# EPro8 Challenge

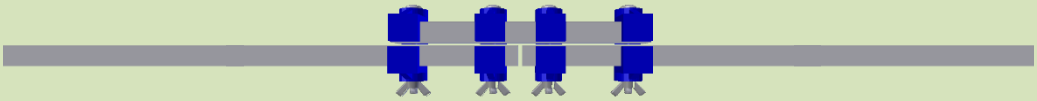
Engineer Problem Solve Innovate

# Fire Engine

Fire, Flame, Explosions.

To help put out the fires we need a motorised fire engine complete with a hinged ladder that can be raised or lowered using buttons.

This challenge contains optional elements using the EPro8 Electronics Starter Kit.

| Ladder Construction | |
|---|---|
| Criteria | Construct a ladder exactly 1.4m long.<br>The gap between each rung must be less than 250mm. |
| Hint | This challenge is all about measurements. Check your measurements very carefully.<br>Make 1.4m long rods by joining two 700mm rods as shown:<br>  |

| Fire Engine | |
|---|---|
| Criteria | The body of a fire engine is approximately 700mm long and 400mm wide. |

| Ladder Mounting | |
|---|---|
| Criteria | The ladder is attached to a fire engine and can be raised by hand.<br>The fire engine can be pulled, but no part of the ladder may touch the ground or any of the wheels. |
| Hint | Attach the ladder to axles using red joiners. |

| Flashing Light | |
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| Criteria | A light is mounted on top of the fire engine. Pulsing the button causes the light to flash. |

| Raising the Ladder | |
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| Criteria | Turning the crank handle raises and lowers the ladder.<br>In the raised position the top of the ladder is at least 1.2m above the ground. |
| Hint | Because the ladder is long it has a lot of leverage acting on it.<br>You will not be able to turn this by directly turning the axle it is attached to.<br>Use the reel and a rope (mounted above the fire engine) to lift the ladder. |

| Motorised Ladder | |
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| Criteria | The fire engine has two buttons.<br>Pushing one raises the ladder.<br>Pushing the other button lowers the ladder. |

| Flat Platform | |
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| Criteria | A platform is at the end of the ladder.<br>The platform will be horizontal, regardless of what angle the ladder is at. |
| Hint | You could hinge a suspended basket to the ladder using an axle.<br>Attach a weight under the basket so that is always flat. |

| Flashing Lights and Sirens (Simulator) | |
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| Criteria | Use the online electronics simulator, code **FRNG**.<br>Two lights on the fire engine flash alternately and the buzzer pulses. |
| Hint | Use a SEQUENCE box to create a loop, with the following:<br>• a push button to TRIGGER 1<br>• STEP 1 is connected to TRIGGER 2<br>• STEP 2 is connected to TRIGGER 3<br>• STEP 3 is connected to TRIGGER 4<br>• STEP 4 is connected to TRIGGER 1<br>Connect lights and buzzers up to the outputs. |

| Motorised Fire Engine | |
|---|---|
| Criteria | The fire engine is motorised. Two push buttons can be used to drive it forwards and backwards. |

| Motorised Ladder | |
|---|---|
| Criteria | Push buttons at the top of the ladder raise and lower the ladder. |

| Ladder Safety | |
|---|---|
| Criteria | The fire engine is motorised.<br>A push button will drive it forward, but only if the ladder is down. |
| Hint | Use the limit switch to detect if the ladder is down.<br>To drive forward the push button must be pushed AND the ladder must be down. |

After you have attempted this challenge watch the tutorial to see our solution at [www.EPro8Challenge.co.nz/Tutorial](www.EPro8Challenge.co.nz/Tutorial) and enter the Challenge Code **FRNG**.