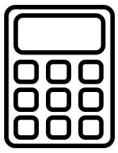
Acumen Teach
To the point

Energy Master-box

Energy—Logic—Mathematical knowledge application—Knowledge of units

CALCULATORS ALLOWED



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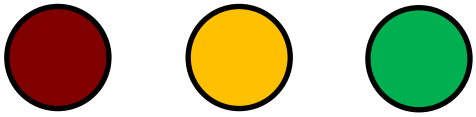
To the point

2 hours

38 Questions

Easy (12 Questions)	/12
Moderate(12 Questions)	/24
Difficult(12 Questions)	/36
Total Marks	**/72**

How did you do?



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Easy Questions

1. What is the unit of energy?

(1 marks)

2. State the principle of conservation of energy.

(1 marks)

3. Calculate the kinetic energy of a 2 kg object moving at 3 m/s.

(1 marks)

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4. What type of energy is stored in a stretched spring?

(1 marks)

5. Convert 500 J into kilojoules (kJ).

(1 marks)

6. What is the gravitational potential energy of a 5 kg object raised to a height of 4 m? (Use $g = 9.8\,\mathrm{m/s^2}$)

(1 marks)

7. Define power.

(1 marks)

8. What is the efficiency of a device that wastes 20 J of energy for every 100 J of input energy?

(1 marks)

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9. Name one renewable energy source.

(1 marks)

10. What is the work done when a force of 10 N moves an object 5 m?

(1 marks)

11. State the equation linking power, energy, and time.

(1 marks)

12. What type of energy transfer occurs in a battery-powered torch?

(1 marks)

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Moderate Questions

13. A car of mass 800 kg is travelling at 20 m/s. Calculate its kinetic energy.

(2 marks)

14. A crane lifts a 50 kg weight to a height of 10 m. Calculate the gravitational potential energy gained. (Use $g = 9.8\,\mathrm{m/s^2}$)

(2 marks)

15. A motor transfers 600 J of energy in 10 seconds. Calculate its power output.

(2 marks)

16. A solar panel receives 2000 J of energy from the Sun and converts 400 J into electrical energy. Calculate its efficiency.

(2 marks)

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17. A force of 50 N is applied to move a box 6 m. Calculate the work done.

(2 marks)

18. A kettle has a power rating of 2000 W. How much energy does it transfer in 30 seconds?

(2 marks)

19. A cyclist does 1500 J of work to overcome friction. If the cyclist's efficiency is 75%, calculate the total energy input.

(2 marks)

20. A ball falls from a height of 5 m. Calculate its speed just before hitting the ground. (Use $g = 9.8\,\mathrm{m/s^2}$, ignore air resistance.)

(2 marks)

21. A machine is 60% efficient. If it wastes 80 J of energy, calculate the total energy input.

(2 marks)

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22. A 2 kg object is dropped from rest. Calculate its kinetic energy after falling 3 m. (Use $g = 9.8\,\mathrm{m/s^2}$)

(2 marks)

23. A light bulb transfers 1200 J of energy in 1 minute. Calculate its power.

(2 marks)

24. A wind turbine generates 5000 J of electrical energy from 20,000 J of kinetic energy. Calculate its efficiency.

(2 marks)

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Difficult Questions

25. A roller coaster of mass 500 kg starts from rest at the top of a 30 m hill. Calculate its speed at the bottom of the hill. (Ignore friction and air resistance, $g = 9.8\,\mathrm{m/s^2}$).

(3 marks)

26. A 0.5 kg ball is thrown vertically upwards with a speed of 10 m/s. Calculate the maximum height it reaches. (Use $g = 9.8\,\mathrm{m/s^2}$, ignore air resistance.)

(3 marks)

27. A pump lifts 100 kg of water to a height of 15 m in 20 seconds. Calculate its power output. (Use $g = 9.8\,\mathrm{m/s^2}$)

(3 marks)

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28. A coal-fired power station has an overall efficiency of 40%. If it produces 2000 MJ of electrical energy, calculate the total energy input from burning coal.

(3 marks)

29. A car engine wastes 70% of the energy from fuel as heat. If the useful energy output is 90 MJ, calculate the total energy input.

(3 marks)

30. A hydroelectric dam converts gravitational potential energy into electrical energy with an efficiency of 80%. If 10,000 kg of water falls 50 m, calculate the electrical energy produced. (Use $g = 9.8\,\mathrm{m/s^2}$)

(3 marks)

31. A 60 W light bulb is left on for 5 hours. Calculate the total energy transferred in kilowatt-hours (kWh).

(3 marks)

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32. A cyclist does 2000 J of work to travel 100 m. If the cyclist's efficiency is 25%, calculate the total energy input.

(3 marks)

33. A 0.2 kg object slides down a frictionless slope from a height of 4 m. Calculate its speed at the bottom. (Use $g = 9.8\,\mathrm{m/s^2}$)

(3 marks)

34. A nuclear power plant produces 500 MW of power. Calculate the energy produced in 1 hour in joules.

(3 marks)

35. A solar cell receives 800 W/m² of sunlight and has an area of 2 m². If its efficiency is 15%, calculate the electrical power output.

(3 marks)

36. A 10 kg object is accelerated from rest to 10 m/s in 5 seconds. Calculate the average power required.

(3 marks)

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