***Integers***

**An integer** is a positive or negative whole number.

**A positive number** is a number greater than zero.

**A negative number** is a number less than zero.

This number line shows integers.

 **Negative integers** **Positive integers**

**0**

**1**

**2**

**3**

**4**

 **-1**

 **-2**

**-3**

**-4**

**5**

**6**

 **-5**

 **-6**

 **Zero is neither positive nor negative**

**Sample Problem 1**: **Write an integer to represent each situation.**

|  |  |  |
| --- | --- | --- |
| **a.** | 22 $ft$ below sea level  | $-22$ |
| **b.** | a bonus of $150 | $$+150$$ |
| **c.** | 7 points lost | $$-7$$ |

**Sample Problem 2**: **Graph each integer or set of integers on a number line.**

|  |  |  |
| --- | --- | --- |
| **a.** |  $-4$  | $-4$**0****1****2****3****4** **-1** **-2****-3****-4****5****6** **-5** **-6** |
| **b.** | $$\left\{-3,0,3\right\}$$ | $$\left\{-3,0,3\right\}$$**0****1****2****3****4** **-1** **-2****-3****-4****5****6** **-5** **-6** |
| **c.** | $\left\{-2,-1, 4,6\right\}$  | $$\left\{-2,-1, 4,6\right\}$$**0****1****2****3****4** **-1** **-2****-3****-4****5****6** **-5** **-6** |

Every integer has an opposite integer. A number and its opposite are the same distance from 0.

**Sample Problem 3**: **Find the opposite of each integer.**

|  |  |  |
| --- | --- | --- |
| **a.** |  $-34$ | $+34$ |
| **b.** | $$+100$$ | $$-100$$ |
| **c.** | $$0$$ | **None opposite** |

**Sample Problem 4**: **Graph each integer and its opposite on a number line.**

|  |  |  |
| --- | --- | --- |
| **a.** |  $-6$  | $6$**0****1****2****3****4** **-1** **-2****-3****-4****5****6** **-5** **-6** |
| **b.** | $$5$$ | $$-5$$**0****1****2****3****4** **-1** **-2****-3****-4****5****6** **-5** **-6** |
| **c.** | $$-1$$ | $$1$$**0****1****2****3****4** **-1** **-2****-3****-4****5****6** **-5** **-6** |

**Sample Problem 5:** **Compare the following integers.** **Write**$ <,=or>.$

|  |  |  |
| --- | --- | --- |
| **a.** | $$12\\_\\_\\_\\_\\_-125$$ | $$12>-125$$ |
| **b.** | $$25\\_\\_\\_\\_\\_\\_\\_-15$$ | $$25>-15$$ |

**The absolute value of a number** is the distance between 0 and the number on a number line.

Remember that distance is always a positive quantity (or zero).

Two vertical bars are used to represent absolute value. The symbol for absolute value of $3$ is $\left|3\right|$ .

**Sample Problem 6**: **Find the absolute value of the following numbers.**

|  |  |  |
| --- | --- | --- |
| **a.** | $$\left|-13\right|=$$ | $$ \left|-13\right|=13$$ |
| **b.** | $$\left|+44\right|=$$ | $$ \left|+44\right|=44$$ |
| **c.** | $$\left|-1,999\right|=$$ | $$ \left|-1,999\right|=1,999$$ |

**Sample Problem 7**: **Order the values from least to greatest.**

|  |  |  |
| --- | --- | --- |
| **a.** | $$\left|-15\right|, 11,-2, \left|-4\right|$$ | $$ \left|-15\right|, 11,-2, \left|-4\right|$$$$ \left|-15\right|=15 \left|-4\right|=4 $$$$ 15, 11, -2, 4$$$$ -2, 4, 11, 15$$$$-2, \left|-4\right|, 11, \left|-15\right|$$ |
| **b.** | $$4, \left|+44\right|,\left|-8\right|, -1, \left|-32\right|$$ | $$ 4, \left|+44\right|,\left|-8\right|, -1, \left|-32\right|$$$\left|+44\right|=44$$\left|-8\right|=8 \left|-32\right|=32$$$ 4, 44, 8, -1, 32 $$$$-1, 4, 8, 32, 44 $$$$-1, 4, \left|-8\right|, \left|-32\right|, \left|+44\right|$$ |

**Sample Problem 8**: **Evaluate each of the following expressions.**

|  |  |  |
| --- | --- | --- |
| **a.** | $$\left|-13\right|+13-\left|4\right|=$$ | $$ \left|-13\right|+13-\left|14\right|=$$$$=13+13-14=$$$$=26-14=$$$$=12$$ |
| **b.** | $$54-\left|+44\right|-\left|-8\right|=$$ | $$ 54-\left|+44\right|-\left|-8\right|=$$$$=54-44-8=$$$$=10-8=$$$$=2$$ |
| **c.** | $$128+\left|-9\right|\*10\*\left|-4\right|=$$ | $$ 128+\left|-9\right|\*10\*\left|-4\right|=$$$$=128+9\*10\*4=$$$$=128+90\*4=$$$$=128+360=$$$$=488$$ |