



University of Waterloo
Faculty of Mathematics



Centre for Education in
Mathematics and Computing

Intermediate Math Circles

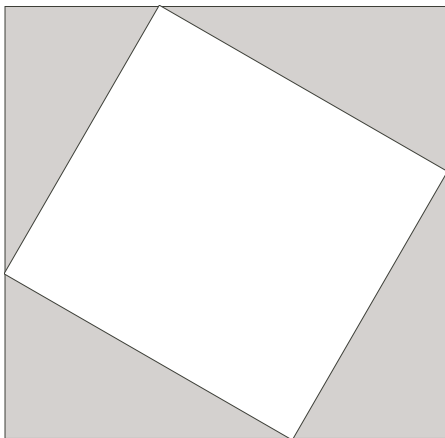
February 11, 2009

Pascal and Cayley Contest Preparation

Problem Set

Problem Set C:

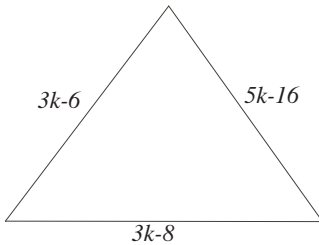
1. If $x = 10$ and $y = 6$, the value of $\frac{x - y}{x + y}$ is
2. If six is subtracted from N , the result is 47. The value of N is
3. A tennis player won 10 of her first 15 matches. She then won her next five matches. What percent of the 20 matches did she win?
4. Jack says that 25% of his books are novels, and that $\frac{1}{9}$ of them are poetry. How many books does Jack have since we know he has between 50 and 100 books?
5. The number of positive integers between $\sqrt{10}$ and $\sqrt{100}$ is
6. When 222,222,222,222,222 is divided by 222 the number of digits in the quotient is
7. If $a + b + c = 42$ and $a = 2b = 4c$, then b equals
8. A square with perimeter 20 is contained within a larger square of perimeter 28. The area of the shaded region is



9. The number $\frac{1234}{9999}$ is written in decimal form. The 19th digit to the right of the decimal point is

10. Each of the numbers 2, 5, 11, and 13 is substituted, in some order, for p , q , r , and s . The greatest possible value of $pq + pr + ps$ is
11. The point $(k, -6)$ lies on the line through the points $(0, 12)$ and $(3, 0)$. The value of k is
12. The number of positive three-digit integers, the sum of whose digits is 24, is

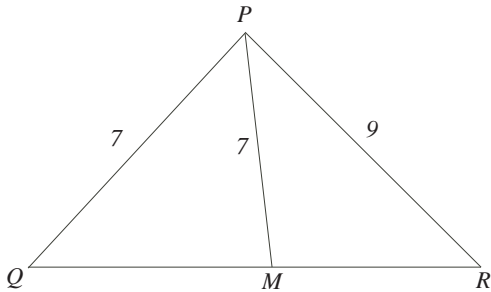
13. The number of different values of k for which the given triangle is isosceles is



14. Constable Nancy is driving along a highway at 100km/h. She is passed by Pat who is driving in the same direction at a constant speed. Ten seconds after Pat passes Nancy, their cars are 100m apart. The speed of Pat's car, in km/h, is
15. In a right angled triangle, the sum of the squares of the three sides is 18. The length of the hypotenuse is

Problem Set D:

1. If 24 is added to a number, the number is tripled. What is the original number?
2. A bowl contains 40g of white rice and 60g of brown rice. If 100g of white rice is added to the mixture, then the percentage of the new mixture that is white rice is
3. If $\frac{1}{R}$ is the average of $\frac{1}{4}$ and $\frac{1}{6}$, then R equals
4. If $px = 20$, $6x - 3q = 30$ and $x = 4$. then the value of $p - q$ is
5. Positive numbers a, b, c, d . and e have the following property: $ab = 2, bc = 3, cd = 4, de = 5$. What is the value of $\frac{e}{a}$?
6. With how many zeros does the product of the first consecutive 10 prime numbers end?
7. An integer is chosen randomly from the integers 1 to 101 inclusive. What is the probability that at least one of the digits of the integer chosen is 7?
8. T and U are two digits of the number $9T68U$. This five-digit number is divisible by 15. The number of different possible value of $(T + U)$ is
9. In triangle PQR , $PQ = 7$, $PR = 9$, and median $PM = 7$. the length of QR is



10. The sum of the series $\frac{25}{72} + \frac{25}{90} + \frac{25}{110} + \frac{25}{132} + \dots + \frac{25}{9900}$ is