Using number strategies to solve equations with whole numbers

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Strategic solving Part I

I am learning to use number strategies to solve equations with whole numbers.

Exercise 1 – What else do I know?

1a. If I know $150 + 250 = 400$ what else do I know?

1b. Clearly explain **why** the following must also be true if I know the equation in the box.

$\boxed{150 + 250 = 400}$	$250 + 150 = 400$	$400 = 150 + 250$	$400 = 250 + 150$
$400 - 250 = 150$	$400 - 150 = 250$	$150 = 400 - 250$	$250 = 400 - 150$

2a) For the equation $58 + 39 = 97$ what other equations could you write?

b) What if the equation was $23 + x = 78$?

c) Which of these equations would help you to find x?

d) Choose one of the equations from part 2b) and use it to find x.

3a) For the equation $87 - 29 = 58$ what other equations could you write?

b) What if the equation was $99 - x = 22$?

c) Which of these equations would help you to find x?

d) Choose one of the equations from part 2b) and use it to find x.

4a) Write your own equation with an unknown (x).

b) Give all the possible forms of the equation.

c) Use the method above to solve your equation.

d) Compare and contrast your equation and solution with another students' equation and solution.

- How are they the same? Different?
- Is the equation you use to find x the same? Different?
- Is the number strategy you use to solve the problem the same? Different?
- What would be a word problem each equation could have come from?

Exercise 2 – Solving equations.

What to do:

1) Write the equation in a way that will help you find the x that makes the equation true.
2) Clearly explain the strategy you use to calculate x.
3) Give the value of x that makes the equation true.

e.g. Equation: $47 = x + 19$
Alternative: $x = 47 - 19$
Strategy: $47 - 20 = 27$; $27 + 1 = 28$.
Solution: $x = 28$

1)	$45 + x = 76$	(2)	$x + 7 = 103$	(3)	$89 = x + 21$
4)	$52 - x = 25$	(5)	$63 = 76 - x$	(6)	$x - 29 = 51$
7)	$73 = 14 + x$	(8)	$x - 16 = 82$	(9)	$72 - x = 51$
10)	$95 = 37 + x$	(11)	$58 = 71 - x$	(12)	$96 = x - 47$
13)	$147 + x = 155$	(14)	$x - 110 = 270$	(15)	$360 - x = 295$
16)	$19000 + x = 20105$	(17)	$x - 123456789 = 987654321$	(18)	$44440 - x = 33330$
19)	$8181 + x = 9191$	(20)	$x - 1000001 = 4999999$	(21)	$98765 - x = 22222$
22)	$147147 + x = 151151$	(23)	$x - 3750 = 2150$	(24)	$10000000 - x = 999995$

Exercise 2b

1a) Sort the equations by the *number strategy* you used to solve the problem.
b) How many different addition / subtraction strategies did you use?

2a) Sort the equations by the *structure* of the equation.
b) How many different 'types' of equation are there?

3a) What information do the *numbers* in the question give you?
b) What information does the *structure* of the equation give you?

Exercise 3 – Word problems

Freddie gave Mark 19 swap cards. Mark now has 47 swap cards.
How many cards did Mark have originally?

This could be written as the equation: $x + 19 = 47$

1a) What does the x stand for in this equation?

b) Solve the equation and translate your solution back into words.

2) Write an equation for each of the following word problems. Clearly explain what the x stands for in each case.

   a) Sarah has $1 000 000. She buys a car and now has $967 000. How much did the car cost?

   b) Finn has 41 matchbox cars. He only wants to keep 15 of these. How many would he have to sell so that he only has 15 left?

   c) Faoa has got 17 pairs of earrings. If she wanted to wear a different pair every day for a month, how many more would she need?

   d) Marcus has 387 marbles. His goal is to get to 500 marbles. How many more does he need?

   e) Jack and Wiremu together have $397 in their bank account. If Jack has $198 dollars, how much does Wiremu have?

   f) Grace has been doing a swimming programme where she swims 5000 m a week. How much further does she have to swim to have swum 16000 metres (10 miles)?

   g) Utpreksha buys a top for $26 and has $73 left. How much money did she have originally?

   h) Daniel weighs 104 kg. If his ideal weight is 85kg, how much weight does he have to lose?

   i) Hayley travelled 27632 km last year. If she wants to keep her mileage under 25000 this year, how many km less does she have to travel?

   j) A television originally cost $1200 and is sold for $1699. How much is the mark-up?

3a) Select 10 of the equations from Exercise 2 and write a word problem that the equation could be used to solve.

b) Clearly explain what the x stands for in each example.

Answers:

Exercise 1

1a) $58+39=97$ $39+58=97$ $97=58+39$ $97=58+39$
$97-58=39$ $97-39=58$ $39=97-58$ $58=97-39$

1b) $23+x=78$ $x+23=78$ $78=23+x$ $78=x+23$
$78-23=x$ $78-x=23$ $x=78-23$ $23=78-x$

1c) $x=78-23$ (or $78-23=x$)

2a) $87-29=58$ $87-58=29$ $58=87-29$ $29=87-58$
$87=58+29$ $87=29+58$ $29+58=87$ $58+29=87$

2b) $99-x=22$ $99-22=x$ $x=99-22$ $22=99-x$
$x+22=99$ $22+x=99$ $99=22+x$ $99=x+22$

2c) $x=99-22$ (or $99-22=x$)

Exercise 2

1) $x=76-45$
$x=31$

(2) $x=103-7$
$x=96$

(3) $x=89-21$
$x=68$

4) $x=52-25$
$x=27$

(5) $x=76-63$
$x=13$

(6) $x=51+29$
$x=80$

7) $x=73-14$
$x=59$

(8) $x=82+16$
$x=98$

(9) $x=72-51$
$x=21$

10) $x=95-37$
$x=58$

(11) $x=71-58$
$x=13$

(12) $x=96+47$
$x=143$

13) $x=155-147$
$x=8$

(14) $x=270+110$
$x=380$

(15) $x=360-295$
$x=65$

16) $x=20105-19000$
$x=1105$

(17) $x=987654321+123456789$
$x=1111111110$

(18) $x=44440-33330$
$x=11110$

19) $x=9191-8181$
$x=1010$

(20) $x=4999999+1000001$
$x=6000000$

(21) $x=98765-22222$
$x=76543$

22) $x=151151-147147$
$x=4004$

(23) $x=2150+3750$
$x=5900$

(24) $x=10000000-999995$
$x=9000005$

Exercise 3

This could be written as the equation: $x + 19 = 47$

1a) The number of swap cards Mark had orginally.

b) The number of swap cards Mark had orginally was 47-19 = 28.

2a) x is the cost of the car.

$$1000000 - x = 967000$$
$$x = 1000000 - 967000$$
$$x = 33000$$

b) x is the number of cards he gives away.

$$41 - x = 15$$
$$x = 41 - 15$$
$$x = 26$$

c) x is the number of earring she would need.

$$17 + x = 31$$
$$x = 31 - 17$$
$$x = 14$$

d) x is the number of marbles he needs.

$$387 + x = 500$$
$$x = 500 - 387$$
$$x = 113$$

e) x is the amount of money Wiremu has.

$$397 = 198 + x$$
$$x = 397 - 198$$
$$x = 199$$

f) x is how far she needs to swim.

$$5000 + x = 16000$$
$$x = 16000 - 5000$$
$$x = 11000$$

g) x is the amount of money she had originally.

$$73 = x - 26$$
$$x = 73 + 26$$
$$x = 99$$

h) x is the weight he needs to lose.

$$104 - x = 85$$
$$x = 104 - 85$$
$$x = 19$$

i) x is the reduction in distance.

$$27632 - x = 25000$$
$$x = 27632 - 25000$$
$$x = 2632$$

j) x is the mark-up.

$$1200 + x = 1699$$
$$x = 1699 - 1200$$
$$x = 499$$