

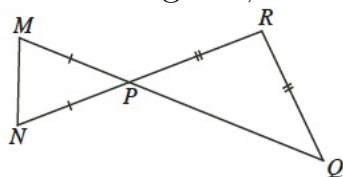
# Pascal and Cayley Contest Preparation

## Problem Set 1

1. What is the value of  $1 + 2 \times 9 - \sqrt{36}$ ?  
(A) 7      (B) 11      (C) 8      (D) 13      (E) 4  
(Pascal 2009 #1)
2. The areas of three squares are 16, 49 and 169. What is the average (mean) of their side lengths?  
(A) 8      (B) 12      (C) 24      (D) 39      (E) 32  
(Pascal 2006 #8)
3. In the subtraction shown,  $M$  and  $N$  each represent a single digit. What is the value of  $M + N$ ?

$$\begin{array}{r} \boxed{M} \boxed{4} \\ - \boxed{3} \boxed{N} \\ \hline \boxed{1} \boxed{6} \end{array}$$

- (A) 14      (B) 12      (C) 15      (D) 13      (E) 11  
(Pascal 2006 #10)
4. A class of 30 students recently wrote a test. If 20 students scored 80, 8 students scored 90, and 2 students scored 100, then the class average on this test was  
(A) 90      (B) 84      (C) 82      (D) 86      (E) 88  
(Cayley 2006 #10)
5. In the diagram, if  $\angle PQR = 48^\circ$ , what is the measure of  $\angle PMN$ ?



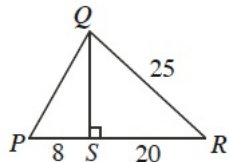
- (A)  $60^\circ$       (B)  $42^\circ$       (C)  $48^\circ$       (D)  $66^\circ$       (E)  $84^\circ$   
(Pascal 2007 #12)
6. For how many different values of  $k$  is the 4-digit number  $7k52$  divisible by 12?  
(A) 0      (B) 1      (C) 2      (D) 3      (E) 4  
(School Visit Package 5B #9)
7. The point  $(0, 0)$  is reflected in the vertical line  $x = 1$ . When its image is then reflected in the line  $y = 2$ , the resulting point is  
(A)  $(0, 0)$       (B)  $(2, 0)$       (C)  $(4, 4)$       (D)  $(2, 2)$       (E)  $(2, 4)$   
(Cayley 2007 #12)

8. At Webster High School, the ratio of males to females writing the Pascal Contest is  $3 : 7$ . If there are 21 males writing the Contest, what is the *total* number of students writing?

(A) 30      (B) 25      (C) 49      (D) 70      (E) 79

(Pascal 2007 #14)

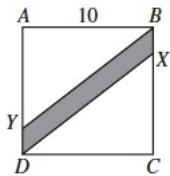
9. In the diagram, what is the perimeter of  $\triangle PQR$ ?



(A) 63      (B) 60      (C) 55      (D) 85      (E) 70

(Pascal 2008 #15)

10. In the diagram,  $ABCD$  is a square with a side length of 10. If  $AY = CX = 8$ , the area of the shaded region is



(A) 16      (B) 20      (C) 40      (D) 48      (E) 24

(Cayley 2003 #13)

11. At Springfield University, there are 10000 students, and there are as many male students as female students. Each student is enrolled either in the Arts program or Science program (but not both); 60% of the students are in the Arts program. Also, 40% of the Science students are male. To the nearest percent, what percentage of the Arts students are female?

(A) 50%      (B) 52%      (C) 26%      (D) 65%      (E) 43%

(Cayley 2007 #16)

12. In a right-angled triangle, the sum of the squares of the three side lengths is 1800. The length of the hypotenuse is

(A)  $\sqrt{1800}$       (B)  $\frac{1}{2}\sqrt{1800}$       (C) 90      (D) 30      (E) 45

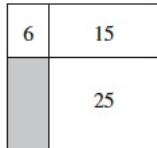
(Cayley 2006 #18)

# Pascal and Cayley Contest Preparation

## Problem Set 2

1. The odometer of a car reads 2722 km. The least number of kilometers that must be travelled before the odometer will again show a number in which three digits are the same is between  
(A) 0 and 50      (B) 50 and 100      (C) 100 and 500      (D) 500 and 1000      (E) 1000 and 5000

2. A rectangle is divided into four smaller rectangles. The areas of three of these rectangles are 6, 15 and 25, as shown. The area of the shaded rectangle is

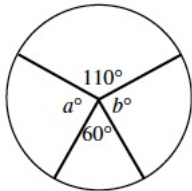


- (A) 7      (B) 15      (C) 12      (D) 16      (E) 10

Pascal 2002 #9

3. If  $a * b$  is defined as  $(a + 1)(b - 1)$ , what is the value of  $0 * 0$ ?  
(A) 0      (B) -1      (C) 1      (D) 2      (E) -2

4. In the diagram,  $a + b$  equals



- (A) 10      (B) 85      (C) 110      (D) 170      (E) 190

Pascal 2002 #9

5. Starting at 777 and counting backwards by 7s, a student counts 777, 770, 763, etc. A number that will be counted is

- (A) 45      (B) 44      (C) 43      (D) 42      (E) 41

6. Chris and Pat are planning a meal together. Chris spends \$8.43 at one grocery store and \$13.37 at another. At a third store, Pat bought \$2.46 worth of groceries. If the cost of the dinner is to be split evenly, how much does Pat owe Chris?

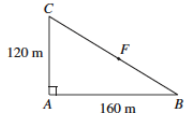
- (A) \$10.90      (B) \$8.46      (C) \$19.34      (D) \$2.48      (E) \$9.67

7. The sum of five consecutive integers is 75. The sum of the largest and smallest of these five integers is  
(A) 17      (B) 65      (C) 13      (D) 30      (E) 34

8. After having played three basketball games, Megan had scored an average of 18 points per game. After her fourth game, her scoring average dropped to 17 points per game. How many points did Megan score in her fourth game?

- (A) 18      (B) 17      (C) 16      (D) 15      (E) 14

9. In the diagram,  $ABC$  represents a triangular jogging path. Jack jogs along the path from  $A$  to  $B$  to  $F$ . Jill jogs from  $A$  to  $C$  to  $F$ . Each jogs the same distance. The distance from  $F$  to  $B$  in metres is



- (A) 40      (B) 120      (C) 100      (D) 80      (E) 200

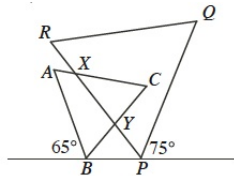
Pascal 2002 #15

10. How many numbers  $n$  between 10 and 200 are such that  $n$  is prime and  $n - 1$  is a perfect square?  
 (A) 1      (B) 2      (C) 3      (D) 4      (E) 5

11. When the product  $(5^3)(7^{52})$  is expanded, the units digit is  
 (A) 5      (B) 3      (C) 9      (D) 7      (E) 0

Pascal 2002 #16

12. In the diagram, if  $\triangle ABC$  and  $\triangle PQR$  are equilateral, then  $\angle CXY$  equals  
 (A)  $30^\circ$       (B)  $35^\circ$       (C)  $40^\circ$       (D)  $45^\circ$       (E)  $50^\circ$

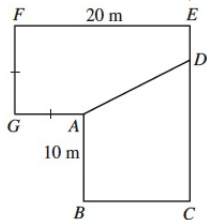


Cayley 2007 #15

13. On an island there are two types of inhabitants: Heros who always tell the truth and Villains who always lie. Four inhabitants are seated around a table. When each is asked “Are you a Hero or a Villain?”, all four reply “Hero”. When asked “Is the person on your right a Hero or Villain?”, all four reply “Villain”. How many Heros are present?  
 (A) 0      (B) 1      (C) 2      (D) 3      (E) 4

Cayley 2007 #17

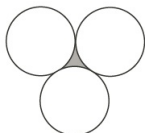
14. In the diagram,  $ABCDEFG$  is a room having square corners, with  $EF = 20\text{m}$ ,  $AB = 10\text{m}$ , and  $AG = GF$ . The total area of the room is  $280\text{m}^2$ . A wall is built from  $A$  to  $D$  creating two rooms of equal area. What is the distance, in metres, from  $C$  to  $D$ ?



- (A) 15      (B)  $\frac{50}{3}$       (C) 12      (D) 13      (E)  $\frac{40}{3}$

Cayley 2004 #22

15. In the diagram, each of the three identical circles touch the other two. The circumference of each circle is 36. What is the perimeter of the shaded region?



- (A) 18      (B) 6      (C) 36      (D) 12      (E) 24

Pascal 2006 #22