Carys is trying to decide who to invite to her 10th birthday party. She has eight classmates to choose from: Alice, Bob, Charlotte, Dylan, Eva, Fern, Gia and Harper. She wants everyone to have fun at her party, but she knows there have been lots of arguments in her class:

- Dylan stole Charlotte's lunchbox. Charlotte does not want to argue with him but her good friends Alice and Eva refuse to sit with him at lunch anymore.
- Dylan does not talk to Bob and Harper because they leave him out of their games in the playground.
- Fern used to be really good friends with Eva, Bob, Gia and Harper but now they are all upset with her because she spends all her time doing maths homework and never hangs out with them.
- Bob and Harper don't like Dylan because he always brags about being the best on the monkey bars. Now they know about the lunchbox incident, they really don't like him at all.
- Fern does not think Bob and Harper are very nice because they used to steal her books and make lots of noise whenever she would try to read peacefully at lunch time.

a) Translate these rules into a simplified expression for who Carys could invite to her party, so that everyone gets on. Show your working in full.
b) Carys wants as many people as possible to come to her party. Who should she invite?

Guidance for supervisors:

a) $[((E \wedge A) \wedge \neg D) \vee (D \wedge \neg(E \vee A))] \wedge [(F \wedge \neg(E \vee G \vee H \vee B)) \vee (E \wedge G \wedge H \wedge A \wedge \neg F)] \wedge [((B \wedge H) \wedge \neg D) \vee (D \wedge \neg(B \vee H))]$

= $[(E \wedge A \wedge \neg D) \vee (D \wedge \neg E \wedge \neg A)] \wedge [(F \wedge \neg E \wedge \neg G \wedge \neg H \wedge \neg B) \vee (E \wedge G \wedge B \wedge H \wedge \neg F)] \wedge [(B \wedge H \wedge \neg D) \vee (D \wedge \neg B \wedge \neg H)]$

= $[(E \wedge A \wedge B \wedge \neg D \wedge H) \vee (H \wedge \neg E \wedge \neg A \wedge \neg B \wedge \neg D)] \wedge [(F \wedge \neg(E \vee G \vee H \vee B)) \vee (E \wedge G \wedge H \wedge A \wedge \neg F)]$

= $[B \wedge \neg D \wedge E \wedge \neg F \wedge G \wedge H] \vee [\neg A \wedge \neg B \wedge D \wedge \neg E \wedge F \wedge \neg G \wedge \neg H]$

b) She should invite Charlotte, Bob, Gia, Alice, Harper and Eva