NBHSEEP
Friday April 15, 2011
Name:_____

Calculating the Potential Rainwater Supply at Natural Bridges High School

1	Area of the catchment surface (m^2)	
2	Average rainfall per year in Santa Cruz	
3	Determine runoff coefficient	

1. a. Calculate the total area of the three modular roofs.
   Area = Base x Height
   i) Brad's room: 36'x40' =_____ ft^2
   ii) Holly's room: 24'x40' =_____ ft^2
   iii) Ryan's room: 24'x40' =_____ ft^2
           (iv) Total =_____ ft^2

units conversion error – correct before using

   b. Convert units from feet^2 to meters^2
         1 foot = .3048 m
         (iv) ft^2 x .3048=_____ m^2

2. Calculate the average rainfall in Santa Cruz

Source: The Weather

Month	Inches of rainfall
January	6.49
February	6.15
March	4.78
April	1.97
May	.7
June	.18
July	.14
August	.11
September	.41
October	1.44
November	4.08
December	4.22

To calculate an average, add each value and then divide the total by the number of values.

Average Rainfall in S.C.= _____ inches/year

Average Rainfall in S.C.= _____meters/year

Hint: [(_____ inches) (25.4mm/1 inch) (1m/1000mm)]= _____ in meters.

3. The Runoff Coefficient (Cr) describes the percentage of water that will be stored after water lost to evaporation and overflow has been subtracted. It is equal to the volume of collected runoff divided by the theoretical volume of rainwater it is possible to collect. This percentage varies for every catchment system and region and is dependent on a number of factors including roofing material and level of sunlight the roof receives. As a result, we must calculate the possible supply at a number of different runoff coefficients

so we can get a range. Once the catchment system has been constructed, we will be able to test what the runoff coefficient is for our system by comparing theoretical amount of water caught without any losses (S=R*A) to the actual amount of water caught.

Roofing materials and the estimated per cent of potential rainfall catchment

- o Sheet metal 80-85%
- o Cement tile 62%-69%
- o Clay tile (machine made) 30%-39%
- o Clay tile (hand made) 24-31%

The modular classrooms have sheet metal roofs, so we are assuming they have a relatively high Cr, but we will still need to test for the actual value, once the system has been constructed.

Runoff coefficient=_____

4. Supply

      a. To find the potential supply, use this formula

      $Supply(m^3)= R*A*Cr$

          R=Rainfall

          A= Roof Area

          Cr=Runoff coefficient

      b. Next we need to convert it into gallons: _____gal

      $1m^3 = 264.17$ gallons