

Lines and Systems II

SUMMARY KEYWORDS

equal, fruit juice, equation, pints, intercept, proportion, type, multiply, negative, expression, how many pints, weighting, juice, pure, x axis, answer, y axis, north south axis, fruit, drink

SPEAKER

Robert McKeown

Our next problem asks us to find the x intercept and the y intercept of a line. Graphically, it's going to look something like this. There's our line. I've drawn it with a negative slope. And we want to find our x axis intercept. And we want to find our Y axis intercept. Now remember that the north south axis is our Y axis, and the East West is our x axis. So if I have seven x plus three, y is equal to negative 12, I can find the equation of the line by solving for y. So solve for y to find the equation for that this line. And so I could rewrite this as three y is equal to negative 12 minus seven x, I'm essentially subtracting seven x on both sides of the expression. And then y is going to be equal to 12 plus seven x over three, and that whole thing is going to have a negative sign in front of it. Now, I didn't actually need to do that, to answer the question. So if I want to find the x axis intercept, well, what is y at the x axis intercept, while y is always equal to zero, y is equal to zero x is going to be equal to some number, except at the origin where it's equal to zero. So to find the x axis intercept, set y equal to zero and solve for x. So I've got three. Well, maybe I'll start with this equation up here, I'll go back to the original equation. So I'm going to have seven x plus three times zero. And that's equal to negative 12. And so I'm going to have x is equal to negative 12 over seven and to find the y axis intercept, set x equal to zero and solve for y. And we did this in an earlier problem. And so I'll start with the original expression, because that's easy to work with God seven times zero plus three y is equal to negative 12. Three y is equal to negative 12. And y the y intercept is equal to negative four. So this is my x axis intercept and this is my Y axis intercept. Here we are an ALEKS. the y intercept is negative four. And the x axis intercept is negative 12 over seven, and let me just double check that and let's see if we have the right answer. And we do so we successfully found the y intercept and the x intercept for that equation. So we've got this royal Fruit Company and they create two different types of fruit drinks. wine has 60% pure fruit juice, the other 85% pure fruit juice and I'd like to make a third drink that contains 75% fruit juice. So how many pints a pint is close to half a liter. And it's a it's a very British measure of union. And you can see that British influence in Toronto, Toronto, when you go out to a bar and you order a beer, you often order a pint of beer. So we want to find how many pints of each pure fruit juice to combine in order to get 80 pints of a combined mixture. So here are some equations that are going to help us the first equation is that we've got in type one, we have 60%, pure fruit juice. And if we multiply that by the weight, how much as a percentage, the proportion of type one to use. And add that with the type two mixture, which is 85% pure. We want to combine those two so that we have that third drink that contains 75% pure fruit juice. A couple other equations we need. If we want to know how many pints of type one we'll need, well, we want a total of 80. And we multiply that by the proportion. The weighting of type one, we will get how many pints of the first fruit juice we need. Similarly, if we want to know how many pints of the

second type we need, well, we can take 80 and multiply that by the way of this, the second type of fruit juice. So it looks like we've got two, two unknowns here. But what we can do is we can make our life a little bit easier because we know that and we use this very often in economics and finance, that the proportion of the first type of juice, plus the proportion of the second type of juice has to be equal to one. We can't use a negative proportion. So how much of the first use type we use has to be greater than or equal to zero. And similarly, the waiting on the second type also has to be greater than or equal to zero. And it can't be greater than one, it can't be greater than 100% can't use more than 100% of one juice type. We can't do that. That would be physically impossible. So now we've got a whole bunch of expressions that can help us solve a word problem like this. I like to start with equation three. And we can see here that if I rearrange this, the weighting of the second juice type is equal to one minus the weighting on the first. And so I can take this expression and plug it into the first equation. So the first equation becomes 60% pure juice times wait one plus 85% pure juice times one minus w_1 is equal to 75%. We want to get that 75% pure juice. multiplying this out we get 60% times w_1 plus 85% minus 85%. w_1 is equal to 75%. Now I can collect like terms And we get minus 25% w_1 is equal to minus 10%. And therefore w_1 is going to be equal to 10 over 25, which is equal to two fifths to over five. What's w_2 ? Well, w_2 is equal to one minus w_1 , which is equal to one minus two over five, which is equal to five, minus two over five, which is equal to three over five. Right? You see how much faster I'm going if you watch the first topic videos, I go over that really slowly. Now I'm going much faster. And you should be able to go this fast too. As you practice in practice and practice, you're going to get better and better and better at it. Now that I know what my weights are, I can answer the question right? The question is asking us how many pints so wants to know the number of pints, the amount of pints of type one for a drink, and the number of pints in type two. So the pints of one is going to be equal to 80 total clients, multiplied by two over five. And that's equal to 160 over five, but if I don't want to use a calculator, I can see that this is also equal to 40 over five times four, which is equal to eight times four, which is equal to 32. So that's a fairly straightforward way of calculating that now we go with pints to how many pints of the second type of fruit juice Are we going to need? Well, I mean, there's other ways to do this, but I'll do it belong way. And like I did before, I'm going to have 240 over five. It's like 40 over five, which is going to be equal to eight times six, and I get eight times six, which is going to be equal to 48. Here we are on ALEKS. Let's see if we've got the right answer. So for the first fruit drink, we had 32 pints. And for the second fruit drink, we had 48. Notice that the sum of those two is 80. So that's a good sign. We have the right answer. I'll click the checkbox and we got the right answer.