Challenge 3

1. _____ The operation ≋ is defined such that a≋b = (a/b)/(b/a). Express the value of 2≋3 as a common fraction in simplest form.

2. _____ How many square units are in the area of the shaded region of the square below? Express your answer as a mixed number.
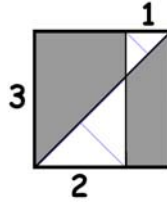
3. _____ If an integer n leaves a remainder of 4 when divided by 7, what is the remainder when n^2 is divided by 7?

4. _____ Michael makes 60% of his free-throw attempts. If Michael attempts two free-throws, what is the probability that he will make exactly one of them? Express your answer as a common fraction in simplest form.

5. _____ What is the sum of all the four-digit integers which use two 1's and two 2's as digits?

6. _____ sec Kyra and Thomas are running in opposite directions on parallel paths that are separated by a distance of 30 meters. Kyra jogs 2 meters per second, while Thomas jogs 3 meters per second. How many seconds pass between the first time that Kyra and Thomas are exactly 50 meters apart and the second time that Kyra and Thomas are exactly 50 meters apart?

7. _____ What is the largest prime number that is the sum of three or more distinct integers from the following set: {1, 3, 5, 7, 9, 11, 13, 15, 17}?

8. _____ cm If rectangle ABCD can be subdivided into ten congruent 3cm by 7cm rectangles, what is the difference between the least possible perimeter of rectangle ABCD and the greatest possible perimeter of rectangle ABCD?

9. _____ What is the largest prime factor of the following sum: $2^3 + 3^3 + 4^3 + 5^3 + 6^3 + 7^3 + 8^3$?

10. _____ The number of diagonals in a polygon is one less than the number of degrees in the sum of its interior angles. How many sides are there on the polygon?