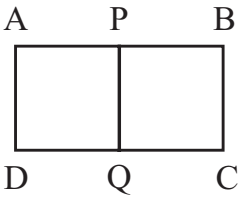
1. Let the operation m ** n be defined as m ** $n = (m - n)^2 \div (m + n)^2$, for all real values of m and n. What is the value of 100 ** 50? Express your answer as a common fraction.

1. _____

2. A movie theater seats 100 patrons. The theater is full for the 5:00 pm Saturday movie. Adult tickets sell for $9.00 each and children's tickets sell for $5.00 each. If the theater collected $640 in ticket sales for the 5:00 pm Saturday show, how many children's tickets were sold?

2. _____ children's tickets

3. The figure shows rectangle ABCD with segment PQ dividing the rectangle into two congruent squares. How many right triangles can be drawn using three of the points {A, P, B, C, Q, D} as vertices?

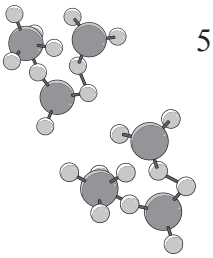


3. _____ right triangles

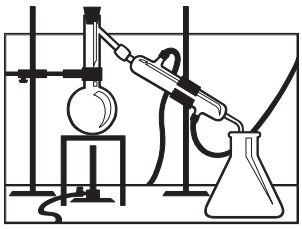
4. Four cards are drawn at random without replacement from a standard deck of 52 cards. (A standard deck of cards includes four suits, each of which contains an ace, 2, 3, 4, 5, 6, 7, 8, 9, 10, jack, queen and king.) What is the probability that all four aces are drawn? Express your answer as a common fraction.

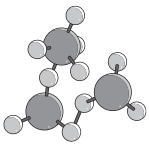
4. _____

5. A club had collected an amount of money to split among the top three finishers of their annual science fair. The first place finisher will receive one-half of the money. The second place finisher will receive one-third of the money. The third place finisher will receive $200. How much money will the first place finisher receive?



5. $_____

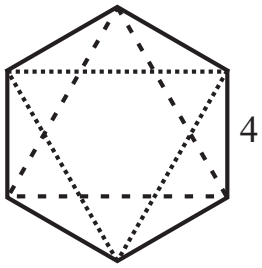




6. For how many positive, three-digit integers is one of the digits equal to the sum of the other two digits?

6. _____ three-digit integers

7. By joining alternate vertices of a regular hexagon with edges 4 inches long, two equilateral triangles are formed, as shown. What is the area, in square inches, of the region that is common to the two triangles? Express your answer in simplest radical form.



7. _____ sq inches

8. In Heidi's history class, the only grades that count toward the semester average are the 6 tests she has already taken and the up-coming final exam. The final exam counts as two tests. Heidi has determined that if she earns 99 points on the final she will have exactly a 90-point average for the semester. On average, how many points has Heidi scored on each test prior to the final exam?

8. _____ points

9. Consecutive powers of 2 are arranged in a triangular pattern, as shown. The first row consists of the single entry, 2^1. Each row has one more entry than the row above it. The product of the right-most entries (first three are bolded) of the first six rows can be expressed in the form 2^m for a natural number m. What is the value of m?

$$\mathbf{2^1}$$
$$2^2 \quad \mathbf{2^3}$$
$$2^4 \quad 2^5 \quad \mathbf{2^6}$$
$$\vdots$$

9. _____

10. What is the area of the region enclosed by the graphs of $y = 2|x - 3| - 2$ and $y = 4 - 2|x - 2|$?

10. _____ sq units