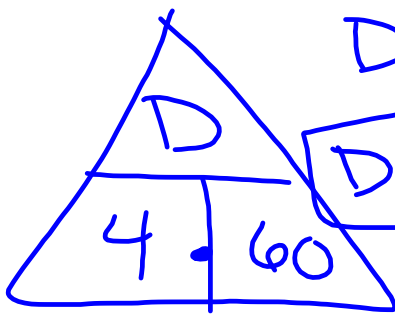


## Warm Up (Do on your HW from yesterday)

1) Find the distance traveled using  $d = rt$

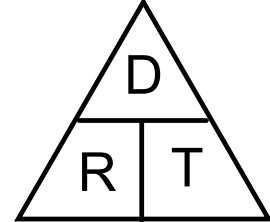
A person walks at a rate of 4 feet per second for 1 minute.

60 sec.



$$D = 4(60)$$

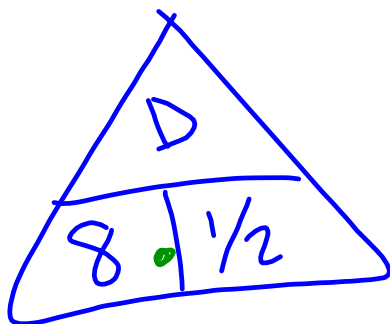
$$D = 240 \text{ ft}$$



8 km/hr

30 min.

1/2 hr.



$$D = 8(1/2)$$

$$= 4 \text{ km}$$

# 1.2 Exponents and Powers

**Goals:** • Evaluate a power

**EQ:** If something is in ( ) or [ ], what does that mean?

## Vocabulary



**Power:** an expression such as  $2^4$

**Exponent:** # of times the base (How many) is used as a factor

**Base:** the factor in repeated multiplication (Big #)

**Grouping symbols:**

( ) [ ] { }

Do FIRST

**Example 1: Read and Write Powers**Exponential FormMeaning

a.  $15^1$

$15$

b.  $5^2$  squared

$5 \cdot 5 = 25$

c.  $6^3$  cubed

$6 \cdot 6 \cdot 6 = 216$

d.  $9^5$

$9 \cdot 9 \cdot 9 \cdot 9 \cdot 9 =$

$9^5$

$59049$

**Try It** Write the expression in exponential form.

1. 4 cubed

$4^3$

2. z to the ninth power

$z^9$

3. a to the fifth power

$a^5$

**Example 2: Evaluate the Power**Evaluate  $x^5$  when  $x = 2$ .

1. Substitute

$$\underline{2^5}$$

=

$$\underline{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2}$$

2. Write out the factors

$$\underbrace{2 \cdot 2}_4 \cdot \underbrace{2 \cdot 2}_4 \cdot 2$$

3. Multiply the factors

$$16 \cdot 2$$

$$\underline{\underline{32}}$$

**Example 3: Evaluate Exponential Expressions**Evaluate the variable expression when  $a = 5$  and  $b = 3$ .a.  $(a - b)^4$ 

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

$$= \underbrace{2 \cdot 2}_4 \cdot \underbrace{2 \cdot 2}_4$$

$$= \underline{\underline{16}}$$

b.  $(a^2) - (b^2)$ 

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

$$25 - 9 = \underline{\underline{16}}$$

~~$$(5^2) - (3^2) = (5/3)^2$$
$$= 2^2$$
$$= \underline{\underline{4}}$$~~

**Try It**Evaluate the variable expression when  $a = 7$  and  $b = 3$ .

$$4. (a^2) + b$$

$$7^2 + 3$$

$$49 + 3$$

$$52$$

$$5. (a + b)^2$$

$$(7 + 3)^2$$

$$10^2$$

$$100$$

$$6. (b^2) - a - 7$$

$$9 - 7 - 7$$

$$2$$

$$7. (a - b)^3$$

$$(7 - 3)^3$$

$$4^3$$

$$64$$

$$8. (a^2) + (b^3)$$

$$7^2 + 3^3$$

$$49 + 27$$

$$76$$

$$9. (a^2) - (b^2)$$

$$7^2 - 3^2$$

$$49 - 9$$

$$40$$

**Example 4: Exponents and Grouping Symbols**Evaluate the variable expression when  $x = 6$ .

$$a. 4x^2$$

$$4 \cdot 6^2$$

$$4 \cdot 36$$

$$144$$

$$b. (4x)^2$$

$$(4 \cdot 6)^2$$

$$24^2$$

$$576$$

**\*\*Note:** Notice that in part (a) of Example 4, the exponent applies to  $x$ , while in part (b) the exponent applies to  $4x$

**Example 5: Find the Volume of the Aquarium**

An aquarium has the shape of a cube. Each edge  $x$  is 5 feet long. Find the volume in cubic feet.

$$V = x^3$$

1. Write formula

$$V = 5^3$$

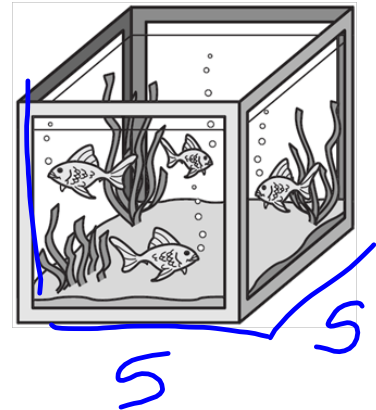
2. Substitute

$$= 5 \cdot 5 \cdot 5$$

3. Evaluate power

$$= 25 \cdot 5$$

$$= 125 \text{ ft}^3$$



**Answer:** The volume of the aquarium is 125 cubic feet.

**Try It**

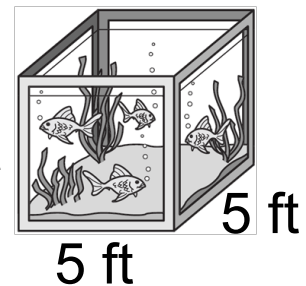
10. Use the formula for the area of a square to find the area of one side of the aquarium in Example 5. Express your answer in square feet.



$$A = l \times w$$

$$A = 5(5)$$

$$A = 25 \text{ ft}^2$$



## Summary

**EQ:** If something is in ( ) or [ ], what does that mean?

DO FIRST

### 1.2 Homework

p.12 #14-44 even, 64-75