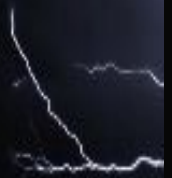

Umang 2.0
NCERT
9th / 10th
CLASS 10
LIVE
CHAPTER
ELECTRICITY
Electrical Power & Energy & it's Numericals
Vedantu
MASTER TEACHER
ABHISHEK SIR

Electric Power & Energy and its numericals

Episode 7



with

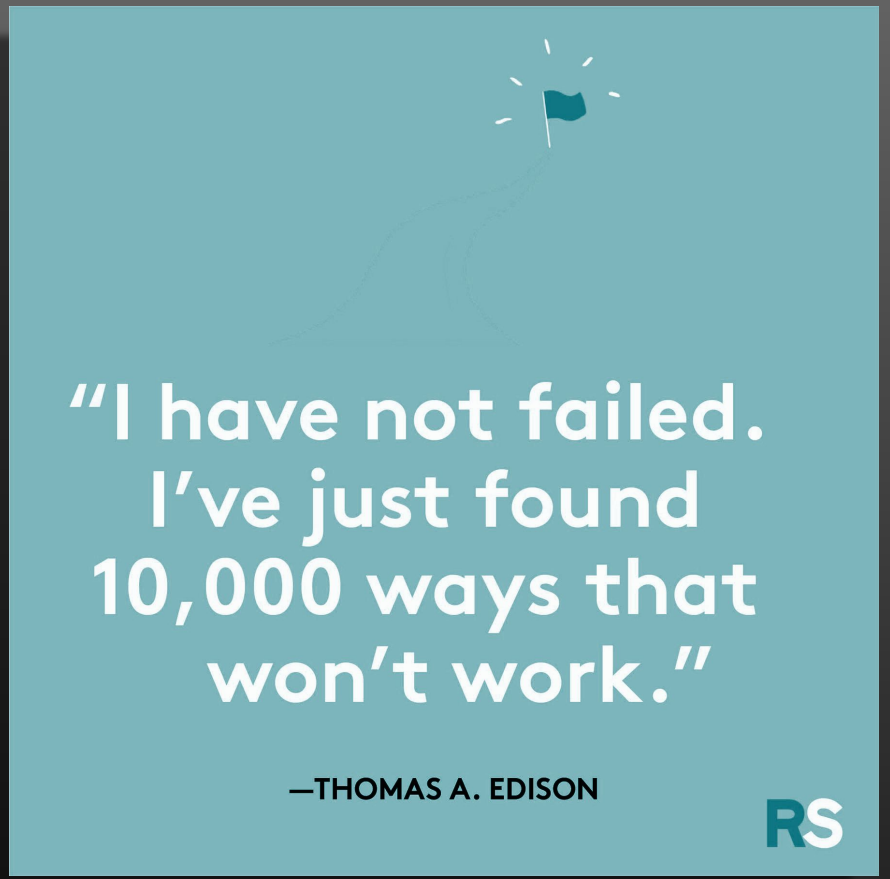
ABHISHEK K R

B.Tech - Aerospace, Alliance University

CBSE Expert | Inventor of **RocketPro**

6+ Years Teaching Exp | Mentored **more than 5000 students**

Helped 1000s of students get **10 CGPA** in CBSE X


“I have not failed.
I’ve just found
10,000 ways that
won’t work.”
—THOMAS A. EDISON
RS

ELECTRICITY

- Electric Current & Potential Difference
- Ohm's Law
- Resistance & Factors Affecting it
- Resistance in Series
- Resistance in Parallel
- Heating effects of Electric Current
- Electrical Power & Energy

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Heating Effects of Electric Current
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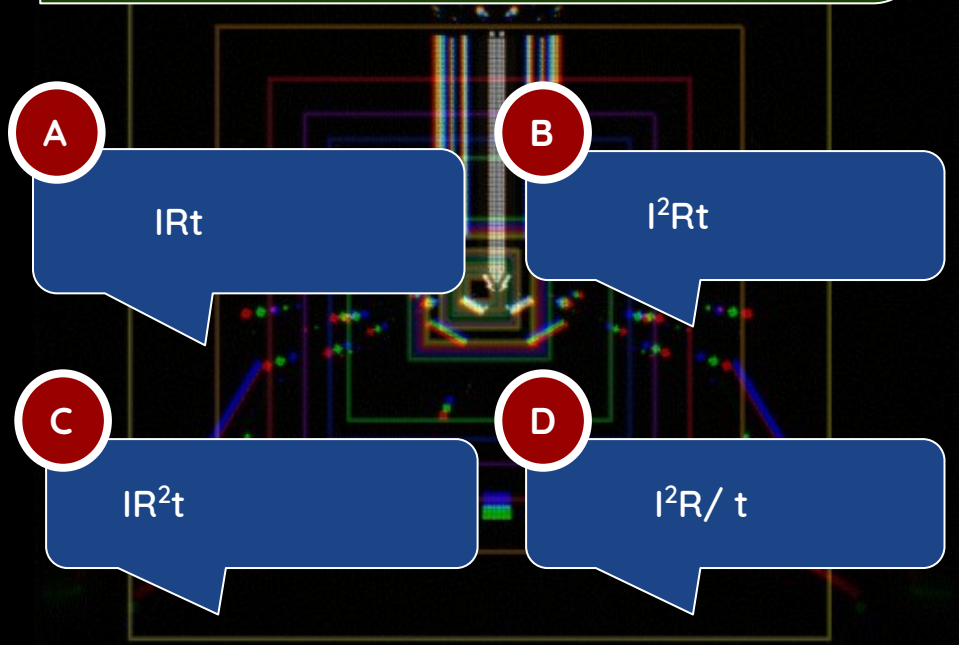
FLASH BACK

Q1. When a current 'I' flows through a resistance 'R' for time 't' the electrical energy spent is given by



A. IRt

B. I^2Rt

C. IR^2t

D. $I^2R/\ t$

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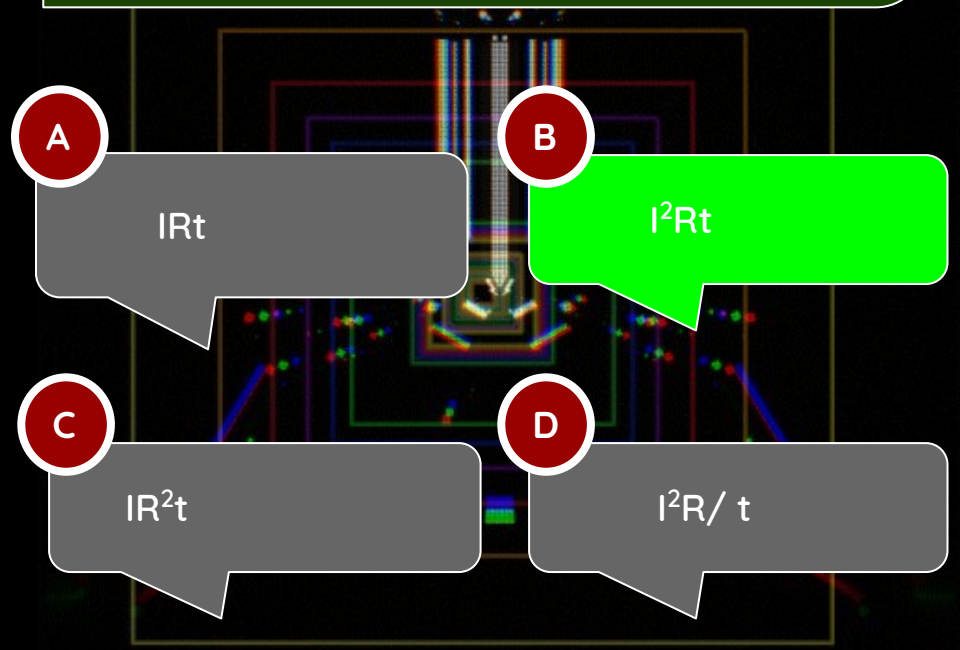

A. IRt

B. I^2Rt

C. IR^2t

D. $I^2R/\ t$

Q2. Two electric bulbs have resistances in the ratio 1:2. If they are joined in series, the energy consumed in them is in the ratio.

A. 2 : 1

B. 1 : 2

C. 4 : 1

D. 1 : 4

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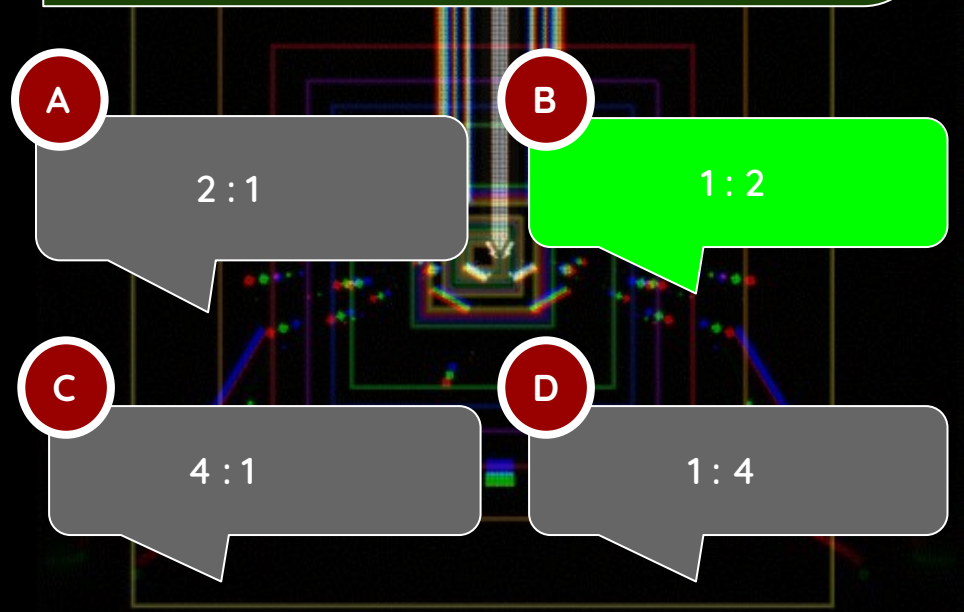

A. 2 : 1

B. 1 : 2

C. 4 : 1

D. 1 : 4

Q3. If the current flowing through a fixed resistor is halved, the heat produced in it will become:

A. One -Fourth

B. One - Half

C. Double

D. Four times

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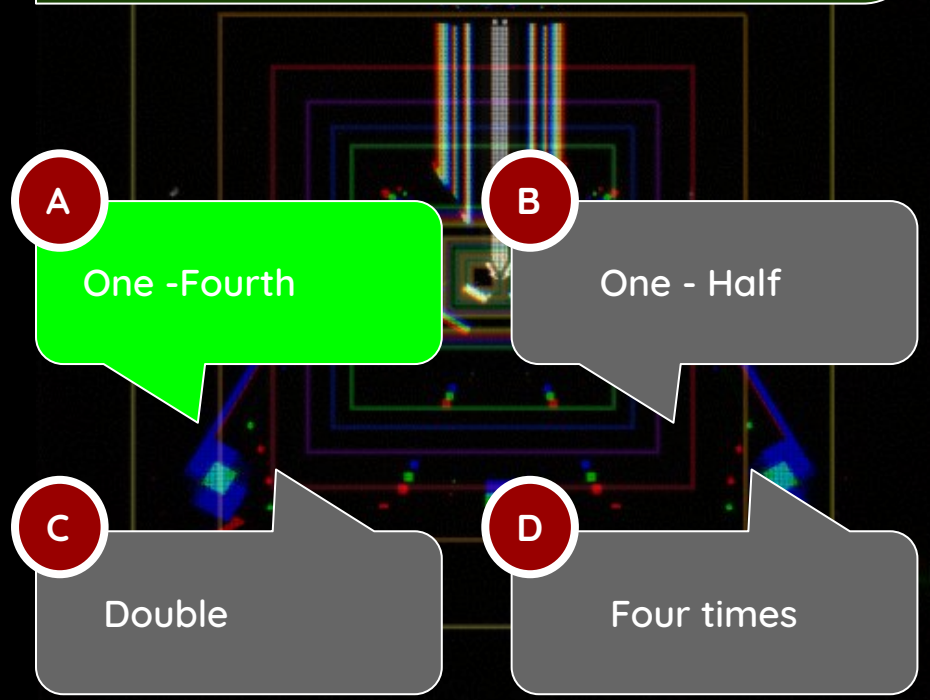

A. One -Fourth

B. One - Half

C. Double

D. Four times

Q9.A current of 5 ampere is passed through a conductor of 12 ohms for 2 minutes. Calculate the amount of heat produced.

ANSWER : 36 KJ

g

gangadhar prasad • 1 day ago (edited)

Answer to h.w question is 36000 Joules.Loved the session a lot!!!! Congratulation Vedantu 9 and 10 for 600k subscribers. Sir plz start a channel for physics too,it will help a lot of students!!!!We will wait for the 600k celebration.

3

A

Avyaaz ch • 1 day ago

Current(I)=5A
resistance(R)=12ohm
time(T) =2min=120s
heat=I^2×R×T
=25×12×120

Read more

3 3

3 replies

Kunal Arya • 1 day ago

ANSWER-36000 Joules or 36 Kilo Joules...

2

Gamer Piyush • 1 day ago
It's 36k joule

Dabblu • 1 day ago (edited)
Homework Q ka Ans is 36000
1

Fสizสή • 1 day ago
ANSWER IS 36000 J
1

Chaitanya Kashyap • 1 day ago
The correct answer is 36000 J.
3

Tejas Kumar • 1 day ago
36000J is the answer =36Kilo joules
3

Let’s take the case of a water heater

Let’s take the case of an electric heater

Electric heater converts electric energy to heat energy

Can reach temperatures of 50-60℃

Now consider an electric furnace

Now consider an electric furnace

Electric furnace also converts electrical energy to heat energy

Can reach temperature of around 1000-1200 °C

Which of these devices can consume electric energy turn it to heat energy faster?

Water Heater

Electric Furnace

Which of these devices can consume electric energy turn it to heat energy faster?

Water Heater

Electric Furnace

The **rate of energy consumption** (or heat generation) is more in furnace than water heater.

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$$Power = \frac{Energy\ dissipiated}{time} = \frac{H}{t} = \frac{V \cdot I \cdot t}{t}$$

$$Power\ (P) = V \cdot I$$

So which of these device will have more power?

Water Heater

Electric Furnace

Electric Furnace

Electric furnace consumes / dissipates more energy per second

Formulas of Electric power

$P = V I$
$P = V^2 / R$
$P = I^2 R$
$P = W/t$


VIP

Q4. A bulb of power 100W is connected to a supply of 220V. How much current will it draw from the supply

1 LEVEL

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1 LEVEL

A. 2.2 A

B. 0.4545 A

C. 0.54 A

D. 4.5 A

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Q5. An electric iron has a rating of 750 W, 220 V. Calculate (i) the current flowing through it and (ii) its resistance when in use

[Boards 2011]

2 LEVEL

Q5. An electric iron has a rating of 750 W, 220 V. Calculate (i) the current flowing through it and (ii) its resistance when in use

[Boards 2011]

2 LEVEL

A. I = 2.2 A, R =75.5 Ω

B. I = 3.4 A, R =75.5 Ω

C. I = 3.4 A, R =64.53 Ω

D. I = 0.5 A, R = 100 Ω

Q5. An electric iron has a rating of 750 W, 220 V. Calculate (i) the current flowing through it and (ii) its resistance when in use

[Boards 2011]

2 LEVEL

SOLUTION

Given: $P = 750$ W, $V = 220$ V

(*i*) $P = VI$

$750 = 220 \times I$

$\Rightarrow I = \frac{750}{220} = 3.40$ A

(*ii*) $P = \frac{V^2}{R}$

$\Rightarrow R = \frac{V^2}{P} = \frac{220^2}{750} \Rightarrow R = 64.53\ \Omega$

Q5. An electric iron has a rating of 750 W, 220 V. Calculate (i) the current flowing through it and (ii) its resistance when in use

[Boards 2011]

2 LEVEL

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Q6. The wattage of a bulb is 24 W when it is connected to a 12 V battery. Calculate its effective wattage if it operates on a 6V battery. **[Boards 2011]**

3 LEVEL

Q6. The wattage of a bulb is 24 W when it is connected to a 12 V battery. Calculate its effective wattage if it operates on a 6 V battery. **[Boards 2011]**

3 LEVEL

A 6 W

B 3 W

C 12 W

D 24 W

Q6. The wattage of a bulb is 24 W when it is connected to a 12 V battery. Calculate its effective wattage if it operates on a 6 V battery. (Neglect the change in resistance due to unequal heating of the filament in the two cases.) **[Boards 2011]**

3 LEVEL

SOLUTION

Given: $P_1 = 24$ W, $V_1 = 12$ V, $P_2 = ?$, $V_2 = 6$ V

Using $$P = \frac{V^2}{R}$$

$$\frac{P_1}{P_2} = \frac{V_1^2}{V_2^2}$$

$$\Rightarrow \quad P_2 = \left(\frac{V_2}{V_1}\right)^2 \times P_1 = \left(\frac{6}{12}\right)^2 \times 24 = \frac{1}{4} \times 24 = 6 \text{ W}$$

Q6. The wattage of a bulb is 24 W when it is connected to a 12 V battery. Calculate its effective wattage if it operates on a 6 V battery. **[Boards 2011]**

3 LEVEL

A. 6 W

B. 3 W

C. 12 W

D. 24 W

COMMERCIAL UNIT OF ENERGY

Have you seen a device like this?

Have you seen a device like this?

It measures the **electric energy** that we consume.

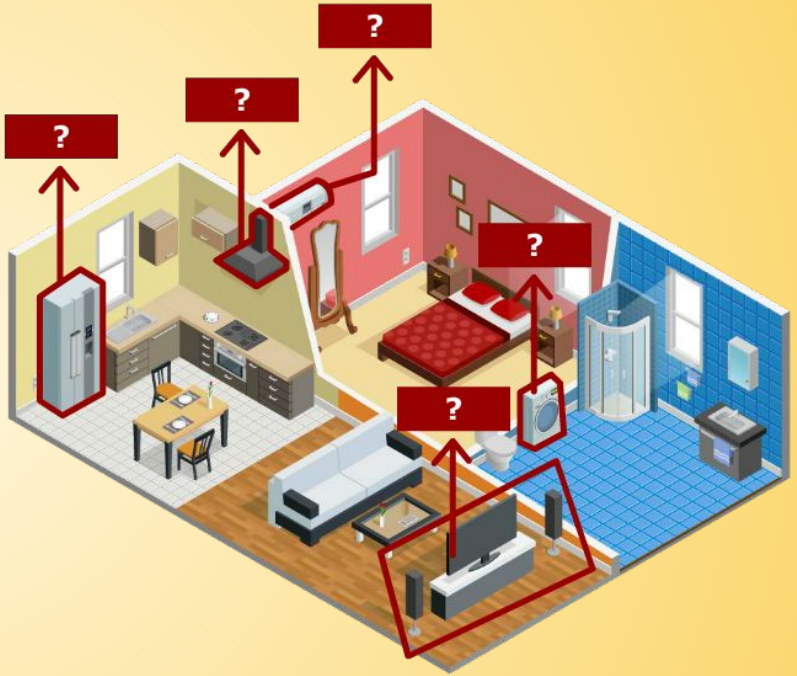
There are many **electrical appliances** at home.

And they **consume** a lot of **energy**.

.

Assume that the **power rating** of a air conditioner is **500W**

Let us find the energy you use:



Watts is a very **impractical** unit to measure **home energy consumption**

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That is why we use **kWh (KiloWatt - hour)**

Watts is a very **impractical** unit to measure **home energy consumption**

That is why we use **kWh (KiloWatt - hour)**

1 kWh = 1000 x 3600 W -s

= 3600000 J

= 3.6×10^6 J

If you notice carefully, this **device measures** electric energy in **kWh**

.

This reading helps electric companies **charge** us for **electric energy.**


VIP

Q9. A 100W bulb is operated for 8 hours daily. Find the cost of operating this bulb for 30 days. Assuming the cost of electricity is ₹4 per unit.

1 LEVEL

A ₹ 68

B ₹ 96

C ₹ 112

D ₹ 124

Q9. A 100W bulb is operated for 8 hours daily. Find the cost of operating this bulb for 30 days. Assuming the cost of electricity is ₹4 per unit.

1 LEVEL

SOLUTION

Given power of the bulb $= 100W$

Energy consumed by the bulb in a second $= 100J$

Energy consumed by the bulb in a month $= 100 \times 3600 \times 8 \times 30$

$= 86400000J$

$= \frac{86400000}{3600000} = 24kWh$

Cost of electric energy $= 24 \times 4 = 96$

Q9. A 100W bulb is operated for 8 hours daily. Find the cost of operating this bulb for 30 days. Assuming the cost of electricity is ₹4 per unit.

1 LEVEL

A ₹ 68

B ₹ 96

C ₹ 112

D ₹ 124

Q10. A bulb draws 2A current form a voltage supply of 220V. This bulb is operated for 4 hours in a day. Find the energy consumed by the bulb in 30 days (in kWh)

2 LEVEL

A. 52.8

B. 61.2

C. 78.2

D. 45.9

Q10. A bulb draws 2A current form a voltage supply of 220V. This bulb is operated for 4 hours in a day. Find the energy consumed by the bulb in 30 days (in kWh)

2 LEVEL

SOLUTION

Given

$I = 2A \qquad V = 220V$

$P = VI = 220 \times 2 = 440W$

$Energy\ consumed = 440 \times 3600 \times 4 \times 30 = 190080000J$

$Energy\ consumed = \frac{190080000}{3600000} = 52.8\ kWh$

Q10. A bulb draws 2A current form a voltage supply of 220V. This bulb is operated for 4 hours in a day. Find the energy consumed by the bulb in 30 days (in kWh)

2 LEVEL

A. 52.8

B. 61.2

C. 78.2

D. 45.9

Q11.A device consumes 180000000 J of energy in a month. If the cost of electricity per unit is ₹3.5. What is the cost of operating the bulb monthly?

3 LEVEL

A ₹ 125

B ₹ 150

C ₹ 175

D ₹ 200

Q11. A device consumes 180000000 J of energy in a month. If the cost of electricity per unit is ₹3.5. What is the cost of operating the bulb monthly?

3 LEVEL

SOLUTION

Given

$$Energy\ consumed = 180000000J$$

$$Cost = \frac{3.5}{kWh}$$

$$Cost\ of\ operating = \frac{180000000}{3600000} \times 3.5 = 50 \times 3.5 = 175$$

Q11.A device consumes 180000000 J of energy in a month. If the cost of electricity per unit is ₹3.5. What is the cost of operating the bulb monthly?

3 LEVEL

A ₹ 125

B ₹ 150

C ₹ 175

D ₹ 200

Q12. An electric bulb of resistance 200 ohm draws a current of 1A. Calculate the power of the bulb and energy in KWh consumed burning it for 5 hours.

[Boards 2013]

VSAT 2020

Grades 9-10

19950
Students Attended

₹32.31 Cr
Scholarships won

RANK 1	RANK 2	RANK 3
GV Siddarth Bengaluru	**Nitish** Jalandhar	**Himanshu** Hisar
Scholarship Won 100%	Scholarship Won 90%	Scholarship Won 90%

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LEARN
English

Reach out to me @
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