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Section : A

CIVIL ENGINEERING DEPARTMENT

Question: 1

Answer:



The given picture describe the metal house. Here, we will discuss its positive and negative points.

Positive points:

1. Less time to Build:

Steel building takes less time to build compared to ordinary houses. Ordinary houses take time and effort to build. It takes weeks and months to finish a house. For metal homes, it takes just 2 to 3 weeks, considering the frames are made ahead of time. All they have to do is put them together and form a whole new house.

2. Dual Purpose:

Metal houses are built in a way that can accommodate both business and leisure. The designs of these houses allow you to utilize the space that you have, making it easier for you to accomplish work without going out.

3. **Space:**

One of the good things about metal houses is that they have very spacious interiors. Steel homes may look rough from the outside, but it does not mean the interior is menial.

4. **Durability:**

Steel is extremely durable and long lasting. It does not need of any renovation for long time.

5. **Sustainability:**

It has higher Sustainability.

6. **More Energy-Efficient**

Metal frames readily accommodate insulation. This is a lot of space in between the frame members and the panels. Also, insulation is offered that fits well within the frame member. Insulation keeps the building at a comfy temperature with less requirement for heating and cooling.

7. **Metal Buildings Are Easily Expandable and Flexible**

A steel building can be designed in nearly any shape and, if needed, are quickly broadened with extra framework and panels. you can produce a larger space. You can repurpose the area if it alters.

Negative points:

1. **Corrosion:**

Corrosion also happens with steel homes especially in areas with tropical climates. However, there are some ways on how to protect your steel homes from corrosion. There are some treatments that can be done. This should be done regularly to avoid rusting and corroding.

2. **More Expensive than Wood Structures:**

Though they are cheaper than conventional steel, these steel frames are still expensive compared to wood building structures.

3. **Not good for multi-story Buildings:**

If you are planning to create a multistory metal home, then you should think twice. Metal homes are not fit for multistory buildings.

4. **Fatigue and Fracture:**

It can cause erosion after a period of time which can cause damage of steel.

5. **Fabrication Error:**

It can also cause fabrication error.

6. **Resistance over fire:**

Steel has very small resistance against fire as compared to concrete.

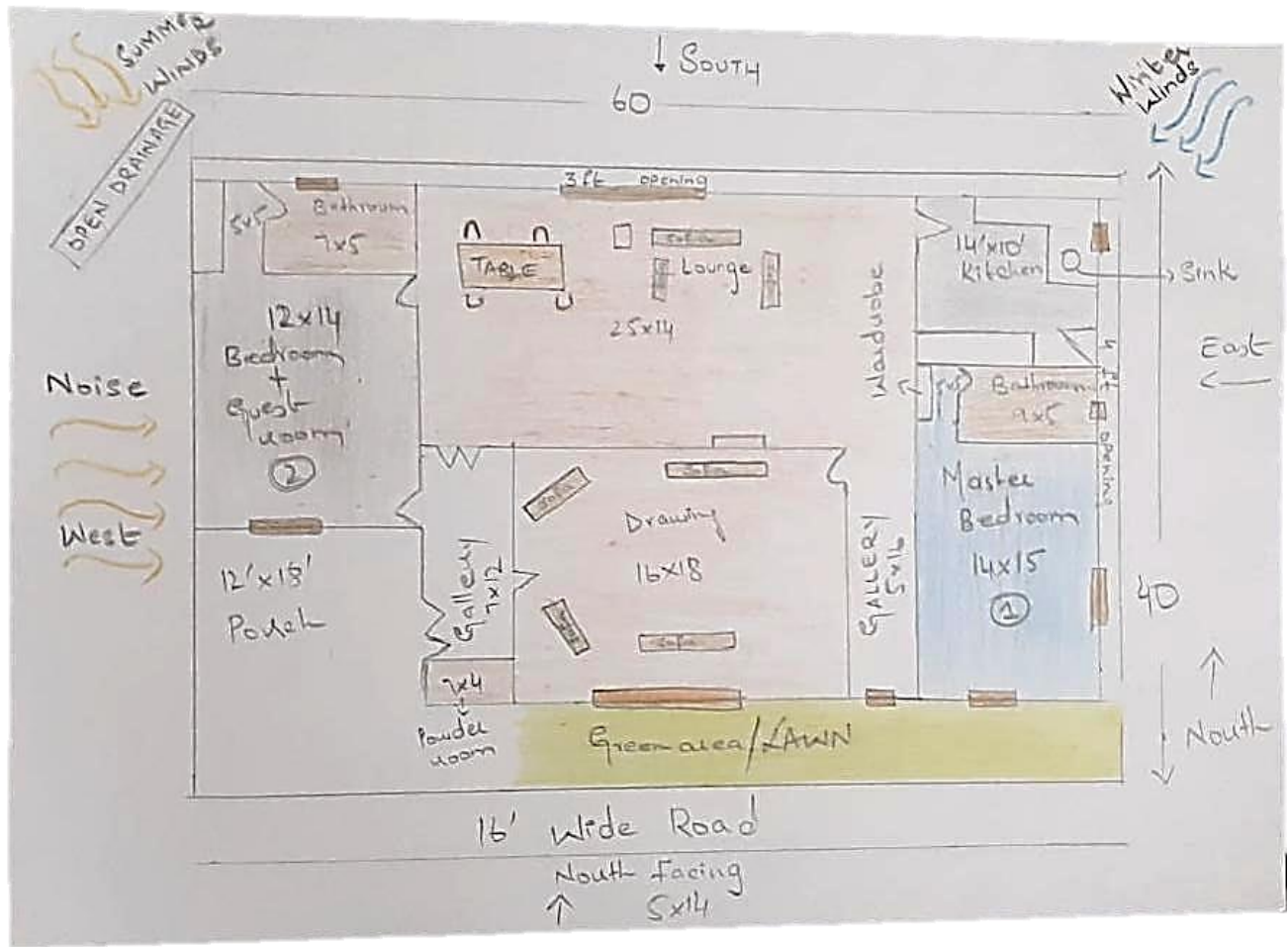
7. **Expensive:**

The main disadvantage of steel is very expensive than the other appliances.

QUESTION: 2

ANSWER:

Design of single story house:



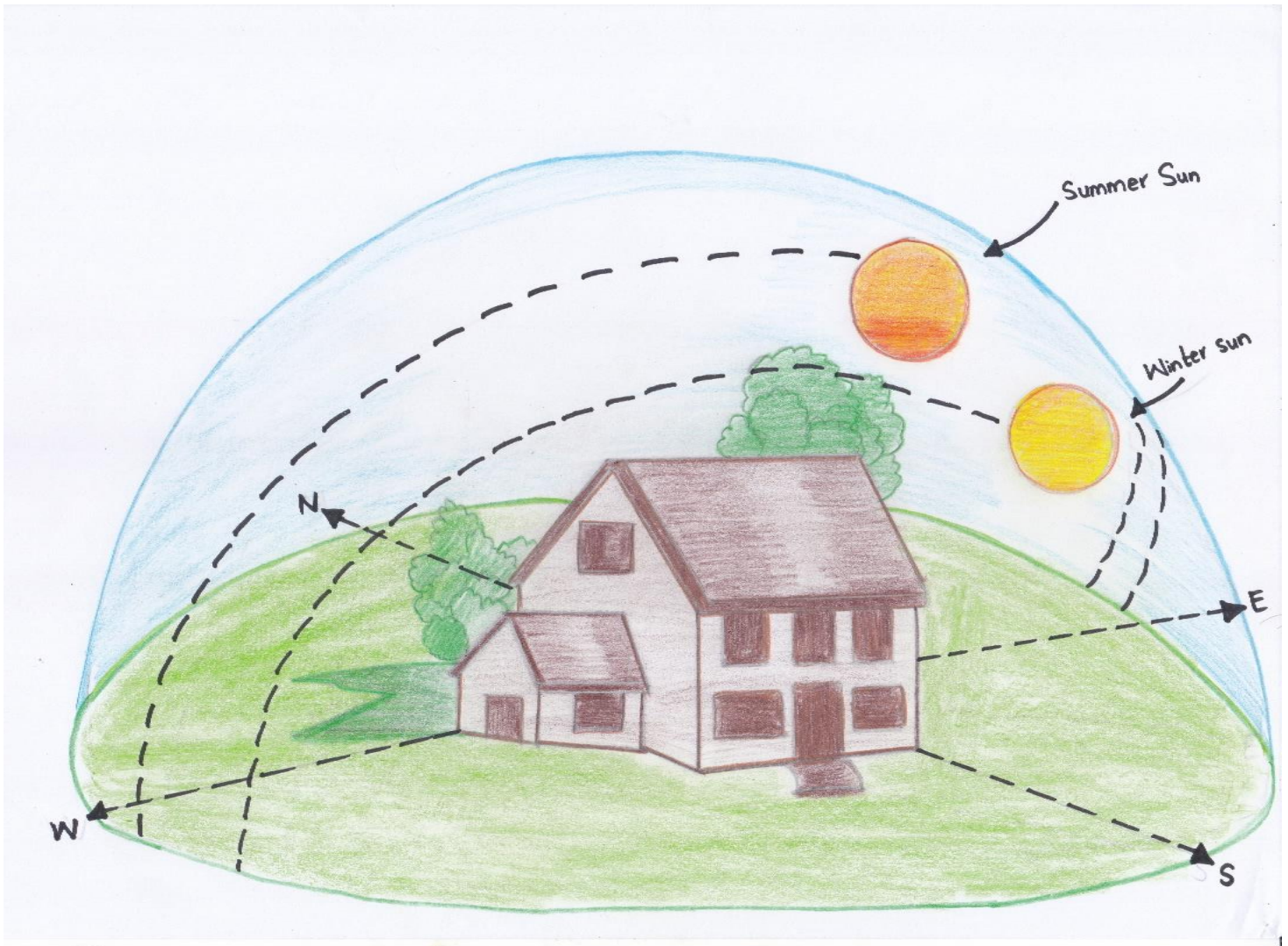
Explanation:

- On south side of house 3ft opening is left for sunlight.
- From the south side of house windows are fixed for natural sunlight for example for sitting area or lounge.
- Bedrooms and guest room windows are fixed, in which the exhaust fan is used for ventilation.
- From west side no window is used due to noise.
- From north and east side windows are used for ventilation.
- Walls dimensions are not mentioned. Just layout of house plan is drawn.

Question: 3

Answer part A

Drawing:



Summer sun: As sun rises from East and set on West .In summer sun it is always for a long time as compared to winter sun.

Effect on solar panel: In summers suns the solar panel will be more efficient .we will set solar sun in a west position. At lower temperatures, solar panels absorb more energy from the sun to more efficiently generate electricity.

Winter sun: As sun rises from east and set to west In winter sun the sun will be for short time and set early as compared to summer sun.

Effect on solar panel: In the winter, It is less likely for solar panels to reach their peak temperature.

Part B Solution:

KOHAT Altitude (K.A) = 33.58°

Sun's altitude at noon on summer solstice

$$= 90 + 23.5 - K.A$$

$$= 90 + 23.5 - 33.58$$

$$= \mathbf{79.92^\circ}$$

Sun's altitude at noon on winter solstice will be

$$= 90 - 23.5 - K.A$$

$$= 90 - 23.5 - 33.58$$

$$= \mathbf{32.90^\circ}$$

Diagram:

