S5 Physics Practice Paper 1 | Uniform acceleration, Newton s second law, power, resistors, refraction

Senior Secondary Physics

S5 Physics practice paper with answers: acceleration, Newton s second law and friction, work energy and power, resistors, refraction, heat capacity and gas laws.

1. Uniform acceleration and v-t graphs (16 marks)

Show working throughout; take g = 10 m/s^2.

#	Question
1	(a) A car accelerates uniformly from rest to 20 m/s in 8 s. Find the acceleration.
2	(b) The car then travels at a steady 20 m/s for 12 s. Find the distance covered.
3	(c) The car then decelerates uniformly at 4 m/s^2 until it stops. Find the braking time and braking distance.
4	(d) Find the average speed over the whole journey (accelerating, steady, braking).

2. Force and Newton s second law (18 marks)

Show working throughout; show steps in (d).

#	Question
5	(a) A resultant force of 15 N acts on a 5 kg body. Find the acceleration.
6	(b) A lift of mass 800 kg accelerates upwards at 1.5 m/s^2. Find the tension in the cable.
7	(c) A 20 kg crate rests on horizontal ground; the coefficient of kinetic friction is 0.25. Find the friction force.
8	(d) A horizontal push of 90 N is now applied to the crate. Find its acceleration and its speed 4 s after starting from rest.

3. Work, energy conservation and power (16 marks)

Show working throughout.

#	Question
9	(a) A horizontal force of 60 N moves a crate 5 m in the direction of the force. Find the work done.
10	(b) A 2 kg body falls freely from a height of 5 m; ignore air resistance. Find its speed on landing.
11	(c) A pump raises 300 kg of water through 8 m every minute. Find its average output power.
12	(d) A motor has an input power of 500 W and an efficiency of 80%. Find its output power.

4. Resistors in series and parallel, and power (18 marks)

Show working; give resistance to 2 decimal places.

#	Question
13	(a) Resistors of 4 ohm and 8 ohm are connected in series to a 12 V supply. Find the total resistance and the current.
14	(b) Find the voltage across the 8 ohm resistor and the power dissipated in it.
15	(c) The same two resistors are reconnected in parallel to the 12 V supply. Find the total resistance and total current.
16	(d) Find the total power in the parallel case and the percentage increase over the series case.

5. Wave speed, frequency and refraction (16 marks)

Show working; give angles to 1 decimal place.

#	Question
17	(a) Sound travels in air at 340 m/s with a frequency of 170 Hz. Find the wavelength.
18	(b) Find the period of this sound wave in milliseconds (1 decimal place).
19	(c) Light passes from air into glass, slowing from 3.0 x 10^8 m/s to 2.0 x 10^8 m/s. Find the refractive index, and the angle of refraction for an angle of incidence of 45 degrees.
20	(d) Water waves travel from deep water (0.40 m/s) into shallow water (0.24 m/s) with an angle of incidence of 30 degrees. Find the angle of refraction.

6. Heat capacity and gas laws (16 marks)

Take the specific heat capacity of water as 4200 J kg^-1 K^-1; show working throughout.

#	Question
21	(a) 2 kg of water is heated from 20 C to 60 C. Find the energy required.
22	(b) A 1,000 W heater of efficiency 84% is used. Find the time required.
23	(c) A fixed mass of gas is compressed at constant temperature from 2.0 L to 0.5 L; its original pressure is 100 kPa. Find the new pressure.
24	(d) At constant pressure, a gas of volume 3.0 L at 27 C is heated to 327 C. Find the new volume.