1. $2 + 3 + 5 + 7 + 11 + 13 + 17 + 19 + 23 + 29 = \boxed{129}$

2. $83 + 89 + 97 = \boxed{269}$

3. $19 + 29 + 59 = \boxed{107}$

4. (a) $315 = \boxed{3^2 \cdot 5 \cdot 7}$ (b) $3234 = \boxed{2 \cdot 3 \cdot 7^2 \cdot 11}$ (c) $8088 = \boxed{2^3 \cdot 3 \cdot 337}$

5. When the instructions say "GREATEST common something," it means the answer should be SMALLER than the numbers given. Here we find the greatest common factors, meaning the greatest number that divides evenly into both numbers.

   (a) $\boxed{8}$ (b) $\boxed{14}$ (c) $\boxed{6}$

6. When the instructions say "LEAST common something," it means the answer should be LARGER than the numbers given. Here we use the soup method.

   (a) 30 and 24. First, prime factorize both numbers. $30 = 2 \cdot 3 \cdot 5$, and $24 = 2^3 \cdot 3$. Second, put each prime factor into our "soup." We put in a 2 and 3 because those are each in 24. Also add a 5 because that is in 30. Now we have 2, 3, and 5. Third, raise each number to the highest power given. We have 2 and 2^3, so we choose the higher one and have 2^3. Both 3's and the 5 don't have a power, so we leave them as 3 and 5. Fourth, multiply: we have $2^3 \times 3 \times 5 = \boxed{120}$

   (b) 243 and 405. Use the method from part a. First, prime factorize: $243 = 3^5$, and $405 = 3^4 \cdot 5$. Second, put each prime factor into our "soup," which is 3 and 5. Third, raise each to the highest power, so we raise 3 to the 5th power. Fourth, multiply: $3^5 \cdot 5 = \boxed{1215}$

   (c) 104, 56 and 72. Use the method from part a. First, prime factorize: $104 = 2^3 \cdot 13$, $56 = 2^3 \cdot 7$, and $72 = 2^3 \cdot 3^2$. Second, put each factor into the soup, so 2, 3, 7, and 13. Third, raise each to the highest power. So we raise 2 to the 3rd power and 3 to the 2nd power. Fourth, multiply: $2^3 \times 3^2 \times 7 \times 13 = 8 \times 9 \times 7 \times 13 = \boxed{6552}$

7. $49 - 9 = \boxed{40}$

8. $\boxed{\text{squares: 64, 81, 100, 121, 144, 169, 196. Cubes: 64, 125.}}$

9. $\boxed{1, 2, 3, 4, 5, 6, 9, 10, 12, 15, 18, 20, 30, 36, 45, 60, 90, 180}$

10. Paul has three pieces of rope with lengths of 140 cm, 168 cm and 210 cm. He wishes to cut the three pieces of rope into smaller pieces of equal length with no remainders.

    (a)We need to find the greatest common factor of the numbers 140, 168, and 210. They are all even, so let's divide out a 2 from each: 70, 84, 105. These are also all divisible by 7, so let's divide out a 7 from each: 10, 12, 15. These three numbers have no factor in common, so we have found the GCD is $2 \times 7 = \boxed{14 \text{ cm}}$.

    (b) From the 140 cm piece of rope, he will get $140 \div 14 = 10$ pieces. From the 168 cm piece of rope, he will get $168 \div 14 = 12$ pieces of rope. From the 210 piece, he will get $210 \div 14 = 15$ pieces. So altogether, he will have $10 + 12 + 15 = \boxed{37}$ pieces of rope.

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