**Scenario: Combating rainwater in buildings**

A team of civil engineers is tasked with designing a resilient home in the Caribbean to withstand extreme weather events like hurricanes, floods, and high winds. This home incorporates advanced architectural designs and materials tailored for maximum durability and safety. Features include elevated foundations to prevent flood damage, impact-resistant windows, reinforced concrete walls, and a roof design that minimizes wind uplift.

34. If planting trees around the home can reduce the ambient temperature by up to 3°C due to shade and evapotranspiration, and each tree covers an area of 30 square meters with its canopy, how much area is needed to cover a garden of 300 square meters?

1. 6 trees
2. 8 trees
3. 10 trees
4. 12 trees
5. 15 trees

35. A solar film applied to windows blocks 70% of the UV and infrared radiation, reducing cooling needs. If there are five windows, each measuring 6.56 feet x 16.4 feet which normally allow 600 W/m² of heat, calculate the total heat blocked by the film.

1. 1.8 kW
2. 4.2 kW
3. 9 kW
4. 21 kW
5. 225,900 kW

36.An engineer is calculating the optimal size for rainwater cisterns to support irrigation during dry periods. If the average rainfall in the area is 31.5 inches per year and the catchment area of the roof is 250 square meters, calculate the total volume of rainwater that can be collected in a year. Assuming a 90% collection efficiency, how much water in cubic meters will be collected?

1. 250 m³
2. 225 m³
3. 200 m³
4. 220 m³
5. 180 m³

37. The house is designed with a roof that can withstand wind speeds up to 50 m/sec. Using the formula for wind pressure (where *P* is in Pascals and *V* is in km/h), calculate the wind pressure exerted on the roof when wind speeds reach maximum levels.

1. 1,500 Pascals
2. 19,440 Pascals
3. 21,600 Pascal
4. 23,760 Pascals
5. 25,920 Pascals

38. If the home's foundation is raised 4.92 feet above the ground to protect from floodwaters and the cost of raising the foundation is $200 per cubic meter, calculate the total cost if the home's footprint is 120 square meters.

1. $18,000
2. $24,000
3. $36,000
4. $48,000
5. $118,000

39. Considering the resilience against high winds, the structural design includes a specific type of siding that can endure a sheer force of 1.5 kN per square meter. If the total external wall area is 30 meters wide x 10 meters tall, calculate the total shear force that the siding needs to withstand.

1. 650 kN
2. 600 kN
3. 500 kN
4. 550 kN
5. 450 kN

40. The Caribbean home includes a seawall designed to protect against storm surges. If the seawall must withstand a hydrostatic pressure of 20 kPa at its base (assuming the water level reaches 2 meters during a surge), calculate the force exerted on a section of the seawall that is 10 meters wide. Use the formula: F = P x A, where P is pressure and A is area.

1. 100 kN
2. 200 kN
3. 300 kN
4. 400 kN
5. 500 kN