

Networks #3 Amusement Park

The Vatican Amusement Park is has five major rides: the Amusatron (A), the Pirate Boats (B), the Rollercoaster (C), the Big Dipper (D) and the Eagle Spinner (E).

The shortest distance between each (in metres) is given in the table:

A	B	C	D	E	
-	60	100	110	70	A
	-	85	125	125	B
		-	65	55	C
			-	90	D
				-	E

- (a) The Park wants to connect up all the major rides with the shortest possible set of paths, to keep down cleaning costs. How should they do that?

- (b) If any one route became impossible for some reason, which would have the smallest effect on the remaining possible shortest set of connecting paths?

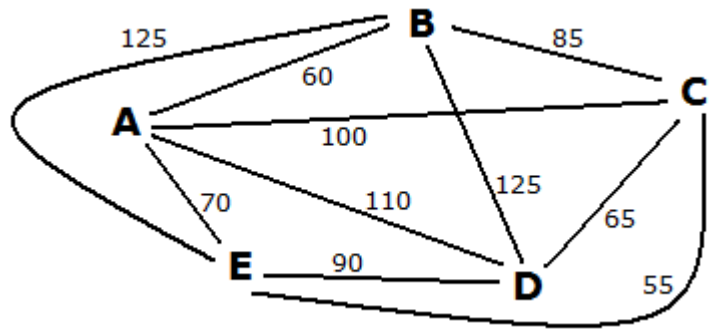
- (c) The park also has a separate system of maintenance tunnels that connect all the rides. At the end of the day technicians drives through each of the tunnels in turn, to make sure no-one is in them, locking them all behind them as they do so. They want to end at the Amusatron, because that is where the exit is.

However, the tunnel connecting the Amusatron to the Big Dipper is not safe and is permanently closed down. Explain which ride or rides the technicians must start from so that they can still lock all the tunnels behind them as they go round and end at the Amusatron.

Answers: Networks #3 Amusement Park

The connected table looks like

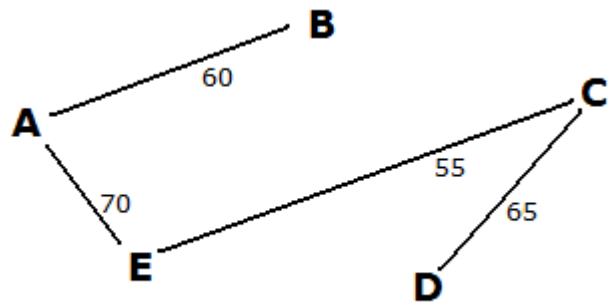
(the network must connect as shown but can be drawn with the points and edges in any position)



- (a) The Park wants to connect up all the major rides with the shortest possible set of paths, to keep down cleaning costs. How should they do that?

A–B, A–E, C–D and C–E

(the network must connect as shown but can be drawn with the points and edges in any position)



- (b) If any one route became impossible for some reason, which would have the smallest effect on the remaining possible shortest set of connecting paths?

Losing A–B would require adding B–C at +25 more. A–E would require B–C at +15, C–D would require E–D at +25 and C–E would require B–C at +30.

So the least effect is if A–E was no longer possible.

- (c) The park also has a separate system of maintenance tunnels that connect all the rides. At the end of the day technicians drives through each of the tunnels in turn, to make sure no-one is in them, locking them all behind them as they do so.

However, the tunnel connecting the Amusatron to the Big Dipper is not safe and is permanently closed down. Explain which ride or rides the technicians must start from so that they can still lock all the tunnels behind them as they go round.

The new network looks like the one to the right.

Only A and D are odd. So to be traversed the technicians must start at A and end at D or start at D and end at A.

To end at A they must start at D.

