Hot X: Algebra Exposed

Solution Guide for Chapter 1

Here are the solutions for the "Doing the Math" exercises in *Hot X: Algebra Exposed*!

DTM from p.8

2. Let's start by simplifying this thing a bit. We know that $\frac{a}{a}$ equals 1, (as long as $a \neq 0$), and that an exponent of 1 is the same as not having an exponent. Also, in that first fraction we can cancel a factor of 2 from the top and bottom, so we can write our expression as: $\frac{2}{3b} - 1 + 1$, which we can then write as simply $\frac{2}{3b}$. And that matches A!

Answer: **A**

3. We can't start by simplifying because it's already simplified. So, is there an expression in the right hand column that can be simplified to look like $b - a$? Hm, we know a negative sign needs to be involved somehow, and it's not C, because (for most values of a and b) we know that $a - b \neq b - a$. The only other item on the right with a negative sign is D, so let's try that one. We know that an exponent of 1 is like not having an exponent, and let's multiply that –1 and a together, so we get: $-a + b$. And we know from the commutative property of addition that this equals $b + (-a)$, in other words, $b - a$. And we have a match! Answer: **D**

4. Let's simplify this. We can drop the big brackets, because they're not actually serving any purpose; they're not separating anything from anything else, you know what I mean?

So we have $\frac{a}{1} + (-1b)$. Next, let's multiply the –1 and the *b* together, and we also know that if the denominator of a fraction is just 1, we can drop that denominator. So we can rewrite this as: $a - b$. and that matches C! Answer: **C**

5. Let's take the hint and first distribute the outside negative sign. Then we get: $-1 + a + b + 1$. Notice that the –1 and 1 cancel each other out, and we are left with: $a + b$. Hm, the only expression in the right hand column we haven't used yet is B; let's see what happens when we simplify it. We know that an exponent of 1 is like not having an exponent, so B becomes: $1(a + b)$. Then distributing the 1 (which then disappears) we get: $a + b$. Since the original problem and B both simplify to the same answer, they are equal! Answer: **B**

DTM from p.12–13

2. If we label the smallest of the two integers *n* (always a good idea), then the next consecutive integer could be expressed as $n + 1$. If their sum is –11, written in the language of math, that sentence looks like:

$$\boldsymbol{n + (n + 1) = -11}$$

And now we solve for *n*. Dropping the parentheses (they're not really doing anything), and combining like terms, we get: $2n + 1 = -11$. With me so far?
Subtracting 1 from both sides we get $2n = -12$, and then dividing both sides by 2, we get $\boldsymbol{n = -6}$.

Does this work? Well, the next consecutive integer after –6 is –5, right? And their sum is: $-6 + (-5) = -11$. Yep!
Answer:
Part a: $\boldsymbol{n + (n + 1) = -11}$
Part b: **–6 & –5**

3. Now we're being asked for three consecutive integers. If we label the smallest one *n*, then the next two would be $n + 1$ and $n + 2$. If their sum is 42, this means:

$$\boldsymbol{n + (n + 1) + (n + 2) = 42}$$

Dropping parentheses (since they're not doing anything) and combining like terms, we get: $3n + 3 = 42$. Then, subtracting 3 from both sides we get $3n = 39$, and dividing both sides by 3, we get $\boldsymbol{n = 13}$.

Does this work? We said that n was the smallest integer, so our three consecutive integers are 13, 14, and 15. Add 'em up and you'll see that, yep, they equal 42!

Answer:

Part a: $\boldsymbol{n + (n + 1) + (n + 2) = 42}$

Part b: **13, 14 & 15**

4. Now we're asked to find 3 consecutive odd integers. If we call the smallest integer n, and if it is odd, then the next odd integer could be expressed as $n + 2$. And the next odd integer after that would be $n + 4$. (See the box at the bottom of p.11 if you want to review why this is.) If their sum is –3, that would mean:

$$\boldsymbol{n + (n + 2) + (n + 4) = -3}$$

Dropping parentheses and combining like terms, we get: $3n + 6 = -3$. Subtracting 6 from both sides, we get: $3n = -9$, and dividing both sides by 3, we get: $\boldsymbol{n = -3}$.

If that is the smallest of the 3 odd integers, then the next one would be **–1**, and the next consecutive odd integer after that would be **1**. (Tricky, huh!)

Does it work? Adding 'em up, we get: $-3 + (-1) + 1 = -4 + 1 = -3$. Yep!

Answer:

Part a: $\boldsymbol{n + (n + 2) + (n + 4) = -3}$

Part b: **–3, 1 & 1**