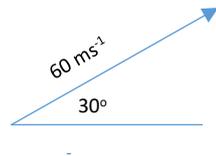


1. A capacitor has a capacitance of 10 mF. What is meant by 10 mf?
2. Calculate the charge stored on a 6 mF capacitor of a potential difference of 6.0 V is across its plates.
3. Calculate the energy stored on a 6 mF capacitor of a potential difference of 6.0 V is across its plates.
4. A cell has an EMF of 6.0 V and a internal resistance of 0.5 A
 - i) What is meant by an EMF of 6.0 V?
 - ii) What is meant by an internal resistance of a cell?
 - iii) How do we know a cell has an internal resistance?
 - iv) Calculate the maximum current this cell can provide.
5. The velocity vector for a golf ball is shown below. The ball is launched from the top of a steep hill and strikes the ground 10.0 s after launch.



- i) Draw a graph of its vertical velocity for the whole flight. Values on the graph are required.
 - ii) Draw a graph of its horizontal velocity for the whole flight. Values on the graph are required.
6. An experiment to find the internal resistance and EMF of a cell is carried out. The table of results are shown below.

Current (A)	V_{TPD} (V)
0.0	1.8
0.1	1.6
0.2	1.4
0.3	1.2
0.4	1.0
0.5	0.8
0.6	0.6
0.7	0.4
0.8	0.2

- i) Draw the circuit needed to carry out this activity.
- ii) Describe how each set of results were taken.
- iii) Draw the graph and use it to find a) the internal resistance of the cell b) the EMF of the cell, and c) the maximum current the cell can provide

7. Benny is running to the left at 5 ms^{-1} . Meanwhile Nestor is running to the right at 7 ms^{-1} .
- Calculate the velocity of the girl relative to the boy.
 - Calculate the velocity of the boy relative to the girl.
 - How far apart will they be 10.0s after they pass each other.
8. What is meant by time dilation?
9. A spaceman measures a pendulum's period to be 0.75 s on his spaceship travelling at 0.8 c.
- Calculate the period of the pendulum measured by a stationary observer on Earth.
 - Calculate the time dilation.
10. What is meant by length contraction?
11. A spaceship travelling at 0.8 c has a length of 75 m as measured by a spaceman on the ship.
- Calculate the length of the spaceship measured by a stationary observer on Earth.
 - Calculate the length contraction.
12. What is meant by the Doppler effect?
13. A police car travels towards and then passes a stationary observer at a speed of 30 ms^{-1} . If the car's siren is 650 Hz. Calculate the change in frequency heard by the observer as the police car passes him.
16. The Universal gravitational constant is $6.67408 \times 10^{-11} \text{ m}^3 \text{ kg}^{-1} \text{ s}^{-2}$. What does that mean?
17. If two 1.00000 kg masses are 1.00000 m apart then calculate the magnitude of the gravitational force they exert on each other.
18. How long will it take a ball launched vertically upward at a velocity of 15 ms^{-1} to arrive back to the thrower's hand.
19. Calculate the magnitude of the force two masses of $2.0 \times 10^9 \text{ kg}$ and $6.0 \times 10^9 \text{ kg}$ exert on each other if they are $1.5 \times 10^5 \text{ km}$ apart.
20. A rocket of mass $1.0 \times 10^5 \text{ kg}$ has an upwards acceleration of 4.0 ms^{-2} .
- Calculate unbalanced force on rocket.
 - If the force of friction acting on the rocket is $1.0 \times 10^3 \text{ N}$, then calculate the upwards force on the rocket.
21. What are the units of irradiance?
22. The irradiance at a 1.0 m^2 surface 4.0 m from a point source is 2.0 Wm^{-2} .
- Calculate the energy this surface receives each second from the point source.
 - Calculate the energy the surface receives each second if it moves to 2.0 m from the point source.
 - Write down the irradiance at the surface when it is 2.0 m from the point source.

23. An experiment was carried out to find the factor the ratio of V_{pk} to V_{rms}

V_{dc}	V_{pk}
0	0
1	1.4
1.5	2.1
2.0	2.8
2.5	3.5
3.0	4.2

i) What is meant by the rms voltage of a ac supply? Note, the labelling of the table says V_{dc} , but the question refers to V_{rms} .

ii) Describe how the data collected above was obtained.

iii) Draw the graph and find the ratio of V_{pk} to V_{rms} .

iv) Suppose a 5 W bulb was connected to an ac signal of peak voltage 25 V. Calculate the effective power output of the bulb.

24. The speed of light in diamond is $1.2 \times 10^8 \text{ ms}^{-1}$. If the light makes an angle of 35° to the normal when it enters the diamond, calculate the angle of refraction inside the diamond.