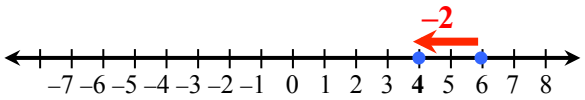
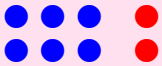
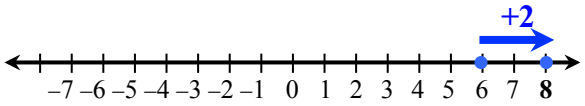
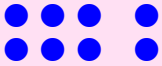
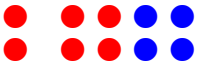
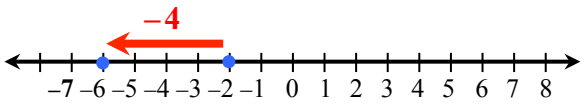
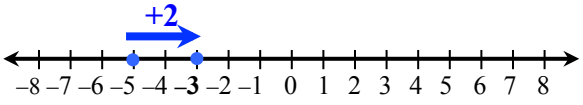
3.3 Subtraction of Integers

Recall the scenarios from section 3.1:

A. I have \$5 in my pocket, but I owe \$10 to my brother. If I give my brother \$5, how much will I still owe him? We can illustrate this by the sum $5 + (-10)$ $= -5$ I still owe \$5, thus my net worth is -5 dollars.	**B.** If I owe \$5 to my cousin and \$10 to another cousin, how much do I owe altogether? We can illustrate this debt by the sum $-5 + (-10)$ $= -15$ I owe 15 dollars, thus my net worth is -15 dollars.	**C.** I have \$20, but owe \$10 to my friend. If I give \$10 to my friend, how much money do I have left? We can illustrate this by the sum $20 + (-10)$ $= 10$ I have 10 dollars left.

Suppose the scenarios changed as follows:

A. My brother has forgiven my debt to him and tells me I no longer owe him the \$10. How much money do I have now? We can illustrate this by the following $5 + (-10) - (-10)$ $= \mathbf{5}$ Notice that $5 + (-10) - (-10)$ $= -5 - (-10) = 5$ $= -5 + 10 = 5$ I had a net worth of **-5** dollars, but when my brother forgave my debt to him, my net worth increased to **\$5**.	**B.** One of my cousins has forgiven my debt of \$10. How much do I owe now? We can illustrate this debt by the following $-5 + (-10) - (-10)$ $= \mathbf{-5}$ Notice that $-5 + (-10) - (-10)$ $= -15 - (-10) = -5$ $= -15 + 10 = -5$ I owed 15 dollars, but now I only owe 5 dollars. Thus my net worth is **-5**.	**C.** My friend has forgiven my debt of \$10. How much money do I have now? We can illustrate this by the following $20 + (-10) - (-10)$ $= \mathbf{20}$ Notice that $20 + (-10) - (-10)$ $= 10 - (-10) = 20$ $= 10 + 10 = 20$ I had 10 dollars left, but now I have **\$20**.

Problem	Integer counters	Number line model
$6 - 2 = 4$	Take away 2	
Alternative method $6 + (-2) = 4$	Remove "0" pairs 	
$6 - (-2) = 8$	Take away –2	
Alternative method $6 + 2 = 8$		
$-2 - 4 = -6$	Take away 4 	
Alternative method $-2 + (-4) = -6$		
$-5 - (-2) = -3$	Take away –2	
Alternative method $-5 + 2 = -3$	Remove "0" pairs	

Demonstration Problems	*Practice Problems*
1. (a) $5 - (-3) =$	**1. (b)** $12 - (-5) =$
2. (a) $-3 - (-5) =$	**2. (b)** $-6 - (-8) =$
	Answers: **1. (b)** 17 ; **2. (b)** 2

Demonstration Problems	*Practice Problems*
3. (a) $-18 - 12 =$	**3. (b)** $-25 - 13 =$
4. (a) $-42 - (-35) =$	**4. (b)** $-53 - (-24) =$
5. (a) $-15 - (-2) =$	**5. (b)** $-12 - (-3) =$
6. (a) $-53 - 25 =$	**6. (b)** $-37 - 32 =$
7. (a) $-245 - 299 =$	**7. (b)** $-108 - 172 =$
8. (a) $52 - (-35) =$	**8. (b)** $42 - (-35) =$
Answers: **3 (b)** –38; **4. (b)** –29; **5. (b)** –9; **6. (b)** –69 ; **7. (b)** –280; **8. (b)** 77	

Demonstration Problems	*Practice Problems*
Simplify. **9. (a)** **(**–8 – 2) – 5 =	Simplify **9. (b)** **(**–5 – 3) – 1 =
10. (a) 14 – 42 – 35 =	**10. (b)** 15 – 53 – 24 =
Let $x = -3$ and $y = 5$ and evaluate the following: **11. (a)** $x - y =$	Let $x = -2$ and $y = 8$ and evaluate the following: **11. (b)** $x - y =$
12. (a) $x + y =$	**12. (b)** $x + y =$
13. (a) $y - x =$	**13. (b)** $y - x =$
Answers: **9. (b)** –9; **10. (b)** –62; **11. (b)** –10 ; **12. (b)** 6; **13. (b)** 10	