 5 \cdot 5} \\ 10 \sqrt{3} \end{array}$$

④ $\sqrt{x^5}$

$$\begin{array}{c} x \cdot x \sqrt{x \cdot x \cdot x \cdot x \cdot x} \\ x^2 \sqrt{x} \end{array}$$

⑤ $\sqrt{x^8}$

$$\begin{array}{c} x x x x \sqrt{x x x x x x x x} \\ x^4 \end{array}$$

⑥ $\sqrt{8x^3}$

$$\begin{array}{c} 8 \\ \wedge \\ 4 \quad ② \\ \wedge \\ ② \quad ② \end{array} \quad \begin{array}{c} x \cdot 2 \sqrt{2 \cdot 2 \cdot 2 \cdot x \cdot x \cdot x} \\ 2x \sqrt{2x} \end{array}$$

$$\textcircled{7} \sqrt{20a^3b^2c^5}$$

$$\begin{array}{c}
 20 \\
 \wedge \\
 4 \textcircled{5} \\
 \wedge \\
 \textcircled{2} \textcircled{2}
 \end{array}
 \quad
 \begin{array}{c}
 \text{c c b a 2} \sqrt{2 \cdot 2 \cdot 5 \textcircled{a} \textcircled{a} \textcircled{b} \textcircled{b} \textcircled{c} \textcircled{c} \textcircled{c} \textcircled{c}}
 \end{array}$$

$$2abc^2 \sqrt{5ac}$$

$$\textcircled{8} \sqrt[3]{48}$$

$$\begin{array}{c}
 48 \\
 \wedge \\
 \textcircled{2} 24 \\
 \wedge \\
 \begin{array}{cc}
 6 & 4 \\
 \wedge & \wedge \\
 \textcircled{2} \textcircled{3} & \textcircled{2} \textcircled{2}
 \end{array}
 \end{array}
 \quad
 \begin{array}{c}
 2 \sqrt[3]{2 \cdot 2 \cdot 2 \cdot 2 \cdot 3} \\
 2 \sqrt[3]{6}
 \end{array}$$

$$\sqrt{-1} = i$$

$$\textcircled{9} \sqrt{-18}$$

$$\begin{array}{c}
 18 \\
 \wedge \\
 \textcircled{2} 9 \\
 \wedge \\
 \textcircled{3} \textcircled{3}
 \end{array}
 \quad
 \begin{array}{c}
 3i \sqrt{\textcircled{-1} \textcircled{2} \cdot \textcircled{3} \cdot \textcircled{3}} \\
 3i \sqrt{2}
 \end{array}$$

8-23-17 3rd Trig

Prime numbers

- only divisible by 1
and itself

- has only 2 factors

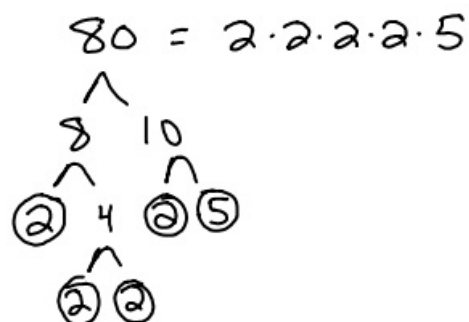
2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, ..

Prime factorization

- all numbers can be written
as the product of prime #s

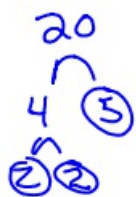
$$24 = 2 \cdot 2 \cdot 2 \cdot 3$$

Factor Trees



Simplify $\frac{4}{10} = \frac{2}{5}$

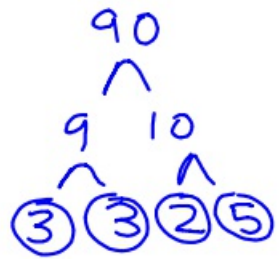
Simplify $\sqrt{20}$
↓
 $\approx 4.47\dots$



$$\sqrt{20} =$$

The expression $\sqrt{20}$ is shown with a red arrow pointing to the prime factorization $\sqrt{2 \cdot 2 \cdot 5}$. Below this, the simplified form $2\sqrt{5}$ is written in red.

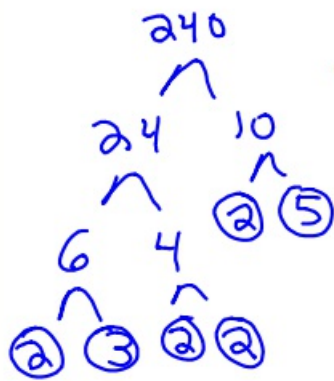
① Simplify $\sqrt{90}$



$$3\sqrt{2 \cdot 3 \cdot 3 \cdot 5}$$

$$3\sqrt{10}$$

② Simplify $\sqrt{240}$



$$2 \cdot 2 \sqrt{2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot 5}$$

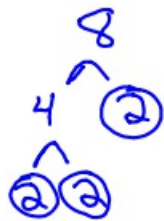
$$4\sqrt{15}$$

③ Simplify $\sqrt{x^5}$

$$x \cdot x \sqrt{x \cdot x \cdot x \cdot x}$$

$$x^2 \sqrt{x}$$

④ Simplify $\sqrt{8x^4}$



$$x \cdot x \cdot 2 \sqrt{2 \cdot 2 \cdot 2 \cdot x \cdot x \cdot x \cdot x}$$

$$2x^2 \sqrt{2}$$

$$\textcircled{5} \sqrt{40 a^2 b^3}$$

$$\begin{array}{l} 40 \\ \wedge \\ 4 \quad 10 \\ \wedge \quad \wedge \\ \textcircled{2} \textcircled{2} \textcircled{2} \textcircled{5} \end{array} \quad \begin{array}{l} ba^2 \sqrt{\textcircled{2} \cdot \textcircled{2} \cdot 5 \textcircled{a} \textcircled{a} \textcircled{b} \textcircled{b} \textcircled{b}} \\ 2ab \sqrt{10b} \end{array}$$

$$\textcircled{6} \sqrt[3]{16 a^8}$$

$$\begin{array}{l} 16 \\ \wedge \\ 4 \quad 4 \\ \wedge \quad \wedge \\ \textcircled{2} \textcircled{2} \textcircled{2} \textcircled{2} \end{array} \quad \begin{array}{l} a^2 \sqrt[3]{\textcircled{2} \cdot \textcircled{2} \cdot \textcircled{2} \cdot \textcircled{2} \textcircled{a} \textcircled{a} \textcircled{a} \textcircled{a} \textcircled{a} \textcircled{a}} \\ 2a^2 \sqrt[3]{2a^2} \end{array}$$

$$\textcircled{7} \sqrt[3]{a^4 b^6 c}$$

$$abb \sqrt[3]{\textcircled{a} \textcircled{a} \textcircled{a} \textcircled{b} \textcircled{b} \textcircled{b} \textcircled{b} \textcircled{b} \textcircled{b} c}$$

$$ab^2 \sqrt[3]{ac}$$

$$\sqrt{-1} = i \quad \text{imaginary \#}$$

$$\textcircled{8} \sqrt{-20}$$

$$\begin{array}{l} 20 \\ \wedge \\ 4 \quad \textcircled{5} \\ \wedge \\ \textcircled{2} \textcircled{2} \end{array} \quad \begin{array}{l} 2i \sqrt{\textcircled{-1} \textcircled{2} \cdot \textcircled{2} \cdot 5} \\ 2i \sqrt{5} \end{array}$$

8-23-17 4th Trig

Prime numbers

- can only be divided by 1 and itself
- only have 2 factors

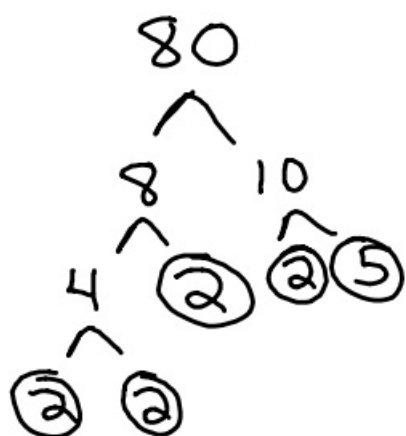
2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, ...

Prime factorization

- all #s can be written as the product of prime #s.

$$80 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 5$$

Factor Tree



$$80 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 5$$

Simplify $\frac{4}{10} = \frac{2}{5}$

Simplify $\sqrt{20}$
 \downarrow
 $\approx 4.47\dots$

$$\begin{array}{c} 20 \\ \swarrow \searrow \\ 4 \quad 5 \\ \swarrow \searrow \quad \swarrow \searrow \\ 2 \quad 2 \quad 2 \quad 5 \\ \swarrow \searrow \quad \swarrow \searrow \\ 2 \quad 2 \quad 2 \quad 5 \end{array}$$

$$\sqrt{20} = 2\sqrt{2 \cdot 5} = 2\sqrt{10}$$

① Simplify $\sqrt{120}$

$$\begin{array}{c} 120 \\ \swarrow \searrow \\ 12 \quad 10 \\ \swarrow \searrow \quad \swarrow \searrow \\ 4 \quad 3 \quad 2 \quad 5 \\ \swarrow \searrow \quad \swarrow \searrow \\ 2 \quad 2 \quad 2 \quad 5 \end{array}$$

$$\sqrt{120} = 2\sqrt{2 \cdot 2 \cdot 3 \cdot 5} = 2\sqrt{30}$$

② Simplify $\sqrt{32}$

$$\begin{array}{c} 32 \\ \swarrow \searrow \\ 8 \quad 4 \\ \swarrow \searrow \quad \swarrow \searrow \\ 4 \quad 2 \quad 2 \quad 2 \\ \swarrow \searrow \quad \swarrow \searrow \\ 2 \quad 2 \quad 2 \quad 2 \end{array}$$

$$\sqrt{32} = 2 \cdot 2 \sqrt{2 \cdot 2 \cdot 2 \cdot 2} = 4\sqrt{2}$$

③ $\sqrt{x^5}$

$$xx\sqrt{\cancel{xxx}}$$

$$x^2\sqrt{x}$$

④ $\sqrt{50a^3b^2}$

$$\begin{array}{c} 50 \\ \swarrow \searrow \\ 5 \quad 10 \\ \swarrow \searrow \quad \swarrow \searrow \\ 5 \quad 2 \end{array}$$

$$ba^3\sqrt{2 \cdot 5 \cdot 5 \cdot a \cdot a \cdot b \cdot b}$$

$$5ab\sqrt{2a}$$

⑥ $\sqrt[3]{16}$

$$\begin{array}{c} 16 \\ \swarrow \searrow \\ 8 \quad 2 \\ \swarrow \searrow \quad \swarrow \searrow \\ 4 \quad 2 \\ \swarrow \searrow \quad \swarrow \searrow \\ 2 \quad 2 \quad 2 \quad 2 \end{array}$$

$$\sqrt[3]{2 \cdot 2 \cdot 2 \cdot 2} = 2\sqrt[3]{2}$$

$$\textcircled{7} \sqrt[3]{a^4 b^5 c^3}$$

$$cba \sqrt[3]{\textcircled{aaa} \textcircled{bbb} \textcircled{ccc}}$$

$$abc \sqrt[3]{ab^2}$$

$$\textcircled{8} \sqrt[3]{54 a^5}$$

$$\begin{array}{c} 54 \\ \swarrow \searrow \\ 9 \quad 6 \\ \swarrow \searrow \swarrow \searrow \\ \textcircled{3} \textcircled{3} \textcircled{2} \end{array}$$

$$\sqrt[3]{2 \cdot \textcircled{3} \cdot \textcircled{3} \cdot \textcircled{3} a a a}$$

$$3a \sqrt[3]{2a^2}$$

$$\sqrt{-1} = i \quad \text{imaginary \#}$$

$$\textcircled{9} \sqrt{-20}$$

$$\begin{array}{c} 20 \\ \swarrow \searrow \\ 4 \quad \textcircled{5} \\ \swarrow \searrow \\ \textcircled{2} \textcircled{2} \end{array}$$

$$2i \sqrt{-1 \cdot \textcircled{2} \cdot \textcircled{2} \cdot 5}$$

$$2i \sqrt{5}$$

$$\textcircled{10} \sqrt{-140 a^2}$$

$$\begin{array}{c} 140 \\ \swarrow \searrow \\ \textcircled{2} \quad 70 \\ \swarrow \searrow \swarrow \searrow \\ \textcircled{7} \quad 10 \\ \swarrow \searrow \\ \textcircled{2} \quad \textcircled{5} \end{array}$$

$$a 2i \sqrt{-1 \cdot \textcircled{2} \cdot \textcircled{2} \cdot 5 \cdot 7 a a}$$

$$2a i \sqrt{35}$$

$$(2a \sqrt{35}) i$$