

Model Answers: Medium

1

The correct answer is **C** because:

- Tar contains cancer-causing compounds (carcinogens) which can cause gene mutations leading to uncontrolled cell division
- Nicotine is a drug that stimulates the nervous system to reduce the diameter of arterioles (narrowing the arteriole lumen) which increases blood pressure
- Carbon monoxide binds to haemoglobin forming a very stable compound called carboxyhaemoglobin, reducing the ability of oxygen to bind and thereby reducing the oxygenation of the blood

2

The correct answer is **B** because:

- Carbon monoxide can damage the lining of the arteries, and nicotine increases blood pressure
- Both of these affects together increase the risks of atherosclerosis (narrowing and hardening of arteries) by damaging the wall of the arteries
- The accumulation of white blood cells, cholesterol and calcium ions in the damaged wall result in the formation of plaques, reducing the elasticity of the wall (this is atherosclerosis)

3

The correct answer is **D** because:

- Carbon monoxide binds irreversibly to haemoglobin forming a very stable compound called carboxyhaemoglobin, reducing the ability of oxygen to bind which reduces the oxygenation of the blood
- Tar causes inflammation along the epithelial lining of the bronchi and bronchioles, as well as resulting in an increase in the secretion of mucus by goblet cells. It stimulates a series of changes that can lead to COPD and lung cancer.

Carbon monoxide binds irreversibly to haemoglobin, but it is mainly the carcinogens in tar that result in cancer developing in smokers.

4

The correct answer is **C** because:

- An obstructed lumen is the same as a narrowed lumen - smoking is a major cause of atherosclerosis which is a buildup of fatty deposits (largely cholesterol) in the lining of arterioles damaged by the effects of smoking
- These effects can be attributed to nicotine which raises blood pressure, increasing the likelihood of damage to the arteries occurring
- Atherosclerosis limits the supply of oxygenated blood to the organs, causing cardiovascular disease

5

The correct answer is **C** because:

- Nicotine is a naturally occurring plant alkaloid that has addictive properties
- Nicotine stimulates the release of adrenaline, which raises blood pressure and heart rate (which is why smoking increases the risk of cardiovascular diseases such as atherosclerosis, CHD and strokes).