

EPPro8 Challenge

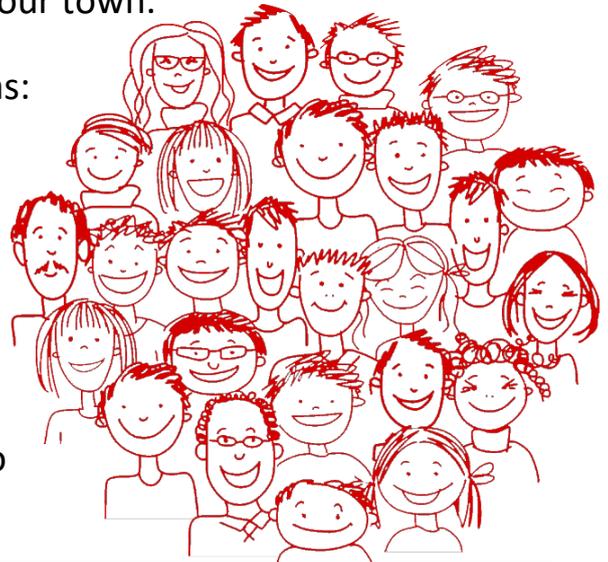
Engineer Problem Solve Innovate

Crowd Size

Your favourite band have played a concert in your town.

A drone photo of the concert shows three areas:

- The mosh pit (where people are jammed together).
- The dance area (people can move around and dance).
- The picnic area (people can chill out).



You will work out how many people can fit into each area and calculate the overall crowd size.

Mosh Pit

Criteria

In the mosh pit people are very tightly packed together.
Build a frame approximately 1m tall.
All four of your team members can stand inside the frame.
Adjust the width and length of the frame so that it is a very tight fit.
Measure the frame (metres wide and long).

Mosh Pit Calculations

Calculate the area of the frame and how many square metres one person takes.
Write down and keep your answer (you will need it later).

Hint

The area of the frame is the width x the length.
One person will be $\frac{1}{4}$ of this area.

Dancing Crowd

Criteria

In the dancing area people can move around between each other and dance.

Build a frame approximately 1m tall.

All four of your team members can stand inside the frame.

Adjust the width and length of the frame so that you can move around between each other and dance.

Measure the frame (metres wide and long).

Dancing Crowd Calculation

Calculate the area of the frame and how many square metres one person takes.

Write down and keep your answer (you will need it later).

Picnic Crowd

Criteria

In the picnic area people can sit down, recline and spread out.

Build a frame approximately **400mm** tall.

All four of your team members can sit inside the frame.

Adjust the width and length of the frame so that you can sit down, recline and spread out.

Measure the frame (metres wide and long).

Picnic Crowd Calculation

Calculate the area of the frame and how many square metres one person takes.

Write down and keep your answer (you will need it later).

Drone Image: Size of Mosh Pit

Criteria	Using the drone image, measure and calculate the <u>area</u> of the mosh pit (in square metres). Note the image is a scale of 1:500.
Hint	A scale of 1:500 means 10mm on the image is $500 \times 10 = 5000\text{mm}$ in real life ($5000\text{mm} = 5\text{m}$). Make measurements on the image and then look at the scale at the bottom.

Number of People: Mosh Pit

Criteria	Using the area of the mosh pit and the area each person takes: Calculate how many people are in the mosh pit.
Hint	A good trick to think what maths you need is to think of a simple example. Imagine if the mosh pit was 80m^2 and each person took 4m^2 of space. How many people could you fit in that area? It would be $80 \div 4 = 20$. From this simple example, we have found that the formula is: Number of People = Total Area \div Area per Person

Drone Image: Size of Dance Crowd

Criteria	Using the drone image, measure and calculate the <u>area</u> of the dance crowd (in square metres).
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Number of People: Dance Crowd

Criteria	Using the area of the mosh pit and the area each person takes: Calculate how many people are in the mosh pit.
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Drone Image: Size of Picnic Crowd

Criteria	Using the drone image, measure and calculate the <u>area</u> of the mosh pit (in square metres).
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Number of People: Picnic Crowd

Criteria	Using the area of the mosh pit and the area each person takes: Calculate how many people are in the mosh pit.
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Total Crowd

Criteria	Calculate the total number of people in the crowd.
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Emergency Exit - Door

Criteria	Measure the dimensions (width and height) of a standard sized door frame. Construct a door frame the same size. Count how many people can exit through this door in 30 seconds.
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Emergency Exit – Number of Doors

Criteria	Using the number of people you calculated in the crowd, calculate how many emergency exits are required for everyone to leave in 5 minutes.
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After you have attempted this challenge watch the tutorial to see our solution at www.EPro8Challenge.co.nz/Tutorial and enter the Challenge Code **CRWD**.