1. A progressive wave carries energy without moving matter along overall.

   ☐ True ☐ False

2. In a transverse wave, the particles vibrate:

   ☐ parallel to the direction of travel

   ☐ perpendicular to the direction of travel

   ☐ in circles around the source

   ☐ not at all

3. As a sound source moves **toward** you, the pitch you hear is:

   ☐ silent

   ☐ lower than the source

   ☐ the same as the source

   ☐ higher than the source

4. All electromagnetic waves are transverse.

   ☐ True ☐ False

5. Polarising a transverse wave means making it vibrate:

   ☐ faster

   ☐ in all planes at once

   ☐ along the direction of travel

   ☐ in one plane only

6. A wave has a period of 0.020 s. What is its frequency?

   _____ Hz

7. Sound travelling through air is a longitudinal wave.

   ☐ True ☐ False

8. A source moving toward an observer bunches the wavefronts ahead of it.

   ☐ True ☐ False

9. In a vacuum, which EM wave travels the fastest?

   ☐ visible light, because we can see it

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   ☐ gamma rays, because they have most energy

   ☐ radio waves, because they are longest

10. Sound waves can be polarised.

    ☐ True ☐ False

1. **True**

   Yes – the particles only oscillate about fixed points; the disturbance and its energy are what travel.

2. **perpendicular to the direction of travel**

   Transverse = vibration at right angles to the energy flow (a rope wave, light, water ripples).

3. **higher than the source**

   Moving toward you bunches the wavefronts, shortening the wavelength and raising the frequency you hear.

4. **True**

   Yes – every EM wave is transverse, and all travel at c in a vacuum.

5. **in one plane only**

   A polarising filter passes only the vibration lined up with its axis, leaving the wave in a single plane.

6. **50 Hz**

   $f = \dfrac{1}{T} = \dfrac{1}{0.020} = 50$ Hz.

7. **True**

   Yes – the air particles vibrate back and forth along the travel direction, making compressions and rarefactions.

8. **True**

   Yes – each new wavefront is sent from a point a little closer, so they crowd together in front.

9. **they all travel at the same speed**

   In a vacuum every EM wave travels at $c = 3.0 \times 10^{8}\ \dfrac{\text{m}}{\text{s}}$.

10. **False**

    No – sound is longitudinal (it vibrates along the travel), so there is no other plane to pick out.

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