SECTION A

Answer **all** *the items from this section*

Item 1.

A brass band was invited to play during a celebration near a tall building, a distance slightly more than 17 m away. Two friends standing in the same direction and in line with the playing band, heard the sound from the band at different intervals of time which attracted them to go and attend the celebration. On arrival, the sound they heard was unclear, confused and indistinct. Later in the night during the cerebration, coloured lights flashing red, blue and green made the colours of their clothes look different from the original colours which puzzled them.

Hint: *Speed of sound in air = 330 ms^{-1}.*

The two friends heard sound after 4 s *and* 5 s, *respectively.*
The friends were originally wearing yellow clothes.

Task:

As a physics student, help the two friends to understand why;

(a) they heard the sound at different intervals.

(b) the sound they heard was unclear, confused and indistinct.

(c) the colour of their clothes kept changing when coloured lights flashed on them.

Item 2.

In a certain town, people are concerned about the waste disposal from the factory into the nearby lake which is their source of water for home use. They raised this issue to the chairperson Local Council 1 (LC1) who directed the management of the factory to stop disposing waste into the lake. A scientist was contacted to investigate the presence of radioactive material in the water. The scientist found out that the water was indeed radioactive as shown in Table **1**.

Table 1

Time/days	0	5	10	15	20	25	30
Activity/counts per minute	1200	740	440	260	160	90	60

Although the water from the lake remains radioactive for a long time, the scientist recommended that water will be safe for use again when the activity is less than 38 counts per minutes.

Task:

As a student of physics;

(a) Advise the chairperson LC1 about the time the community will wait for the water to be safe for use again.

(b) Sensitise the members of the community about the risks associated with radioactive materials and how such materials should be handled.