PLTW 3.1.2a Concept Understanding Sheet

DoK-1 VOCABULARY: In your own words, define these two terms…

a.) WORK ENVELOPE:

b.) END EFFECTOR:

Watch the introductory video (link in pdf does not work):
https://drive.google.com/file/d/1ENp5oGASNNSa8NT_k4lTcP0iYG40DmAM/view?usp=sharing

DoK-2 THEORY: Use Google.Drawing

1, 2, & 3.) Sketch FIVE small, multiple line graphs of a robot arm moving. Paste the sketches into this document here. The first graph sketch is where the arm will start, the second is where the first move is to, the third is the next move-to position, etc. *Bonus: Include an explanation of the positions.*

4.) Use Google.Draw to sketch the top-view work envelope of your movements in steps 1,2 & 3, putting an X for each ending position. Copy/paste a screenshot of your drawing here.

DoK-3 APPLYING POSITIONAL ANALYSIS

Reference: Process steps for calculating angles:

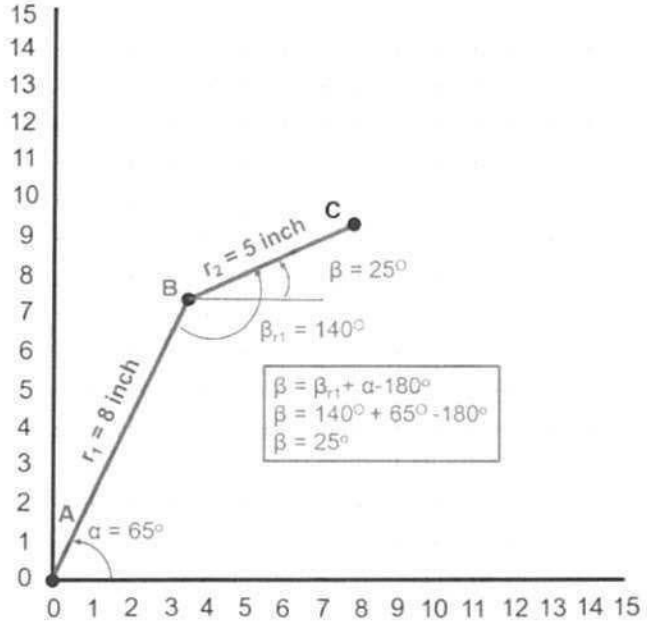


FIGURE 1

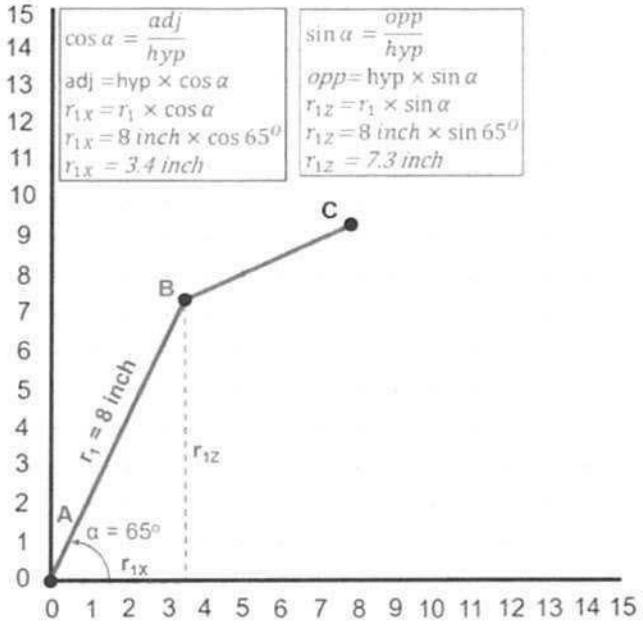


FIGURE 2

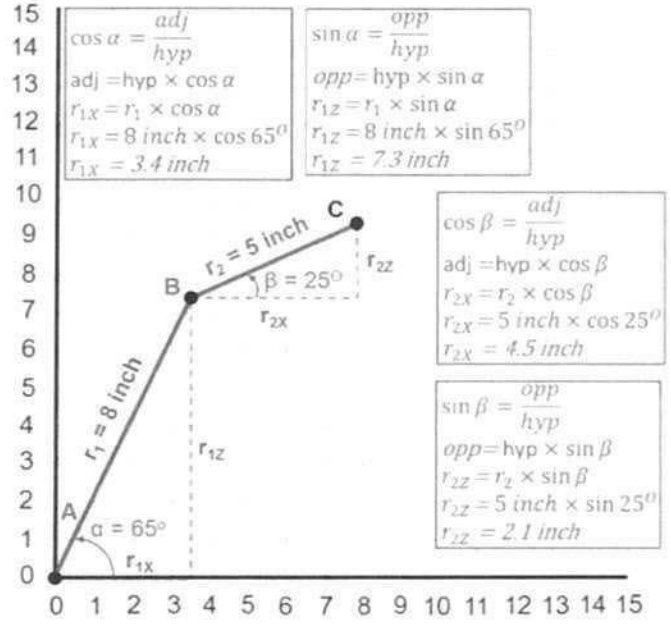


FIGURE 3

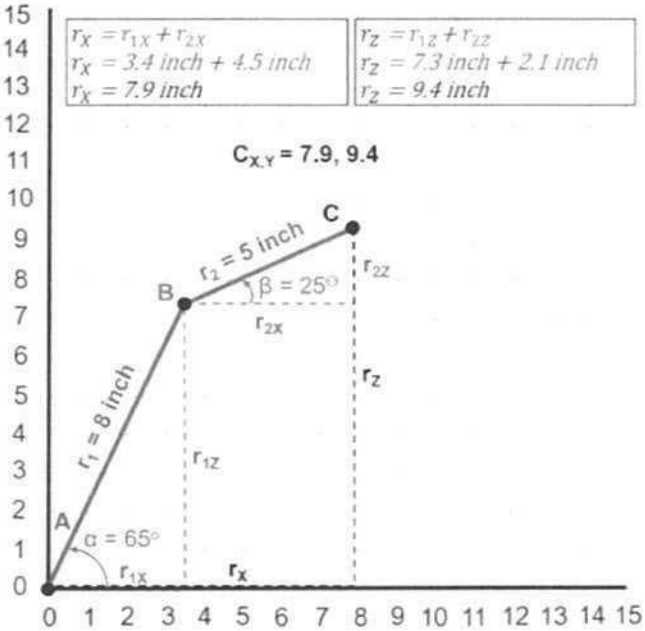
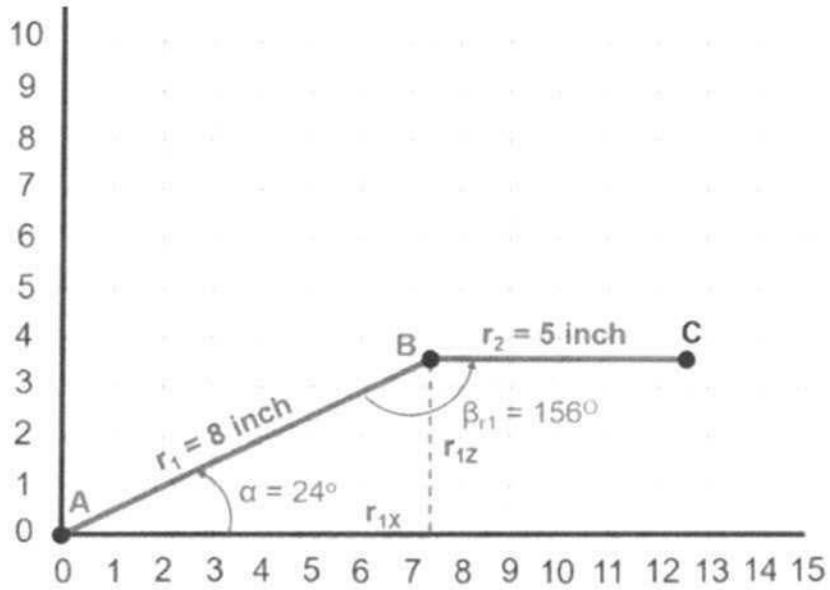


FIGURE 4

8. Calculate the coordinates of position C in the work envelope for the robot arm position shown below:

SHOW YOUR WORK.
GIVE YOUR ANSWER AS:

X =
Y =



9. Making Connections: Using an example, describe the relationship to these physical science concepts to the programming of a robot arm.

FORWARD KINEMATICS:

INVERSE KINEMATICS:

DoK-4 Extended Thinking: *Must be descriptive answers/explanations using accurate industry terminology and supported with an illustration.*

1. How would adding joints to a robot arm or its cell environment affect its overall work envelope and its movement therein?

2. Based upon your answer to #1 above, what industrial applications (beyond simple pick-n-place) can you envision for a robot arm cell?