A.REI.A.1: Identifying Properties 1b

1. A teacher asked the class to solve the equation \(3(x + 2) = 21\). Robert wrote \(3x + 6 = 21\) as his first step. Which property did he use?

2. While solving the equation \(4(x + 2) = 28\), Becca wrote \(4x + 8 = 28\). Which property did she use?

3. When solving \(p^2 + 5 = 8p - 7\), Kate wrote \(p^2 + 12 = 8p\). The property she used is

4. When solving the equation \(4(3x^2 + 2) - 9 = 8x^2 + 7\), Emily wrote \(4(3x^2 + 2) = 8x^2 + 16\) as her first step. Which property justifies Emily's first step?

5. A part of Jennifer's work to solve the equation \(2(6x^2 - 3) = 11x^2 - x\) is shown below.
   Given: \(2(6x^2 - 3) = 11x^2 - x\)
   Step 1: \(12x^2 - 6 = 11x^2 - x\)
   Which property justifies her first step?

6. When solving the equation \(12x^2 - 7x = 6 - 2(x^2 - 1)\), Evan wrote \(12x^2 - 7x = 6 - 2x^2 + 2\) as his first step. Which property justifies this step?

7. When solving for the value of \(x\) in the equation \(4(x - 1) + 3 = 18\), Aaron wrote the following lines on the board.
   
   [line 1] \(4(x - 1) + 3 = 18\)
   [line 2] \(4(x - 1) = 15\)
   [line 3] \(4x - 1 = 15\)
   [line 4] \(4x = 16\)
   [line 5] \(x = 4\)
   
   Which property was used *incorrectly* when going from line 2 to line 3?
8 Britney is solving a quadratic equation. Her first step is shown below.

Problem: \(3x^2 - 8 - 10x = 3(2x + 3)\)
Step 1: \(3x^2 - 10x - 8 = 6x + 9\)
Which two properties did Britney use to get to step 1?
I. addition property of equality
II. commutative property of addition
III. multiplication property of equality
IV. distributive property of multiplication over addition

9 A method for solving \(5(x - 2) - 2(x - 5) = 9\) is shown below. Identify the property used to obtain each of the two indicated steps.

\[
5(x - 2) - 2(x - 5) = 9
\]
(1) \(5x - 10 - 2x + 10 = 9\) (1) ________________________________
(2) \(5x - 2x - 10 + 10 = 9\) (2) ________________________________
\[3x + 0 = 9\]
\[3x = 9\]
\[x = 3\]

10 John was given the equation \(4(2a + 3) = -3(a - 1) + 31 - 11a\) to solve. Some of the steps and their reasons have already been completed. State a property of numbers for each missing reason.

\[
4(2a + 3) = -3(a - 1) + 31 - 11a \quad \text{Given}
\]
\[8a + 12 = -3a + 3 + 31 - 11a\] ________________________________
\[8a + 12 = 34 - 14a\] Combining like terms
\[22a + 12 = 34\] ________________________________

11 A student is in the process of solving an equation. The original equation and the first step are shown below.

Original: \(3a + 6 = 2 - 5a + 7\)
Step one: \(3a + 6 = 2 + 7 - 5a\)
Which property did the student use for the first step? Explain why this property is correct.
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Answer Section

1  ANS:  
distributive property  
REF:  081419ia

2  ANS:  
distributive  
REF:  080601a

3  ANS:  
the addition property of equality  
REF:  061909ai

4  ANS:  
addition property of equality  
REF:  061401ai

5  ANS:  
distributive property of multiplication over subtraction  
REF:  081701ai

6  ANS:  
distributive property of multiplication over subtraction  
REF:  011801aii

7  ANS:  
distributive  
REF:  061405ia

8  ANS:  
II and IV  
REF:  011908ai

9  ANS:  
(1) Distributive; (2) Commutative  
REF:  061132ia

10 ANS:  
Distributive and Addition Property of Equality  
REF:  012029ai

11 ANS:  
Commutative,  This property is correct because $x + y = y + x$.  
REF:  081926ai