1) 120  Nothing more than a counting problem.

2) 0  Drawing the altitude to the base creates two 6-8-10 triangles for each given triangle. Therefore the areas are equal.

3) 5√2  Points of intersection are (-3,3) and (2,8).

4) -64  Solving m=-3 and n=1/3 therefore $m^2 = 9$ and $n^2 = 1/9$. Therefore p=9, q=-82, and r=9.

5) 406.87  Area of circle is $12.5^2\pi$ and area of triangle is $\frac{1}{2}(7)(24)$

6) 1/9  Of the 18 possible 4 digit numbers only 4021, 4201, 2401, and 2041 are possible primes with 4021 and 4201 being the primes.

7) 32  Let the roots be a-d, a, and a+d. Solving a=8 and d=3.

8) $\frac{1}{2}xy$  Let one diagonal be the base of two adjacent triangles.

9) $\frac{25A-50}{24}$  Of the 48 remaining numbers, their sum is 50A-100.

10) $\log_c\left(\frac{b^a}{n^b}\right)$  Rules of logarithms
11) \( \frac{1}{2} \)  
Triangle AXC has the same base as ABC and \( \frac{1}{2} \) the height because EF is a midline. Therefore \( \frac{1}{2} \) the area.

12) 10.5  
Use either the remainder theorem or synthetic division.

13) 2:5  
Area of smaller square is \( \frac{4R^2}{5} \) and area of larger square is \( \frac{R^2}{2} \), therefore \( \frac{\frac{4R^2}{5}}{\frac{R^2}{2}} \)

14) 13  
\( \left( \frac{12!}{5! \times 7 \times 6!} \right) + \left( \frac{12!}{6 \times 5! \times 6!} \right) = \left( \frac{6 \times 12! + 7 \times 12!}{6 \times 5! \times 7 \times 6!} \right) = \left( \frac{13!}{6! \times 7!} \right) \)

15) \( \frac{\sqrt{3}}{2} \)  
\( \cos(x) = \cos(47 + 13) = \cos(60) \)