

## Factors and Prime Factorization

Prime Number - An integer greater than one whose only factors are one and itself.

$$\frac{2}{1 \cdot 2} \quad \frac{3}{1 \cdot 3} \quad \frac{5}{1 \cdot 5} \quad \frac{7}{1 \cdot 7}$$

Composite Number - An integer greater than one that has factors other than one and itself.

$$\begin{array}{l} \frac{4}{1 \cdot 4} \\ 2 \cdot 2 \end{array} \quad \begin{array}{l} \frac{6}{1 \cdot 6} \\ 2 \cdot 3 \end{array} \quad \begin{array}{l} \frac{9}{1 \cdot 9} \\ 3 \cdot 3 \end{array} \quad \begin{array}{l} \frac{20}{1 \cdot 20} \\ 2 \cdot 10 \\ 4 \cdot 5 \end{array}$$

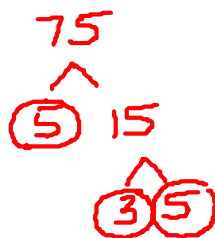
Factors - Numbers that divide evenly into a number.

$$\begin{array}{l} \frac{2}{1 \cdot 2} \\ 2 \cdot 3 \end{array} \quad \begin{array}{l} \frac{6}{1 \cdot 6} \\ 2 \cdot 3 \end{array} \quad \begin{array}{l} \frac{9}{1 \cdot 9} \\ 3 \cdot 3 \end{array}$$

Prime Factorization - Writing a number as a product of prime numbers.



$$3 \cdot 3 \cdot 3 \text{ OR } 3^3$$

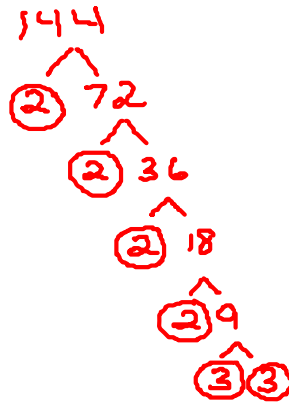


$$3 \cdot 5 \cdot 5 \text{ OR } 3 \cdot 5^2$$

Directions: Write all the factors of the number. If the number is composite, write the prime factorization.

1. 144

144  
1·144  
2·72  
3·48  
4·36  
6·24  
8·18  
9·16  
12·12



2·2·2·2·3·3 OR  $2^4 \cdot 3^2$

2. 87

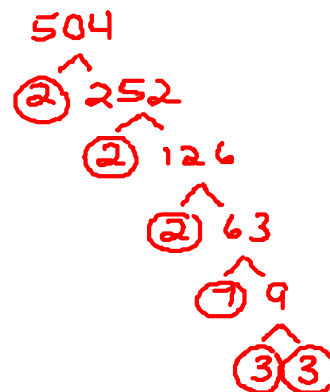
87  
1·87  
3·29



3·29

3. 504

504  
1·504  
2·252  
3·168  
4·126  
6·84  
7·72  
8·63  
9·56  
12·42  
14·36  
18·28  
21·24



2·2·2·3·3·7 OR  $2^3 \cdot 3^2 \cdot 7$

4. 53

53  
1·53

Directions: Factor the monomial.

5.  $24ab$



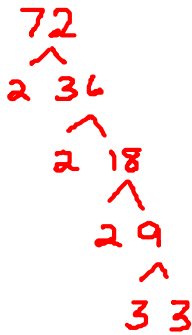
$$2 \cdot 2 \cdot 2 \cdot 3 \cdot a \cdot b$$

6.  $4x^3y^2$



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

7.  $72m^2$



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

Directions: List the factors of the monomial.

8.  $60a^2$

60  
1 · 60  
2 · 30  
3 · 20  
4 · 15  
5 · 12  
6 · 10

$a$   
 $a^2$

1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60  
 $1a, 2a, 3a, 4a, 5a, 6a, 10a, 12a,$   
 $15a, 20a, 30a, 60a$   
 $1a^2, 2a^2, 3a^2, 4a^2, 5a^2, 6a^2, 10a^2,$   
 $12a^2, 15a^2, 20a^2, 30a^2, 60a^2$

9.  $56xy^2$

56  
1 · 56  
2 · 28  
4 · 14  
7 · 8

$x$   
 $y$   
 $y^2$   
 $xy$   
 $xy^2$

1, 2, 4, 7, 8, 14, 28, 56  
 $1x, 2x, 4x, 7x, 8x, 14x, 28x, 56x$   
 $1y, 2y, 4y, 7y, 8y, 14y, 28y, 56y$   
 $1y^2, 2y^2, 4y^2, 7y^2, 8y^2, 14y^2, 28y^2,$   
 $56y^2$   
 $1xy, 2xy, 4xy, 7xy, 8xy, 14xy,$   
 $28xy, 56xy$   
 $1xy^2, 2xy^2, 4xy^2, 7xy^2, 8xy^2,$   
 $14xy^2, 28xy^2, 56xy^2$

10. What is the prime factorization of 36?

- a) ~~1~~  $2 \times 2 \times 3 \times 3$
- b)  $2 \times 2 \times 3 \times 3 = 36$
- c)  $2 \times 3 \times 3 \times 3 = 54$
- d) ~~3~~  $3 \times 3 \times 4$

B