Theta World

Week 3 - Rollercoaster

Introduction:

After experiencing some troubles with the rollercoaster, Theta World has decided to close it down and replace it with an updated, community designed version. To do this, the theme park is running a competition to inspire individuals to rally to the challenge and create their own geometric-themed ride. The winning ride will have to consider math-related design elements to fit with the rest of Theta world.

This week's challenge has two tasks that you must complete and a bonus task (Task C).

Good luck!

Task A:

Your team is finalising a blueprint **(Image A.1.)** for an incomplete section of the rollercoaster. Using the sketch below solve the following design problems and draft the section of missing track **(Image A.2.)**:

Image A.1.

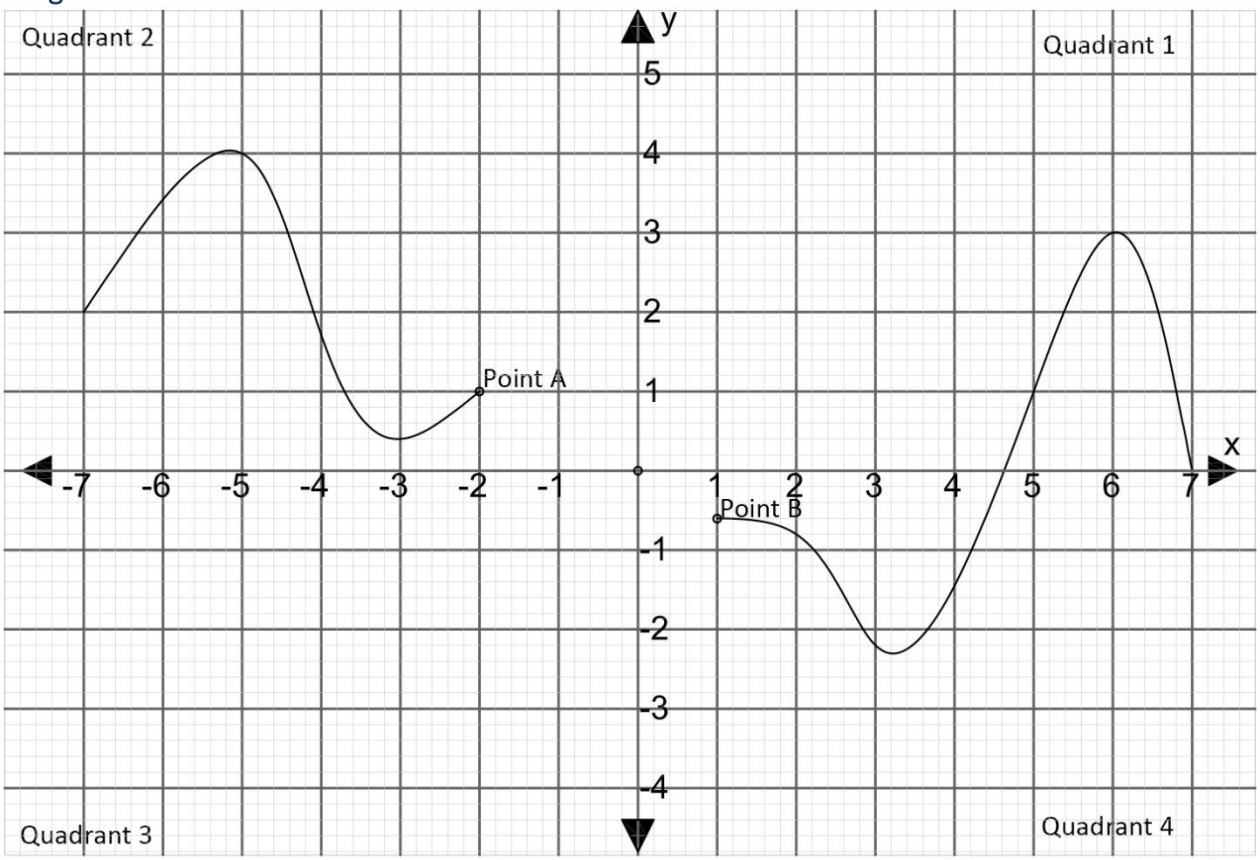
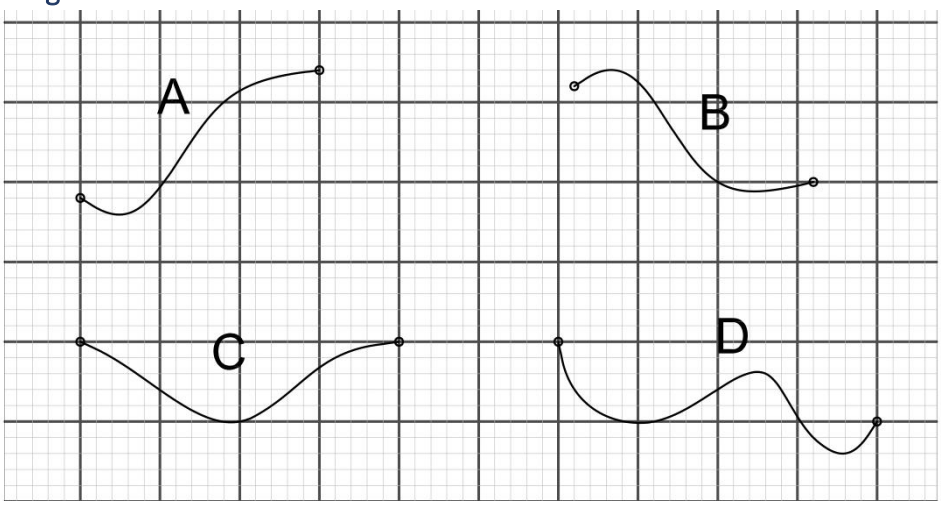


Image A.2.



Question 1. Which **quadrant/s** does the current two sections of designed rollercoaster **not** cross through?
Question 2. The rollercoaster finishes at **Point A** and begins again at **Point B.** What are the coordinates of these two points?
Question 3. Now we know the coordinates of **Point A** and **Point B**, the Rollercoaster Engineer needs your assistance to determine which section of the track would complete the rollercoaster **(A, B, C, D,** See image A.2**)**? Explain your choice and how you manipulated the chosen track.

Tip: You may need to perform **a transformation** including a rotation, reflection or translation of a section of track.

Task B:

The next task for your team is to engineer the support structure for the hill climb. You need to make sure that it aligns with the geometric theme of the park, some key factors must be highlighted.
(Refer to Image B, page 5).

Question 1. To capture the geometric theme, we need to identify the different types of shapes. This does not include overlapping, only labelled shapes (1 to 11).

a. Count and record the number of:
    a. Right-angle triangles
    b. isosceles triangles
    c. equilateral triangles
    d. scalene triangles
    e. acute-angled triangles
    f. obtuse-angled triangles
b. Count and record the number of:
    a. Kites
    b. Rectangles
    c. Squares
    d. Parallelograms
    e. Rhombus
    f. Trapeziums

Question 2. What is the total sum of **interior angles** in the following shapes?

a. Shape 3
b. Shape 7

NOTE: This does not include shapes that are created by a combination of other shapes overlapping/only labelled shapes. **Do not include shapes created from overlaps!**

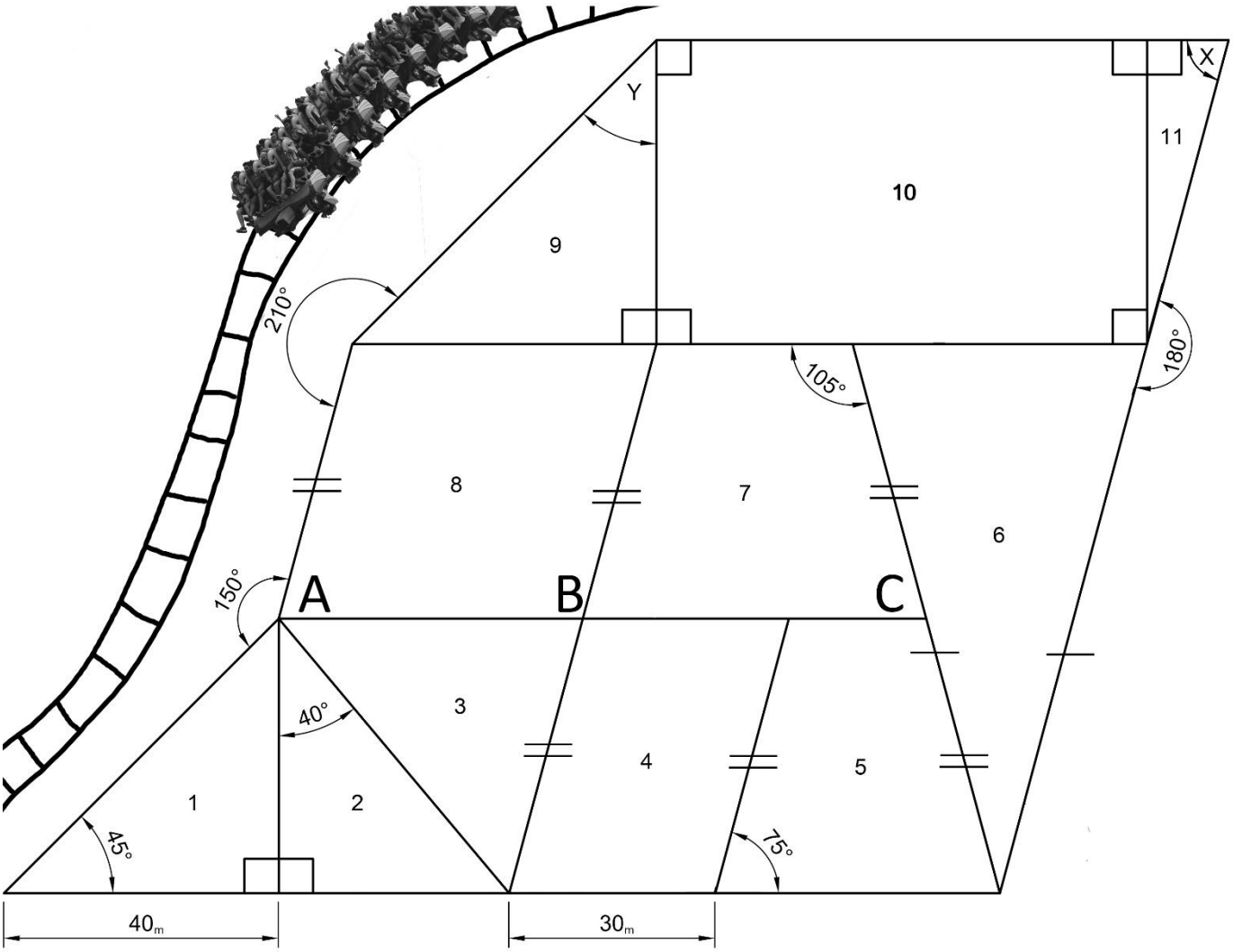
Bonus Task C:

Today is the day to pitch your design in front of the Theta World executives. **(Refer to Image B, page 5)**

Question 1. Angles play a very important role in structural engineering. After seeing the damaged plans, the Theta World staff want you to prove that all the angles in the structure are correct. To prove this, calculate the values of **X** and **Y** (in shapes 9 and 11).

Question 2. The executives want to put advertising panels on **shape 1 and 4**. What **area** is required to fill each of the shapes?

Image B



Q&As:

Q1. Do I need to include units?

A. Yes, please include your units.

Q2. Do I count overlapping shapes?

A. Only count labelled shapes.

Answer form here:
https://survey.sparkchart.com/start/xmzjjGvvKjCzUIOIXww3Mgs

MATHSPACE