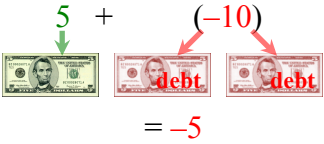
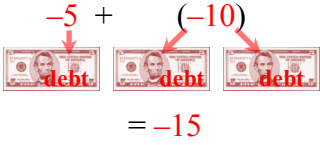
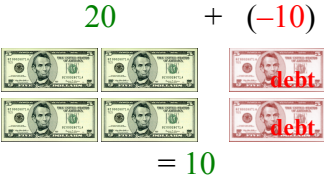
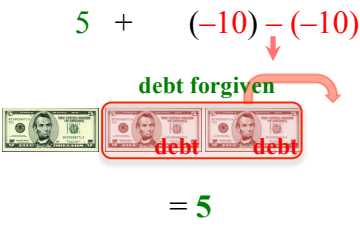
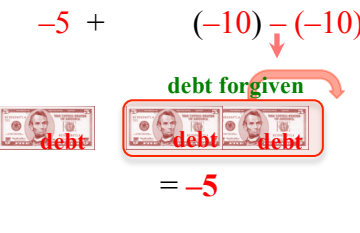
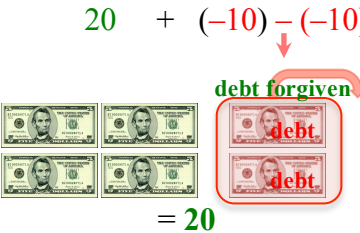



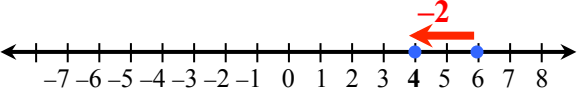


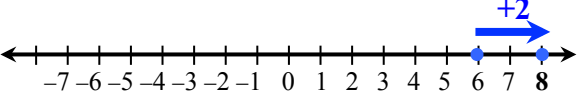


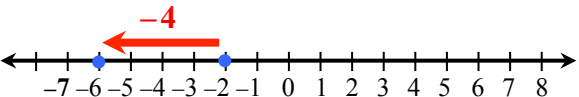


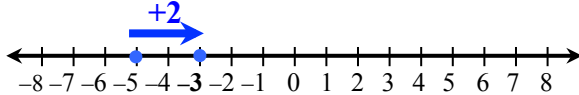

3.3 Subtraction of Integers

Recall the scenarios from section 3.1:

<p>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?</p> <p>We can illustrate this by the sum</p> $5 + (-10) = -5$  <p>I still owe \$5, thus my net worth is -5 dollars.</p>	<p>B. If I owe \$5 to my cousin and \$10 to another cousin, how much do I owe altogether?</p> <p>We can illustrate this debt by the sum</p> $-5 + (-10) = -15$  <p>I owe 15 dollars, thus my net worth is -15 dollars.</p>	<p>C. I have \$20, but owe \$10 to my friend. If I give \$10 to my friend, how much money do I have left?</p> <p>We can illustrate this by the sum</p> $20 + (-10) = 10$  <p>I have 10 dollars left.</p>
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Suppose the scenarios changed as follows:

<p>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?</p> <p>We can illustrate this by the following</p> $5 + (-10) - (-10) = 5$  <p>Notice that</p> $\begin{aligned} 5 + (-10) - (-10) &= -5 - (-10) = 5 \\ &= -5 + 10 = 5 \end{aligned}$ <p>I had a net worth of -5 dollars, but when my brother forgave my debt to him, my net worth increased to \$5.</p>	<p>B. One of my cousins has forgiven my debt of \$10. How much do I owe now?</p> <p>We can illustrate this debt by the following</p> $-5 + (-10) - (-10) = -5$  <p>Notice that</p> $\begin{aligned} -5 + (-10) - (-10) &= -15 - (-10) = -5 \\ &= -15 + 10 = -5 \end{aligned}$ <p>I owed 15 dollars, but now I only owe 5 dollars. Thus my net worth is -5.</p>	<p>C. My friend has forgiven my debt of \$10. How much money do I have now?</p> <p>We can illustrate this by the following</p> $20 + (-10) - (-10) = 20$  <p>Notice that</p> $\begin{aligned} 20 + (-10) - (-10) &= 10 - (-10) = 20 \\ &= 10 + 10 = 20 \end{aligned}$ <p>I had 10 dollars left, but now I have \$20.</p>
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Problem	Integer counters	Number line model
$6 - 2 = 4$	Take away 2 	
Alternative method	Remove "0" pairs 	
$6 + (-2) = 4$		
$6 - (-2) = 8$	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	Remove "0" pairs 	
$-5 + 2 = -3$		

<i>Demonstration Problems</i>	<i>Practice Problems</i>
1. (a) $5 - (-3) =$	1. (b) $12 - (-5) =$
2. (a) $-3 - (-5) =$	2. (b) $-6 - (-8) =$

Answers: 1. (b) 17; 2. (b) 2

<i>Demonstration Problems</i>	<i>Practice Problems</i>
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	

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