HOMEWORK

READING. DIAGRAM / FLOWCHART COMPLETION

EXERCISE 1 [13]

How Mobile Telephony turned into a Health Scare

The first mobile phones to connect to telephone networks were often installed in cars before the hand-held version came on the market and the revolution in mobile technology began. The first generation of mobile phones (called 1G) was large, heavy and analogue and it was not until the invention of the second generation (2G) in the 1990s that digital networks could be used. The digital element enabled faster signaling. At the same time, developments in battery design and energy-saving electronics allowed the phones themselves to become smaller and therefore more truly mobile. The second generation allowed for text messaging too, and this began with the first person-to-person text message in Finland in 1993, although a machine-generated text message had been successfully sent two years earlier.

None of this would have been possible without the development of duplex technology to replace the relatively primitive simplex technology of the first phase of mobile communication. In duplex technology, there are two frequencies available simultaneously. These two frequencies can be obtained by the principle of Frequency Division Duplex (FDD). To send two signals wirelessly, it is necessary to create a paired spectrum, where one band carries the uplink (from phone to antenna) and the other carries the downlink (from the antenna to phone). Time Division Duplex (TDD) can achieve the same thing, but instead of splitting the frequency, the uplink and downlink are switched very rapidly, giving the impression that one frequency is used.

For mobile telephony to work to its fullest potential, it needs to have a network through which it can relay signals. This network depends on base stations which send and receive the signals. The base stations tend to be simple constructions, or masts, on top of which are mounted the antennas. With the rapid increase in demand for mobile services, the infrastructure of antennas in the United Kingdom is now huge. Many thousands of reports have appeared claiming that the signals relayed by these antennas are harmful to human and animal health. The claims focus on the fact that the antennas are transmitting radio waves in microwave form. In some ways, public demand is responsible for the increase in the alleged threat to health. Until quite recently, voice and text messages were transmitted using 2G technology. A 2G mast can send a low-frequency microwave signal approximately 35 kilometres. Third generation (3G) technology allows users to wirelessly download information from the internet and is extremely popular. The difference is that 3G technology uses a higher frequency to carry the signals, allowing masts to emit more

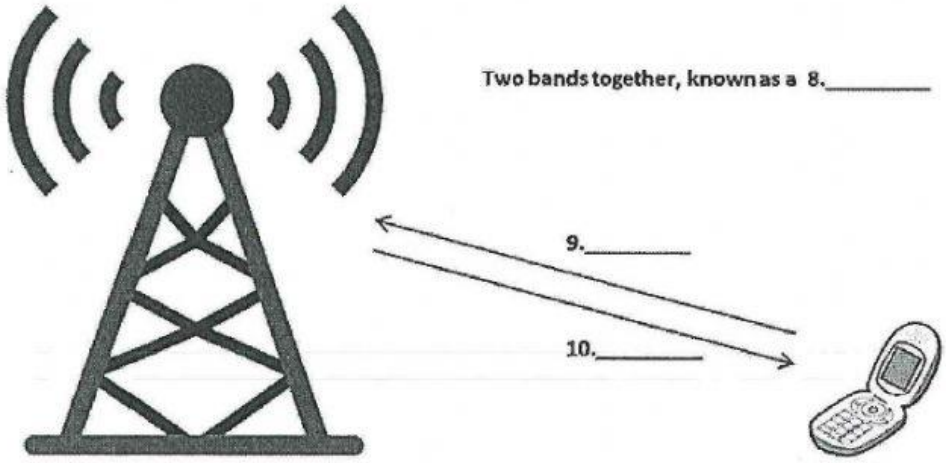
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radiation. This problem is intensified by the need to have masts in closer proximity to each other and to the handsets themselves. Whatever danger there was in 2G signals is greatly multiplied by the fact that the 3G masts are physically much closer to people.

Choose **NO MORE THAN TWO WORDS** from the passage.

Frequency Division Duplex (FDD): two signals sent 7._____



EXERCISE 2[14]

Stainless steel

Varieties

There are over 150 grades of stainless steel with various properties, each distinguished by its crystalline structure. Austenitic stainless steel, comprising 70% of global production, is barely magnetic, but ferritic and Martensitic stainless steel function as magnets because they contain more nickel or manganese. Ferritic stainless steel – soft and slightly corrosive – is cheap to produce, and has many applications, while Martensitic stainless steel, with more carbon than the other types, is incredibly strong, so it is used in fighter jet bodies but is also the costliest to produce.

Recyclability

Stainless steel can be recycled completely, and these days, the average stainless steel object comprises around 60% of recycled material.

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Cutting-edge application

In the last few years, 3D printers have become widespread, and stainless steel infused with bronze is the hardest material that a 3D printer can currently use.

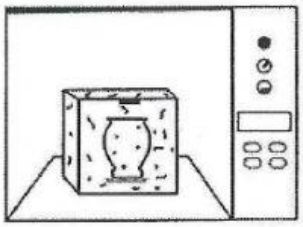
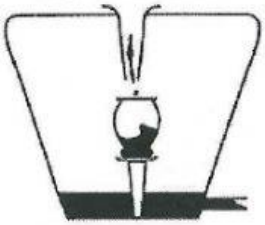
In 3D printing, an inkjet head deposits alternate layers of stainless steel powder and organic binder into a build box. After each layer of binder is spread, overhead heaters dry the object before another layer of powder is added. Upon completion of printing, the whole object, still in its build box, is sintered in an oven, which means the object Is heated to just below the melting point, so the binder evaporates. Next, the porous object is placed in a furnace so that molten bronze can replace the binder. To finish, the object is blasted with tiny beads that smooth the surface.

Appraisal

In less than a century, stainless steel has become essential due to its relatively cheap production cost, its durability, and its renewability. Used in the new manufacturing process of 3D printing, its future looks bright.

Choose **NO MORE THAN TWO WORDS** from the passage.

3D printing using stainless steel and bronze

Sintering	Replacing the binder	Finishing
BUILD BOX in OVEN 	OBJECT in (13)..... 	
Object heated to just below (12)..... *to evaporate binder.*	*Binder replaced with molten bronze.*	*Object blasted with* (14).....

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