ESM 1: Problems used in the study group grouped into the activities of school algebra

Activity	**Problem (P #)**	**Content**
Representational	*P #1*: A farmer had 19 animals on his farm - some chickens and some cows. He also knew that there was a total of 62 legs on the animals on the farm. How many of each kind of animal did he have?	Simultaneous linear equations with two variables in a concrete context.
	P #2: Die A and Die B are twelve sides each. Suppose that you roll die A and die B at the same time. When do the dice satisfy the following two conditions? (i) The sum of 2 times A plus B equals 15. (ii) 3 times A minus B equals 5.	
	P #3: You have some teen and young adult books. You gave one-half of the books plus one to a friend, one-half of the remaining books plus one to another friend, and one-half of the remaining books plus one to another friend. If you have one book left for you, how many books did you have at the start?	Linear equations with one variable in a concrete context.
Rule-based	*P #4*: Solve the equations below for *x*: (a) $4 \times (x + 3) = 16x$ (b) $2.\left(\frac{3(2x-1)}{7} + 6\right) + 7 = 25$	Linear equations with one variable in an abstract context.
	P #5: Solve the equations below for *x*: (a) $2(x + 1) + 3(x + 1) = 10$ (b) $4(x - 2) + 2x + 10 = 2(3x + 1) + 4x + 8$	
Generalising and justifying	*P #6*: If you are given the sum and difference of any two numbers, show that you can always find out what the numbers are.	The use of letters to express generality.
	P #7 (a) A girl multiplies a number by 5 and then adds 12. She then subtracts the original number and divides the result by 4. She notices that the answer she gets is 3 more than the number she started with. She says, "I think that would happen, whatever number I started with." Using algebra, show that she is right. *P #7 (b)* Show, using algebra, that the sum of two consecutive numbers is always an odd number.	

Note: Items were sourced from Tripathi (2008) (P #1), Ito-Hino (1995) (P #2), Musser et al. (2008) (P #3), Star and Seifert (2006) (P #4 and P #5), and Kieran (1992) (P #6 and P#7).

References

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