**Title**

Work it harder, Make it better, Do it faster, Makes us stronger. HSN.Q.

**Alignment to Content Standards**

CCSS.MATH.CONTENT.HSN.Q.

**Tasks**

Both of the guys from Daft Punk are supposed to go onstage in 20 minutes but first they need to clean their helmets. It would take one of them 50 minutes to clean both helmets by himself and it would take the other 35 minutes to clean them both by himself. Using your knowledge of algebra, ratios, and unit analysis, determine how long it will take them to clean the helmets if they work together. Will their concert be able to start on time?



**Commentary**

This task requires students to think about the information they know and organize it based of the units of the given information. They are asked to use unit analysis to solve the problem. This forces them to keep track of their units the entire time so that they know that their answer is at least talking about the correct thing. This problem meets all of the common core algebra quantity standards. First their units guide them through the problem. Next they must define the unit less x as minutes and finally they must decide how far to round their answer in order to qualify the concert as starting late or not.

Since students are often put off by lengthy unit analysis this better suited for an in class question so the teacher can help them though it if need be.

**Solution**

Using our prior knowledge of unit analysis we will set up our problem as follows:

$$\frac{number of jobs}{time it takes to do them}+\frac{number of jobs}{time it takes to do them}=\frac{number of jobs}{time it takes to do them}$$

Where red is our known data for person 1, blue is our known data for person 2, and purple is the data for both of them working together.

Plugging in our data we get:

$\frac{1 job}{50 min}+\frac{1 job}{35 min}=\frac{ 1 job}{x }$

Now finding our common denominator we get:

$\frac{35 job min.}{1750 min^{2}}+\frac{50 job min.}{1750 min^{2}}=\frac{ 1 job}{x }$

Which equals:

$\frac{85 job min.}{1750 min^{2}}=\frac{ 1 job}{x}$

By cross multiplication we get:

$$85x job min =1750 job min^{2}$$

Now isolating x we get:

$$x=\frac{1750 job min^{2}}{85 job min }$$

Simplifying we have:

$x≈20.6 min$

So the concert will not start on time but it will hardly be late.