2-5-1 Multiplication of Real Numbers

Multiplication

When you first learned multiplication, your book had pictures of equal number of objects in several rows.

You learned that 3×4 meant "three fours." $3 \times 4 = 4+4+4$

$3 \times (-4)$ means "three negative fours" $3 \times (-4) = (-4)+(-4)+(-4) = -12$ using the addition rules.

There are three ways to write multiplication. 3x4 or 3(4) or $3\cong4$

Remember: multiplication is COMMUTATIVE. $3\times4 =4\times3$ and $3\times (-4)=-4\times3$

> Think: Is Division Commutative?

Practice: Perform the indicated operation.

a) $4\times6=$ 4(-6)   -6x4

b) 243×100 $243\times(-100)$ $-100\cong243$

So far you have learned positive times positive, positive times negative, and negative times positive. There is only one pattern left. positive

> **Rule: a POSITIVE times a POSITVE is POSITIVE**
> **a NEGATIVE times a NEGATIVE is POSITIVE**
> **a POSITIVE times a NEGATIVE is NEGATIVE**
> **a NEGATIVE times a POSITVE is NEGATIVE**
>
> The multiplication and division rules are exactly the same.

Since NEGATIVE times a NEGATIVE is positive is a little hard for students to envision, think of pouring juice out of a clear jug. This would be negative. Now video tape the jug emptying. Playing the tape backwards is also a negative, but the jug appears to be filling (positive) when watched on the screen.

We will discuss in more detail why this is in section 2.7

Examples: $-2\times(-100) = 200$ $-5(-5) = 25$ $-23\times(-12) = 276$
$-3x\ 4 = -12$ $0.3\ x\ (-2)=-0.6$
$-8\div(-4) = 2$ $-12\div4 = -3$ $8\div(-4) = -2$

Practice: Perform the indicated operations.

a) $2\times5=$ $52\times(-513)=$ $13\times(-13)=$ $82\times53=$ $32\times(-13)=$ $-15\times15=$

b) $-2\times5=$ $52\times513=$ $-5\cong5=$ $11(-11)=$ $-25\times(-25)=$ $2(-5)=$

c) $7\times(-7)=$ $-7\times(-7)=$ $-11\times(-11)=$ $-10\times10=$ $-9\times(-9)=$ $6\times(-6)=$

d) $-80\div(-4) =$ $27\div(-3) =$ $-8\div2 =$ $-27\div(-3) =$ $75\div(-3) =$ $-65\div5 =$

e) $-32\div8 =$ $-20\div(-5) =$ $-25\div5 =$ $-81\div(-3) =$ $56\div(-7) =$ $48\div(-8) =$

f) $543\ x(-24)=$ $(-2)(-34)=$ $(-56)(-3)=$ $-7\ x\ 5=$ $-45\cong98=$ $(79)(-84)=$

g) $582\div(-14)=$ $-\ 358\div5=$ $-82\div (-3)=$ $100\div (-5)=$ $-\ 100\div(-20)=$ $-250/(-25)=$