

14.67 or 14/1

As there are **two coils** mentioned in the question it must refer to **mutual inductance**. Thus a change of current in one coil causes a voltage to be induced into the other coil.

14.68 or 14/2

If a transmission line was appearing to be purely resistive it would most likely be perfectly matched. Its own capacitance and inductance would cancel each other out.

14.69 or 14/3

In fact "demodulation" of frequency modulation (known as discriminator) is much more complex than the demodulation of amplitude modulation (known as a detector). FM is inherently less prone to interference and will give good quality assuming that the signal is strong enough.

14.70 or 14/4

The electric field is at right angles to the magnetic field.

By convention, the polarization of a radio wave is given by the polarization of the electric field.

14.71 or 14/5

In a balanced modulator the carrier and the speech input are balanced out internally. This means that the output contains only sideband. In fact there are both the upper and the lower side bands present. It is then necessary to use a suitable filter to select the required sideband and reject the unwanted one.

14.72 or 14/6

Impedance is the **vector sum** of the inductive reactance (in this case) and the resistance. By Pythagoras:

$$\begin{aligned} Z^2 &= (X_L)^2 + (R)^2 \\ &= 40^2 + 30^2 \\ &= 1600 + 900 \\ &= 2500 \end{aligned}$$

Thus Z is the Square root of 2500 = **50 Ohms**

14.74 or 14/7

Impedance is the vector sum of the reactance and the resistance. Once again, Pythagoras is in the answer. IE : The square on the hypotenuse (diagonal) is equal to the sum of the squares on the other two sides  
In other words: Total impedance = the square root of  $(R^2 + X_L^2)$

14.75 or 14/8

The graph shows that the transistor is biased beyond the cut-off point. It is therefore operating in class C.

However, as the sketch in the question is not very precise, some students have taken it to be biased "at cut-off" and this would be in Class "B".

Thus I am taking choices C or D as being correct.

14.76 or 14/9

The callsign G8XYZ would become GD8XYZ when in use in the Isle of Man.

As this would be a temporary location the suffix "/P" should be added to the callsign. See BR68 7(3)

The resultant call sign to be used would be GD8XYZ/P

14.77 or 14/10

The speed of a radio wave = FREQUENCY X WAVELENGTH

This could be re-arranged: FREQUENCY = divided by WAVELENGTH

Thus, in this case, the 300 Million is divided by 100 = 3.0 MHz

The second harmonic is therefore 2 times 3 MHz =6 MHz (or 6000 kHz)

14.78 or 14/11

The maximum frequency that is reflected by the ionosphere, for a signal that is transmitted straight up is known as the critical frequency. Whereas the maximum usable frequency relates to the maximum frequency that can be used between two different points on the earth.

14.79 or 14/12

A pure sine wave, has no corners, and therefore will have the minimum harmonic content.

14.80 or 14/13

according to the text books, the sunspot activity peaks every 11 years. This is my intended answer. However, recent developments (according to a BBC science programme) indicates that it may now be longer...

14.81 or 14/14

This circuit is a little unusual. It is best not to actually do any calculations....

Just use logic. The circuit shows 50 Volts being connected these resistor pairs. In fact any voltage could have be shown and the answer is the same. Take the top half of the circuit. There is a 75 resistor in series with a 56 resistor. Thus the voltage at x will a proportion of the total voltage. As the lower resistors are the same value as the top ones the proportion at y will be the same.

Thus the voltage and x and y will be the same. If they are at the same voltage, the volts difference is zero.

14.81 or 14/15

The speed of light is  $300 \times 10^6$  (Note that this is the same as  $3 \times 10^8$ )