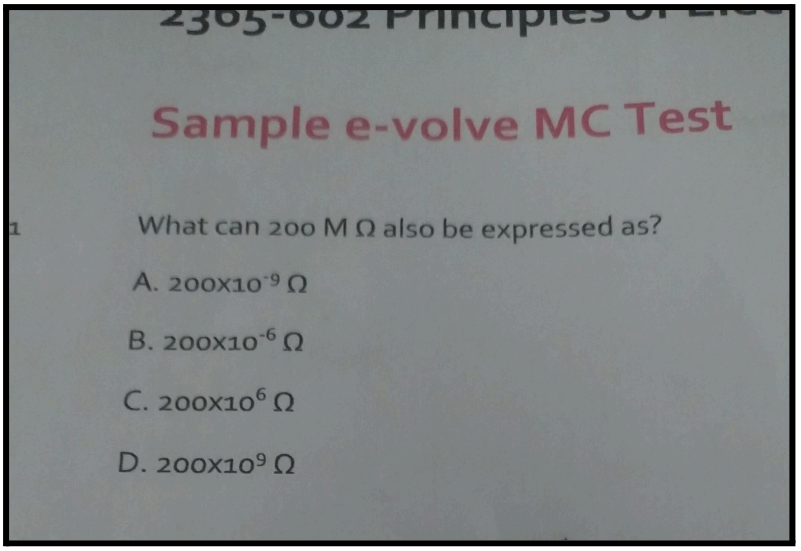
Sunday 7th September 2025
Lesson 18
IWA

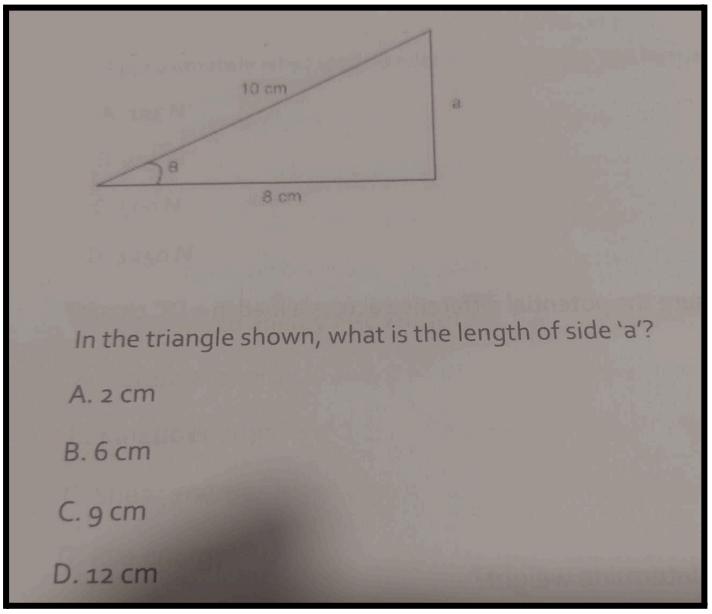
Class room - Worksheet walkthrough

5357 - 003 Electrical Scientific Principles and Technologies /
2365-602 Principles of Electrical Science

Question 1



Question 2:



<u>Question 2 working out:</u>

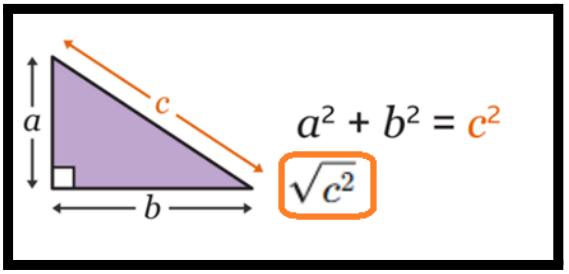
Foundation:

The formula $a^2 + b^2 = c^2$ is known as the Pythagorean theorem, which states that in a right-angled triangle, the square of the hypotenuse (the longest side) is equal to the sum of the squares of the other two sides (the legs).

This means that if you square the lengths of the two shorter sides (a and b) and add them together, you get the same value as squaring the length of the longest side (c).

Original source: google

Answer is 6 cm



C = The hypotenuse which is the longest side of the triangle.

a = 8 cm | c = 10 cm | b = ?

1) **Following, the rule we know that performing the addition:**

- **$a^2 + b^2 = c^2$**
- **$a^2 + b^2$ equates to c^2**

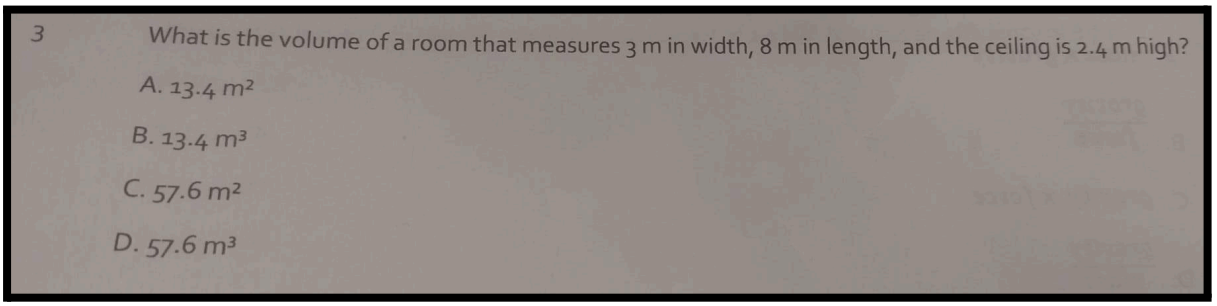
The question already gave us the value for c to be 10. So $c^2 = 100$.

Therefore, $a^2 + b^2$ has to equal 100.

We already have a value for a to be 8 cm. So a = 8 cm.

$8^2 = 64$. Which is 36 away from 100. The square root of 36 is 6. Therefore the answer for b = 6 cm.

Question 3

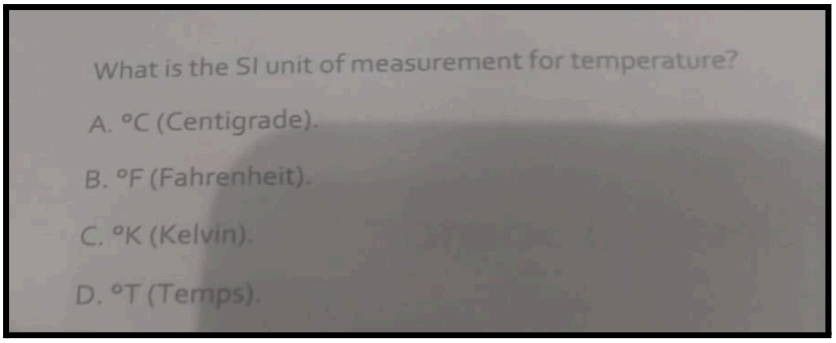


Question 3 working out

The answer is C.

Perform the multiplication 3 m x 8 m x 2.4 m = 57.6m^2

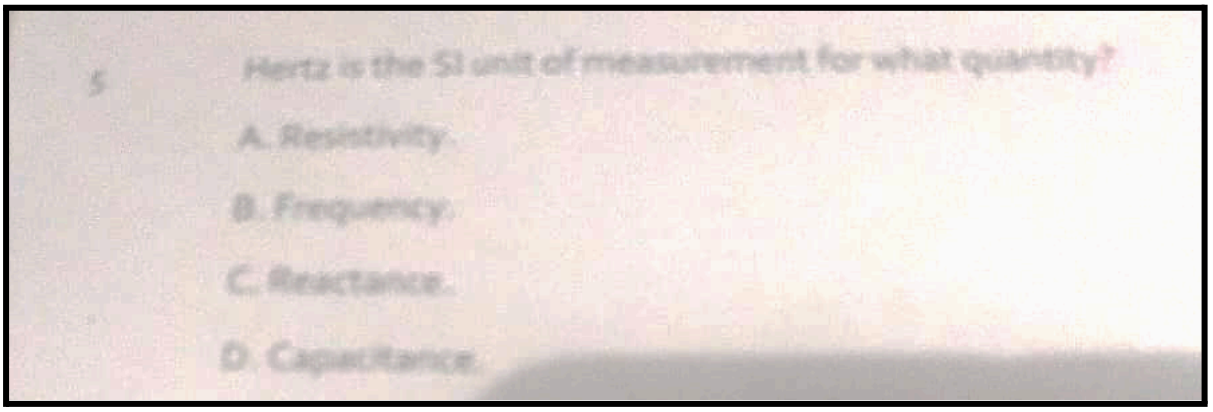
Question 4



Question 4 working out

The answer is Kelvin

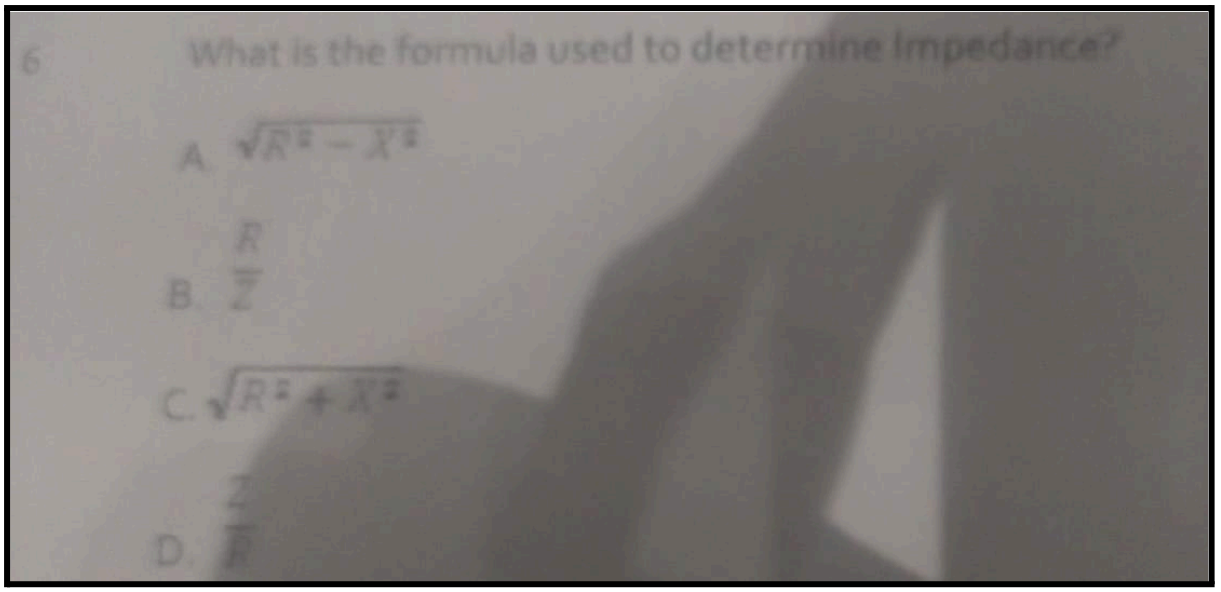
Question 5



Question 5 working out

The answer is B frequency

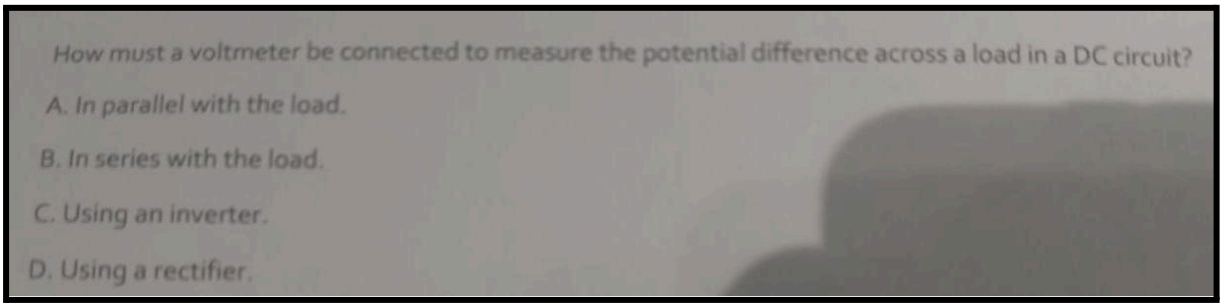
Question 6



Question 6 working out

The answer is C

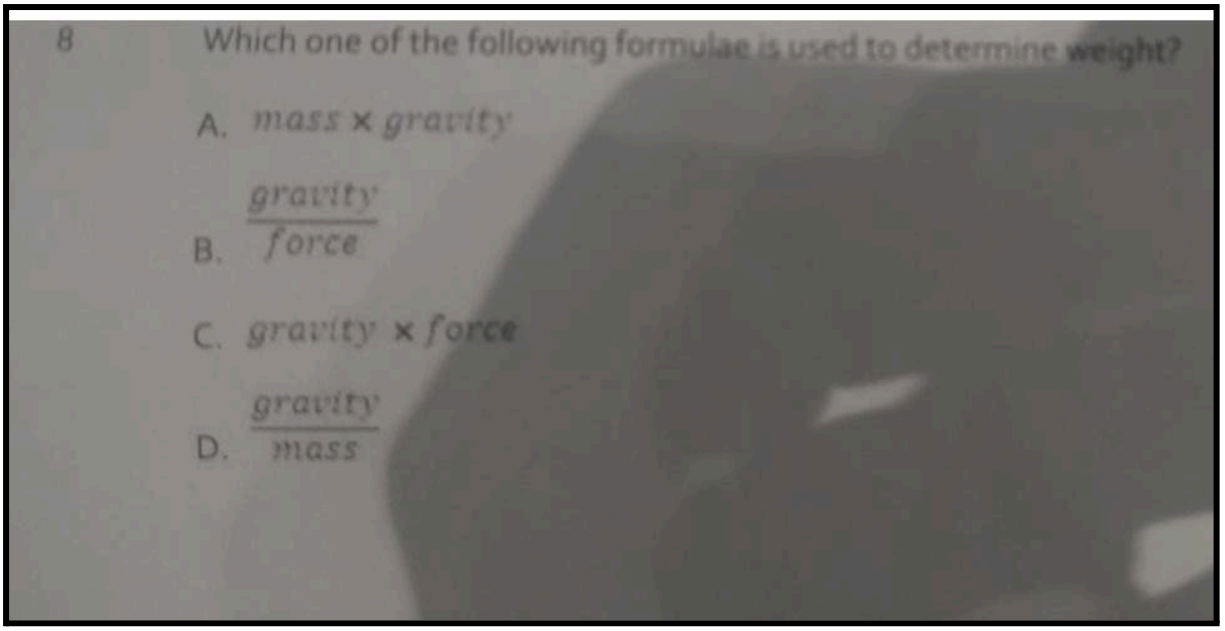
Question 7



Question 7 working out

The answer is A

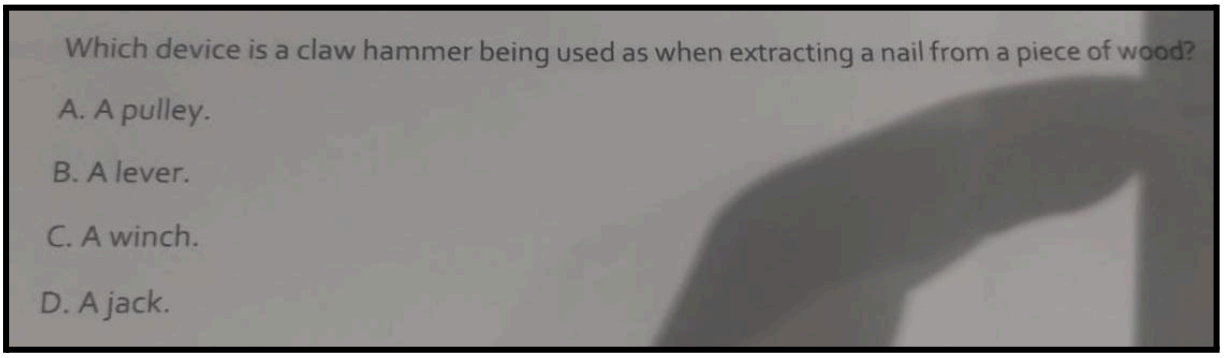
Question 8



Question 8 working out

The answer is A) weight = mass x gravity

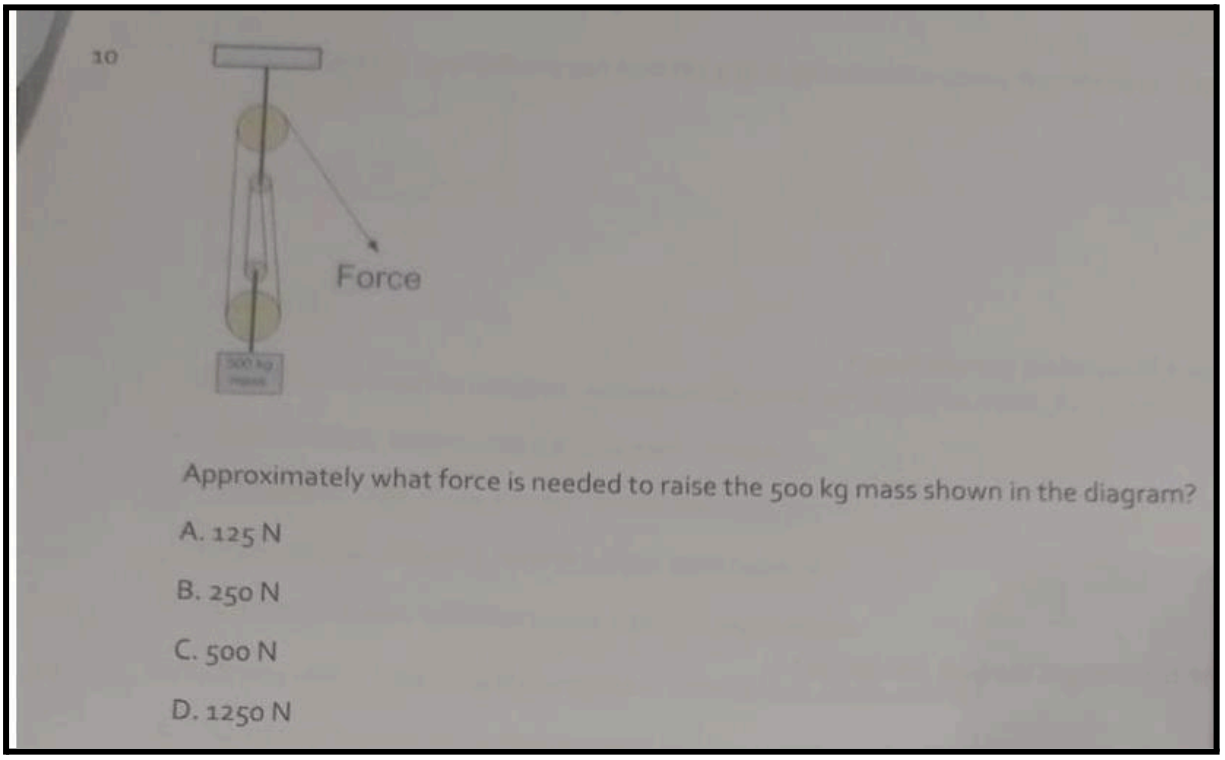
Question 9



Question 9 working out

The answer is B) A lever

Question 10



Question 10 working out

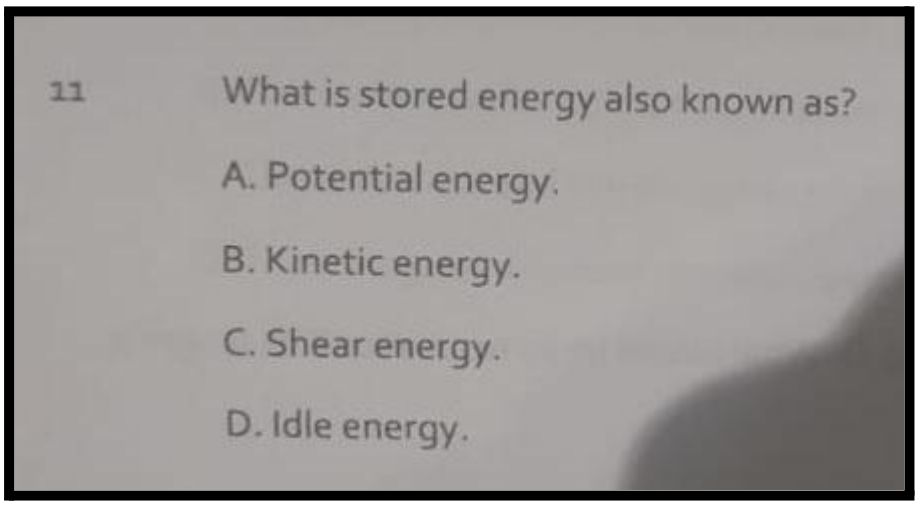
There are 4 pulleys (represented by four circles)

The weight is 500 kg.

The formula is: Force = Mass x gravity

4905 = 500 kg x 9.81

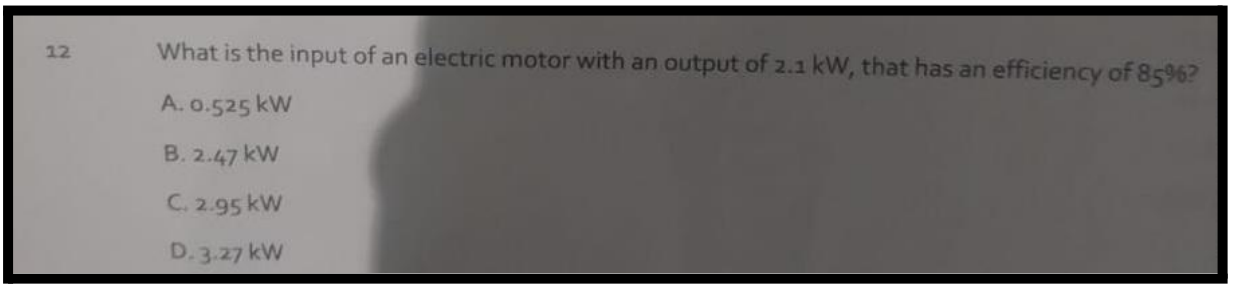
Question 11



Question 11 working out

The answer is A) Potential energy

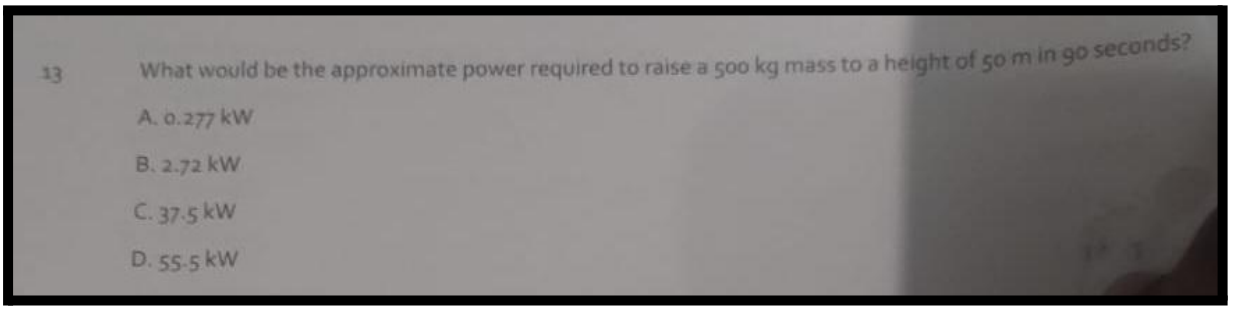
Question 12



Question 12 working out

The answer is B => 2.1 / 0.85 = 2.47

Question 13

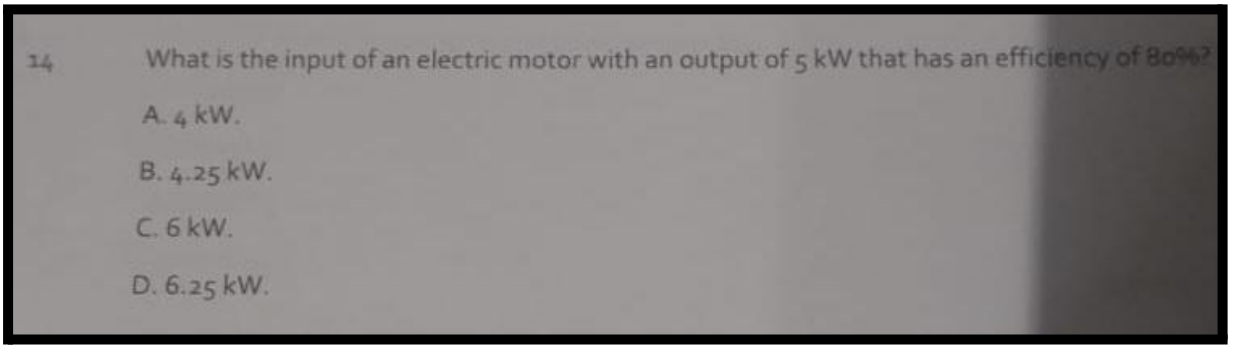


Question 13 working out

$$\frac{(500 \times 9.81)}{90} \times 50$$

$$\frac{\text{Mass} \times \text{Distance}}{\text{Time}}$$

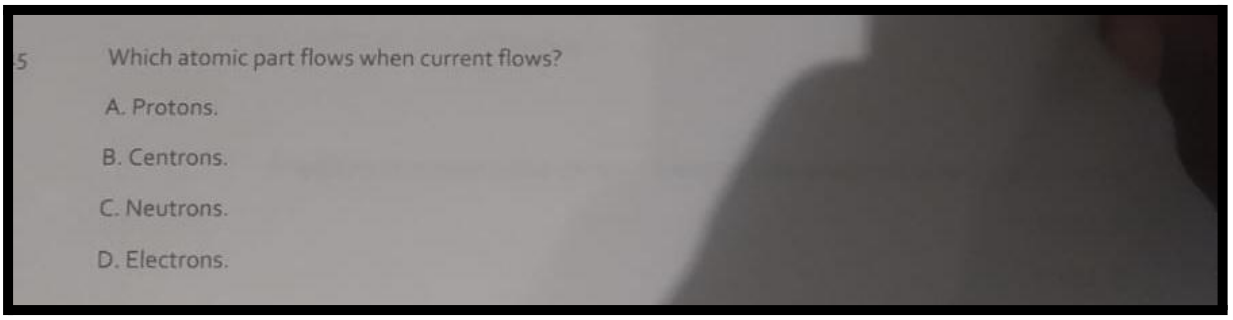
Question 14



Question 14 working out

5 / 0.80 = 6.25 kW

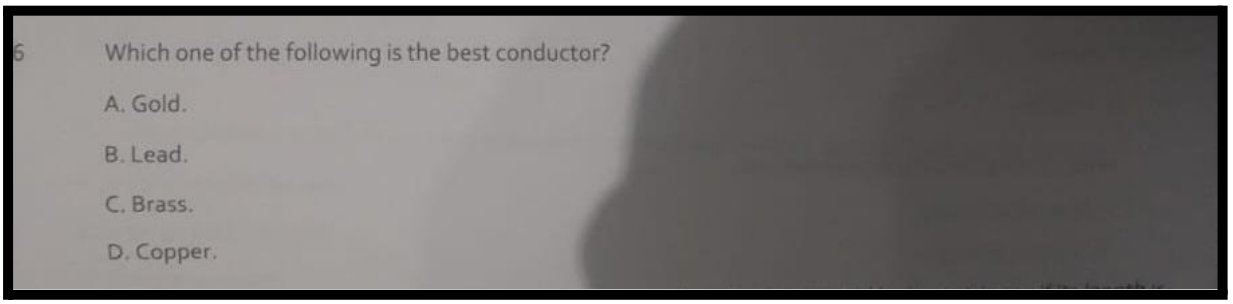
Question 15



Question 15 working out

The answer is A) Protons

Question 16

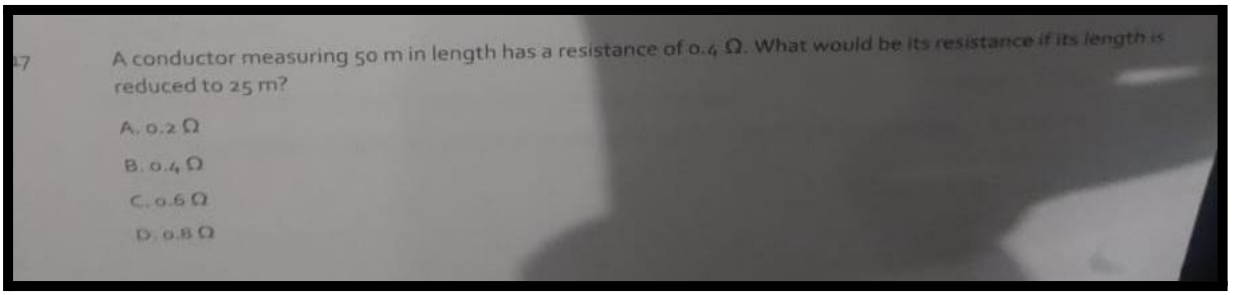


Question 16 working out

The correct answer is D) Copper.

Gold is also a conductor of electricity.

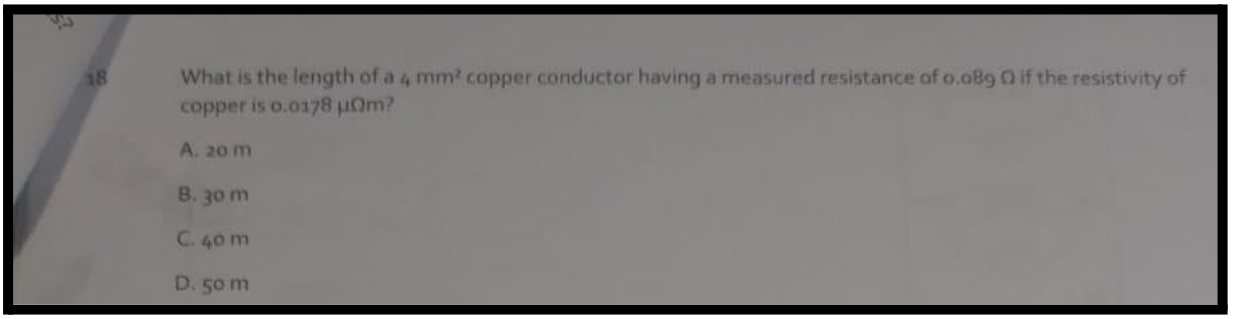
Question 17



The correct answer is A) 0.2 ohms.

When you half the distance you half the resistance.

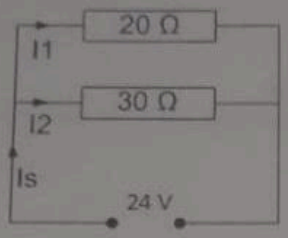
Question 18



Question 18 working out

Question 19

19



What is the relationship between voltage and current across the resistors for the circuit shown?

A. Same voltage, same current across each resistor.

B. Different voltage, same current across each resistor.

C. Same voltage, different current across each resistor.

D. Different voltage, different current across each resistor.

Question 19 working out

The circuit shown is a Parallel circuit.

The answer is D.

In a parallel circuit; the voltage is constant, the current differentiates.
In a series circuit; the current is the same and the voltage changes based on the resistors.

Question 20

20 Which one of the following statements is correct for a series circuit?

A. The voltage varies across the resistors but the current is constant.

B. The current varies across the resistors but the voltage is constant.

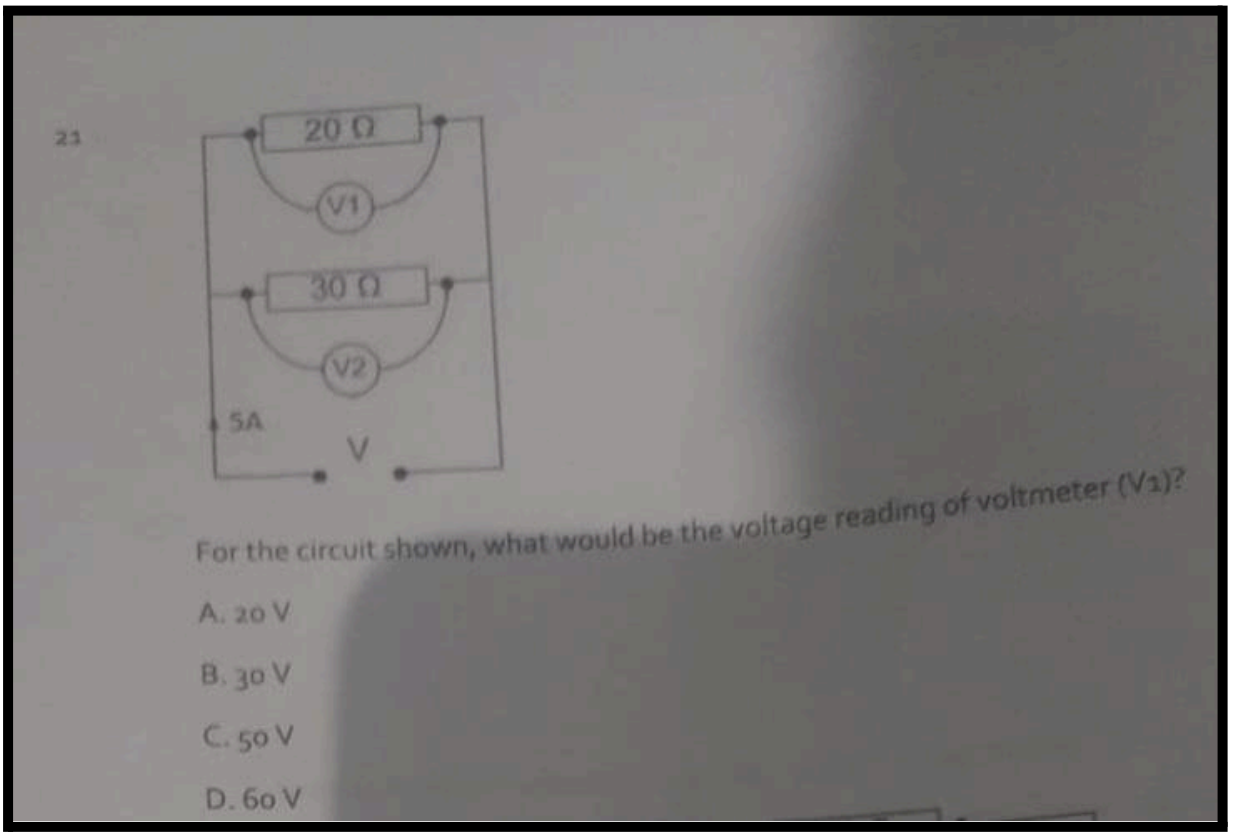
C. The resistance and current varies when the voltage is constant.

D. The voltage and current remains constant when resistance changes.

Question 20 working out

The answer is **A) The voltage varies across the resistors but the current is constant.**

Question 21



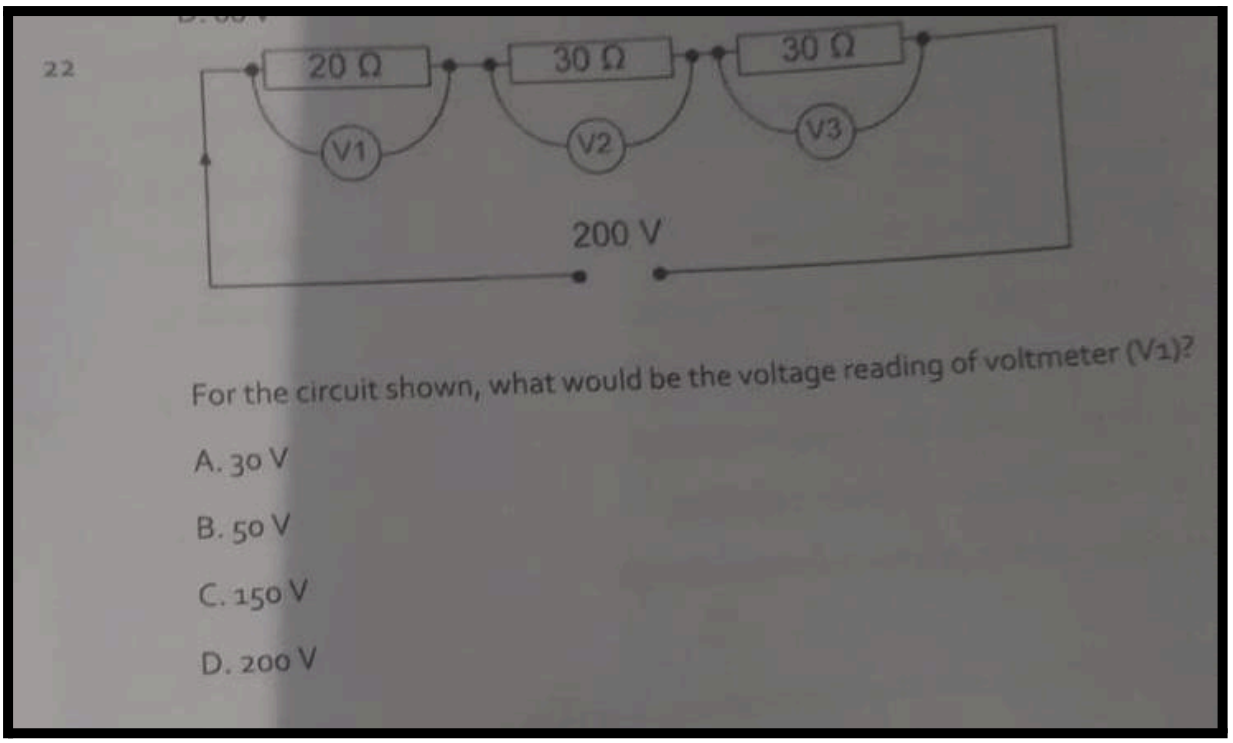
Question 21 working out

VIR formula triangle.

V = I x R.

Therefore, 5 A (the current is constant in a series) x 20 ohms of resistance -

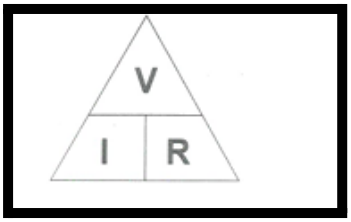
Question 22



Question 22 working out

The answer is **B) 50 V.**

This circuit is a series circuit.
In a series circuit the current is constant and the voltage changes around the resistors.



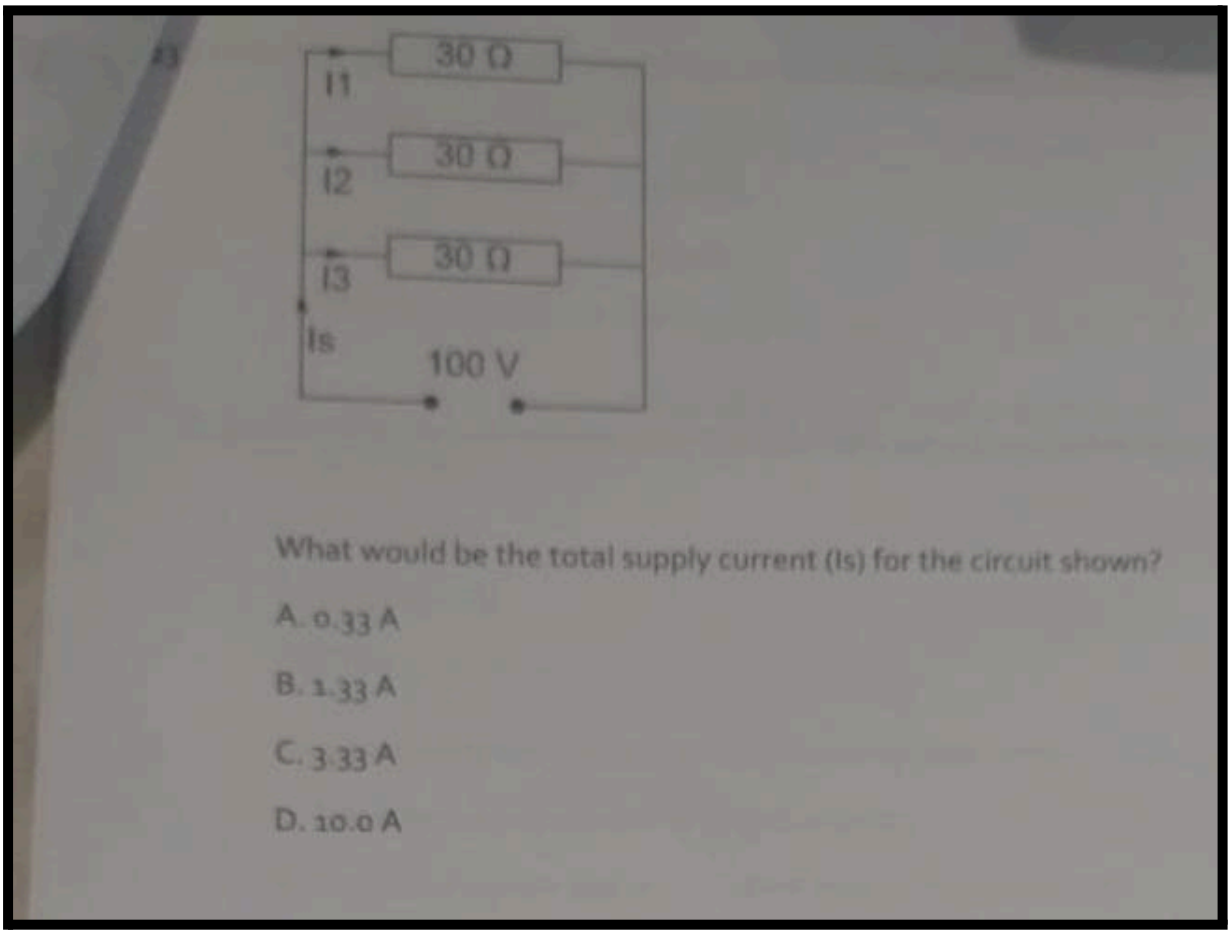
The **total voltage** is given as **200 V**.
We can calculate the **total resistance as** (**20Ω** + **30Ω** + **30Ω**) = **80Ω**.
We can then calculate the **total current** for the series circuit = **2.5 A.**
I = **V** / **R** => **2.5 A** = **200 V** / **80Ω**

The current of **2.5 A** is constant in a series circuit.

Then we do Ohms law around each resistor.

V1 = **2.5 A** x **20Ω** => **50 V**
V2 = **2.5 A** x **30Ω** = > **75 V**
V3 = **2.5 A** x **30Ω** = > **75 V**

Question 23

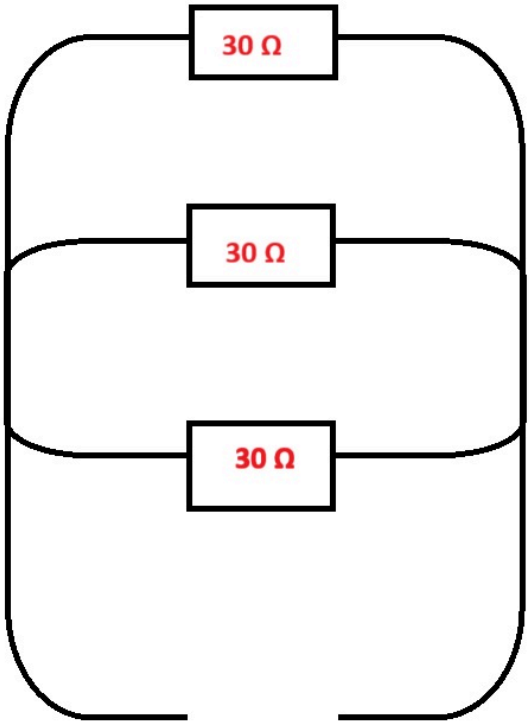


Question 23 working out

V_T = 100 V
I_T = ?
R_T = ~~90Ω~~ (we do not add up the resistor/resistance values as we would do in a series circuit)
1/rt = 1/30 + 1/30 + 1/30
0.1 = 0.0333 + 0.0333 + 0.0333
0.1 => **10Ω** (multiply by 100)

I_T = **100 V** / **10Ω**
I_T = **10 amps**

In a parallel circuit; the **voltage** is constant and the **current** differentiates.



V = 100 Volts
I = 10 Amps
R = 10 Ω

V/R = I

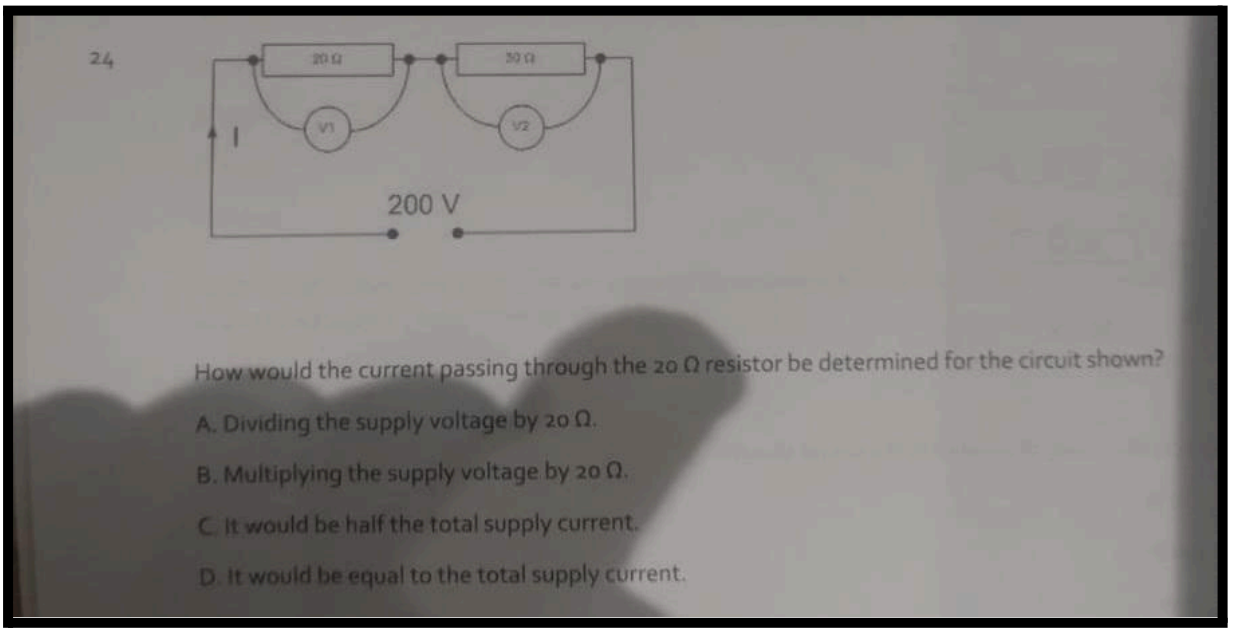
Parallel circuit:
- **Voltage** is constant
- **Current** changes around each resistor

Resistor one
100 V / **30 Ω** = **3.33 amps**

Resistor two
100 V / **30 Ω** = **3.33 amps**

Resistor three
100 V / **30 Ω** = **3.33 amps**

Question 24

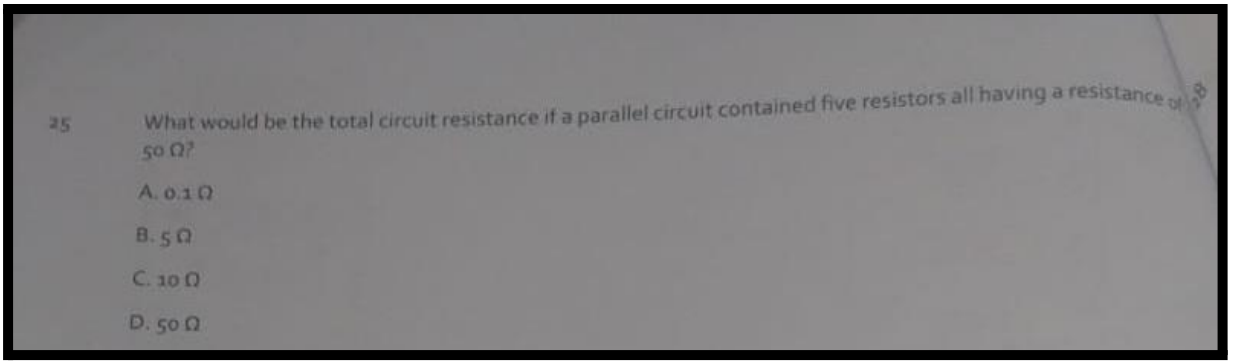


Question 24 working out

The answers is D

The **current** is constant in a series circuit and the **voltage** changes around the resistors.
I = **Voltage** / **Resistance**.
200V / **50 ohms Ω** = **40 amps**

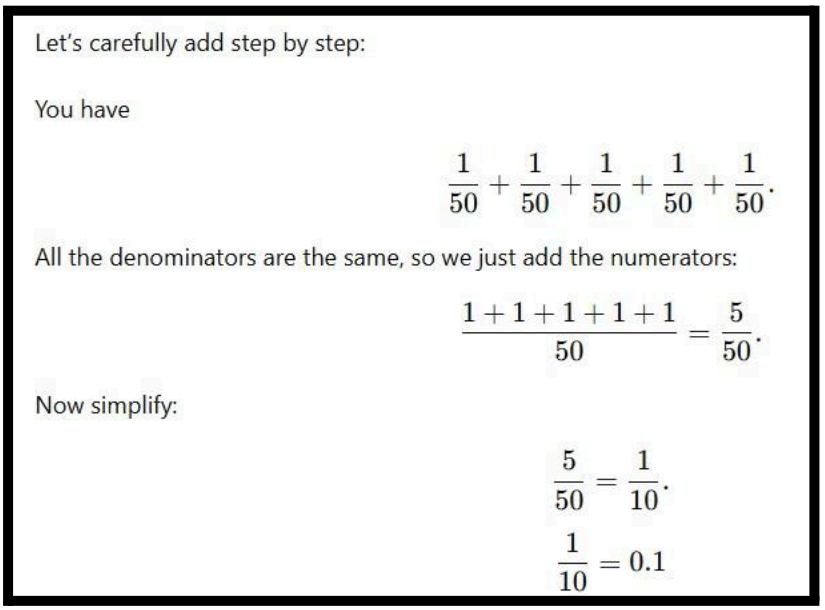
Question 25



Question 25 working out

The answer is **C) 10 Ω**

The questions: “What would be the total circuit resistance if a parallel circuit contained five resistors all having a 50Ω?”



Let's carefully add step by step:

You have

$$\frac{1}{50}+\frac{1}{50}+\frac{1}{50}+\frac{1}{50}+\frac{1}{50}.$$

All the denominators are the same, so we just add the numerators:

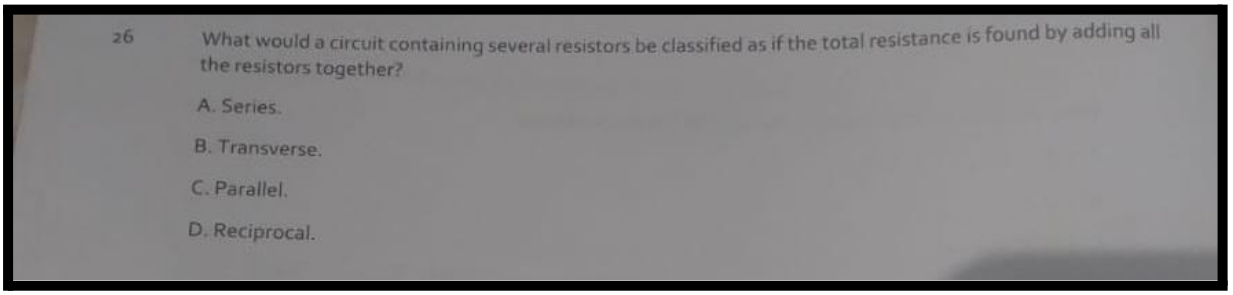
$$\frac{1+1+1+1+1}{50}=\frac{5}{50}.$$

Now simplify:

$$\frac{5}{50}=\frac{1}{10}.$$

$$\frac{1}{10}=0.1$$

Question 26



26 What would a circuit containing several resistors be classified as if the total resistance is found by adding all the resistors together?

A. Series.

B. Transverse.

C. Parallel.

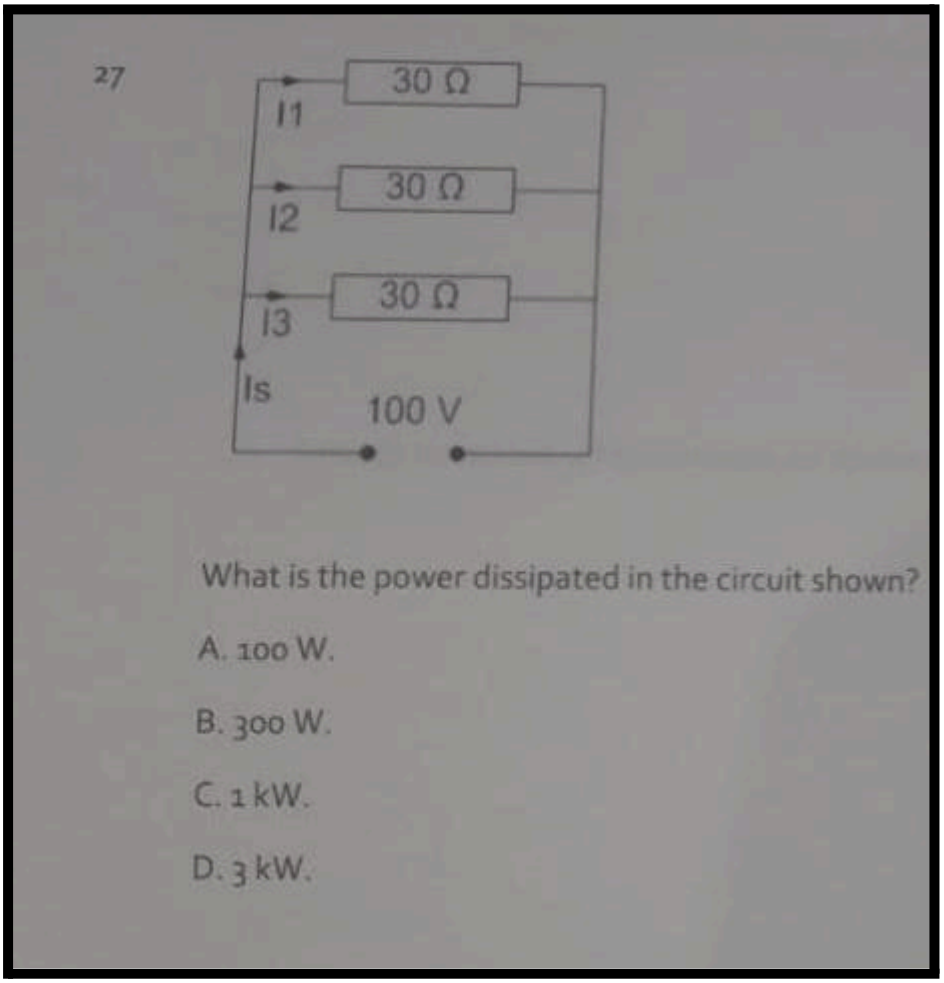
D. Reciprocal.

Question 26 working out

The answer is A) Series.

In a series circuit you can calculate the total resistance by adding all of the individual resistors together.

Question 27



Question 27 working out

In a parallel circuit the **voltage** is constant. The **current** differentiates.

Whenever power is mentioned the formula to use is **PIV**. P = I x V.

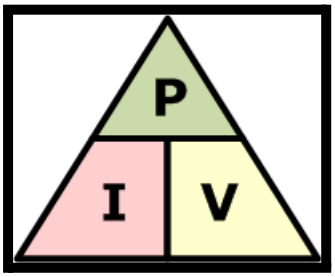
The question provides us with the **voltage** and the information to calculate the total **resistance**. However, we need to use the VIR formula triangle first to get the I (**current**) in order to calculate the power.

V = **100V**
I = ?
R =>
1/30 + 1/30 + 1/30 = 3/30.
3/30 simplified = 1/10 => 0.1.
0.1 x 100 = **10Ω.**

100V / 10Ω = 10 amps

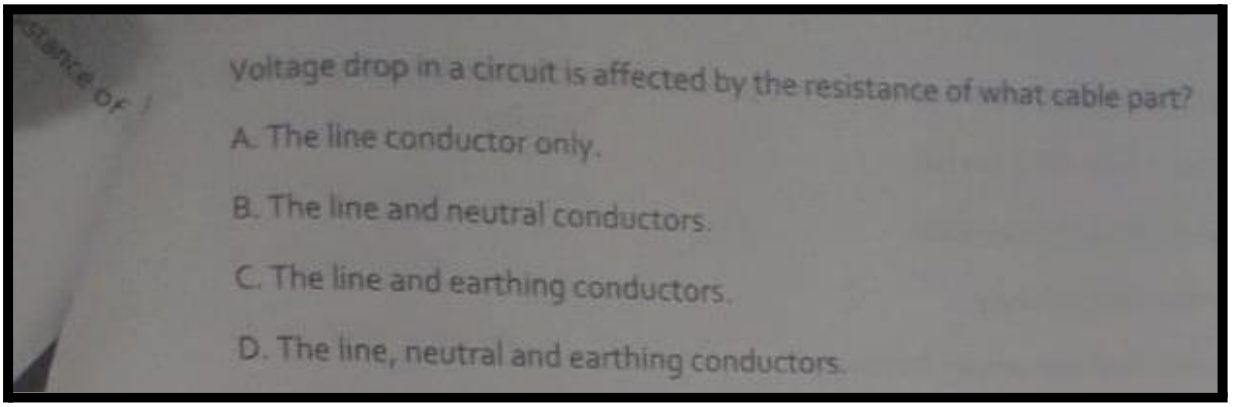
V = 100V
I = 10 amps
R = 10Ω

Now we have the **current** and the **voltage** so we can deduce the **power**. Using the **power** formula triangle.



Power = Current x Voltage
1kW = 10 amps x 100V

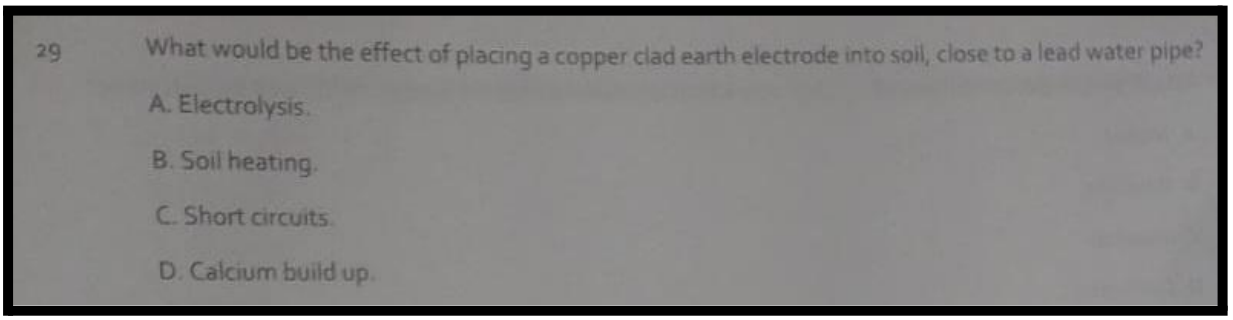
Question 28



Question 28 working out

The answer is B

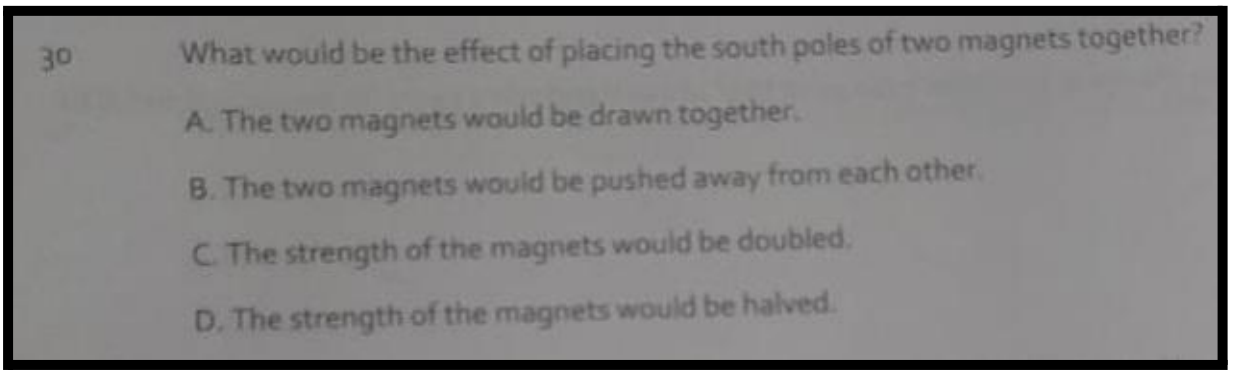
Question 29



Question 29 working out

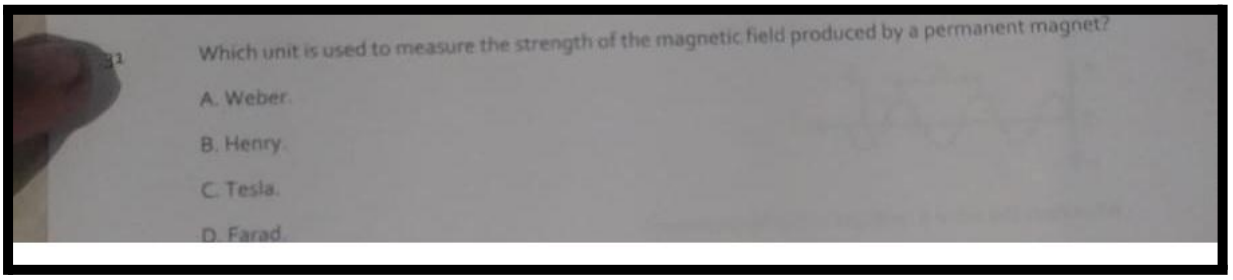
The answer is A

Question 30



The answer is B

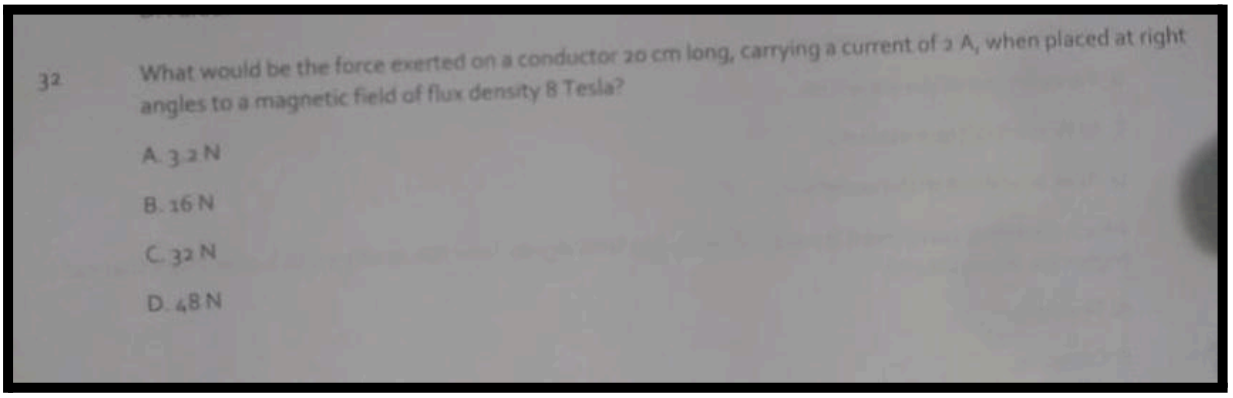
Question 31



Question 31 working out

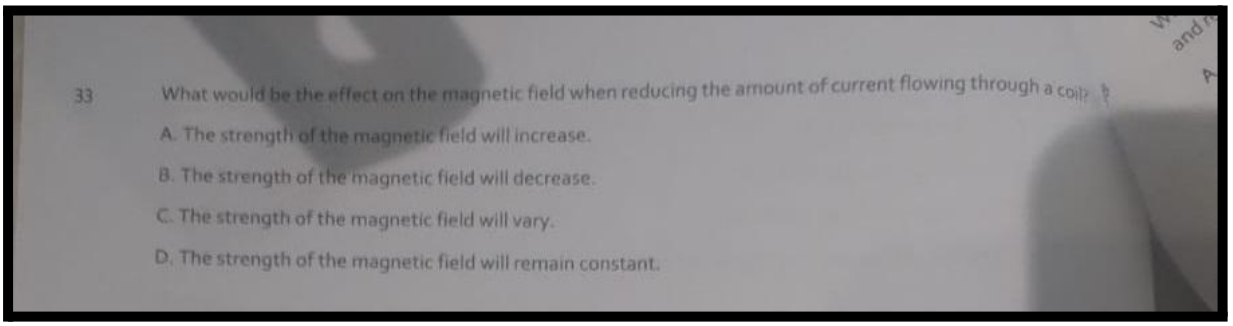
The answer is B

Question 32

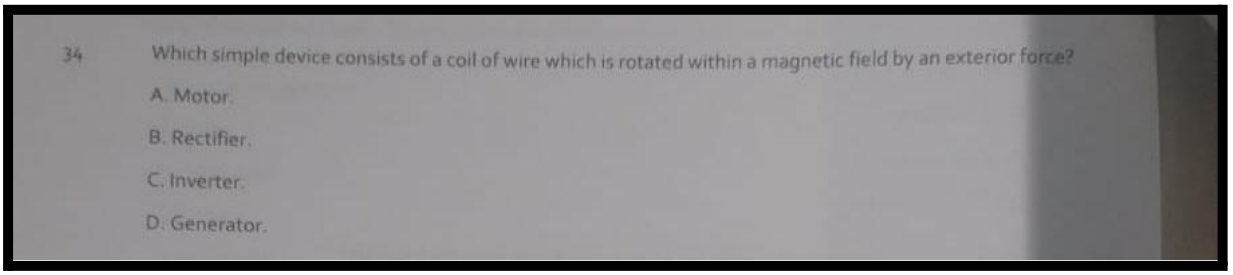


Question 32 working out

Question 33



Question 34



Question 35

35 What would be the flux change in a coil that induces an EMF of 150 V and takes 10 ms for the current to fall to zero?

A. 0.15 Wb.

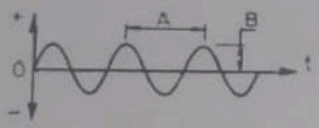
B. 1.5 Wb.

C. 15 Wb.

D. 150 Wb.

Question 36

36



What does the value B, indicate in the figure shown?

A. Average value of the waveform.

B. Periodic time of the waveform.

C. RMS value of the waveform.

D. Peak amplitude of the waveform.

Question 37

37 Which electronic component is used to amplify low level signals from PIR detectors, to higher levels that can trigger the alarm circuit?

A. Thyristor.

B. Capacitor.

C. Transistor.

D. Resistor.

Question 38

Which electronic component is used in a remote control device to pulse a pattern that a receiver recognises and responds accordingly?

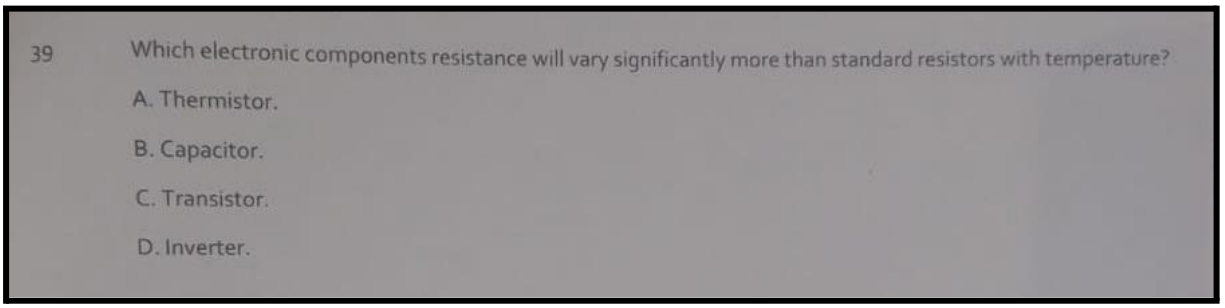
A. Zener Diode.

B. Photo Diode.

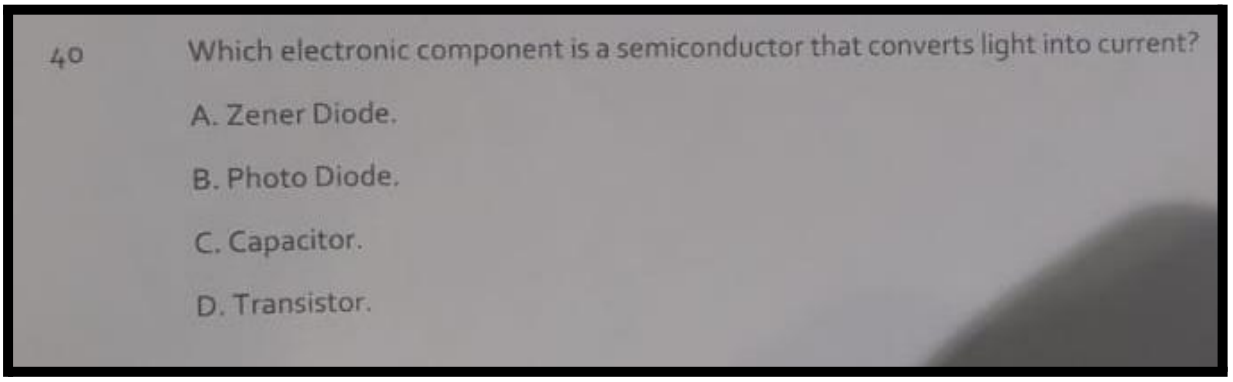
C. Thermonic Diode.

D. Light Emitting Diode.

Question 39



Question 40



Classroom theory

Mass never changes and stays the same.
Weight changes due to the impact of gravity. A person would have a different weight on earth compared to outer space.