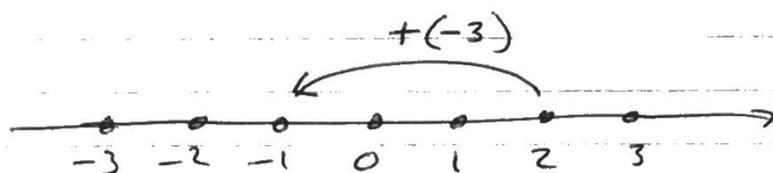


## 2.4 Subtracting signed numbers

p1.

Last time we saw how to add signed numbers. Review this - remember cases (A), (B).

We saw on the number line that adding a negative number moves left, for example



$$2 + (-3) = -1$$

Subtracting also moves left, and it's really the same thing

$$2 - 3 = -1.$$

**Rule** Subtracting a number is the same as adding its opposite.

So the idea is to change every subtraction question into a simpler addition one.

Examples

(1) Find:  $-12 - 24$

Solution:  $(-12) - (24) = (-12) + (-24)$

change to addition

opposite of 24

Now add the absolute values and keep the sign

$$\begin{array}{r} 12 \\ +24 \\ \hline 36 \end{array}$$

Answer  $-12 - 24 = \boxed{-36}$ .

(2) Compute:  $34 - (-19)$

Solution:  $(34) - (-19) = (34) + (19)$  change to +  
opposite of -19

Again, add the absolute values and keep the sign

$$\begin{array}{r} 34 \\ + 19 \\ \hline 53 \end{array}$$

Answer:  $34 - (-19) = \boxed{53}$ .

(3) What is  $19 - 64$ ?

Solution:  $(19) - (64) = (19) + (-64)$

Adding with different signs,  $|19| = 19$   $|-64| = 64$

Subtract abs. values  $\begin{array}{r} 64 \\ - 19 \\ \hline 45 \end{array}$  and use sign of  $\uparrow$

Answer:  $19 - 64 = \boxed{-45}$

(4) Evaluate:  $-39 - (-43)$

Solution:  $(-39) - (-43) = (-39) + (43)$  change to +  
opp. of -43

$|-39| = 39$ ,  $|43| = 43$

$\uparrow$   
use sign

$$\begin{array}{r} 43 \\ - 39 \\ \hline 4 \end{array}$$

Answer:  $-39 - (-43) = \boxed{4}$ .

Subtraction questions can also be asked in words:

(5) Subtract 16 from 3

means

$$3 - 16$$

(not  $16 - 3$ )

Solution:  $(3) - (16) = (3) + (-16)$

$$|3| = 3$$

$$|-16| = 16$$

$$\begin{array}{r} 16 \\ -3 \\ \hline 13 \end{array}$$

Answer:  $3 - 16 = \boxed{-13}$

(6) Subtract  $-345$  from  $-8$ .

Solution:  $(-8) - (-345) = (-8) + (345)$

$$|-8| = 8$$

$$|345| = 345$$

↑  
use sign

$$\begin{array}{r} 345 \\ -8 \\ \hline 337 \end{array}$$

Answer

$$\boxed{337}$$

## 2.5 Multiplying signed numbers

The Rule for multiplying two signed numbers

- Multiply their absolute values and
  - same sign the answer is positive
  - different signs the answer is negative.

You can see this is much easier than the rule for addition. See the book for why the rule is true.

Examples

① Find  $(-2) \times (-5)$

Solution:  $|-2|=2$ ,  $|-5|=5$ , same signs so answer is positive  $\boxed{10}$ .

This question is the same as

$(-2)(-5)$  or  $-2(-5)$  but not  $(-2)-5$ .

② Multiply  $(-14) \cdot 9$

Solution:  $|-14|=14$ ,  $|9|=9$  product

$$\begin{array}{r} 14 \\ \times 9 \\ \hline 126 \end{array}$$

Different signs so  $\boxed{-126}$  answer.

③ Compute:  $-92(-300)$

Solution: Answer will be positive

$$\begin{array}{r} 92 \\ \times 300 \\ \hline 0 \\ 0 \\ 276 \\ \hline 27600 \end{array}$$

or

$$\begin{array}{r} 300 \\ \times 92 \\ \hline 600 \\ 2700 \\ \hline 27600 \end{array}$$

either way Answer is  $\boxed{27600}$ .

④ Find  $(0) \times (-516)$ . Solution: Anything times zero is zero. Answer  $\boxed{0}$ .

(5) Calculate:  $(-2)(-6)(-10)(3)$

Solution: We have 3 multiplications here and go from left to right

$$(-2)(-6) = 12 \text{ first}$$

$$\begin{aligned} (-2)(-6)(-10)(3) &= \underbrace{(12)(-10)}(3) \\ &= \underbrace{(-120)}(3) \\ &= -360 \end{aligned}$$

In fact, when you are multiplying many signed numbers together, it's easy to see what the sign of the answer will be. Just count how many negative factors there are. Since every two negative factors give a positive product we see the answer is

- positive if even number of negative factors,
- negative if odd number of negative factor.

(6) Example, find:  $(-3)(2)(-1)(-1)(-2)(-3)(-1)$

Solution: There are an even number (six) of negative factors so answer is positive. Multiply the absolute values to get 36.

Answer 36.