

A) Calculate the total mass.

Q1.

To calculate total mass we need weight of drone components.

$$\text{Q450 frame} = 330 \text{ (gm)}$$

$$\text{motor 810kv} = 80 \text{ (gm)}$$

$$\text{pinhaw 2.1} = 38 \text{ gm}$$

$$30\text{A Esc} = 23 \text{ gm}$$

$$4\text{S Battery} = 360 \text{ gm}$$

$$10 \times 4.5 \text{ Propeller} = 14 \text{ gm per each}$$

$$= 14 \times 4$$

$$= 56 \text{ g.}$$

Total weight = weight of Q450 Frame + ~~not~~ weight of motor 810kv + weight of 810kv + weight of pinhaw 2.1 + weight of 30A Esc + weight 4S Batter + weight of 10 x 4.5 Propeller

Total weight (or) total mass =

$$330\text{g} + 80\text{g} + 38\text{g} + 23\text{g} + 360\text{g} + 56\text{g}$$

$$= 887 \text{ gram.}$$

Note :- Here I consider 4S Battery model as Based on question

model Numb:- ORANGE 5200 / 3S-40.

Total weight if we consider only one Propeller according to figure will be

$$= 330 + 80 + 38 + 23\text{g} + 360 + 14 = 845 \text{ gram}$$

2) Find out how much time can it fly with 4S battery of 5200 mah rating.

To find how much time it takes fly we have a formula.

$$\text{fly time (per hour)} = \frac{\text{Battery Capacity (in mah)}}{\text{Average Current Draw (in mA)}}$$

First we need to convert the battery capacity to ampere-hours (Ah)

$$\text{Battery capacity} = \frac{5200 \text{ mah}}{1000} \quad (\text{given in question})$$

$$\boxed{\text{Battery capacity} = 5.2 \text{ Ah.}}$$

Now, we need to know average current draw during flight. So we have a formula for it

$$\text{Current (in A)} = \frac{\text{voltage (in V)}}{\text{Resistance (in ohms)}}$$



right now, I don't have Average current draw  
so I am assuming it as 10 Amps (A)

$$\therefore \text{Fly Time (in hours)} = \frac{\text{Battery Capacity}}{\text{Average current draw}}$$

$$= \frac{5.2 \text{ Ah}}{10 \text{ A}}$$

$$\boxed{\text{Fly Time (in hours)} = 0.52 \text{ hours.}}$$

In term of minutes fly time is

$$\text{fly time (in minutes)} = \text{fly time (in hours)} \times 60$$

$$= 0.52 \times 60$$

$$\boxed{\begin{array}{l} \text{fly time} = 31.2 \text{ min} \\ \text{in min} \end{array}}$$

C) Find out how much power/energy would the quadcopter consume?

3) Find out how much Power/energy would the quadcopter consume.

The formula of Power in watts.

$$\boxed{\text{Power (W)} = \text{voltage}^2 (\text{V}) \times \text{Current (A)}}$$

given that battery supply a constant value of 14.8 volts

we don't the current value so

~~$$\text{Power (W)} = \text{voltage}$$~~

~~$$\text{Power (W)} = 14.8 \text{ V}$$~~

we will calculate current (A)

$$\boxed{\text{Current} = \frac{\text{voltage}}{\text{Resistance}}}$$

~~we don't know Resistance so~~  
~~R.~~ we don't know Resistance so

$$\boxed{R = \frac{V}{C} \quad \begin{array}{l} \text{(voltage)} \\ \text{discharge rate} \end{array}}$$

as this battery discharge rate is 40.

Note:- I have search in website.

$$\text{so, } R = \frac{14.8}{40}$$

$$R = 0.37 \approx 0.4 \text{ } \Omega \text{ (ohm)}$$



Finding Current

$$\text{Current} = \frac{\text{voltage}}{\text{Resistance}}$$

$$= \frac{14.8}{0.37}$$

$$\text{Current} = \approx 40 \text{ A. (Approximately)}$$

$$\text{Power (W)} = I^2 \times R.$$

$$\text{Power} = (40)^2 \times 0.37 \approx 592 \text{ W.}$$

Find Energy

$$\text{Energy} = \text{Power} \times \text{time}.$$

To find Energy we need to convert Power unit to kilowatt ~~hour (kwh)~~ (Kw)

So, power will be.

$$P = \frac{592}{1000} \times \text{time}$$

$$\cancel{P = 0.592 \text{ (kw)} \times t} \quad [P = 0.592 \text{ kw}]$$

let assume time taken by quadcopter in term of hour So, Energy will be

$$E = 0.592 \text{ (kw)} \times t$$

NOTE I HAVE CONSIDER ALL VALUES FOR THE MODELS THAT YOU MENTIONED IN THE QUESTION

Sir i have poor handwriting try to understand it sir thank you sir.