Name:

GMP I

1. Several students were meeting in a room. After 45 of them left, the room was $\frac{5}{8}$ as full as it was initially. How many students were in the room at the start of the meeting?

2. Coffee beans lose 12.5% of their weight during roasting. In order to obtain 252 kg of roasted coffee beans, how many kg of unroasted beans must be used?

3. Last year, three fifths of the Outing Club were girls, but this year the number of boys doubled and six new girls joined. There are now as many boys in the club as there are girls. How many members did the club have last year?

4. A flat, rectangular board is built by gluing together a number of square pieces of the same size. The board is m squares wide and n squares long. Using the letters m and n, write expressions for
   (a) the total number of 1×1 squares;
   (b) the total number of 1×1 squares with free edges (the number of 1×1 squares that are not completely surrounded by other squares);
   (c) the number of completely surrounded 1×1 squares;
   (d) the perimeter of the figure.

5. If you pick a random decimal between 0 and 1 and multiply that decimal by itself, what is the probability the result will be larger than 0.5?

6. Find a collection of prime numbers that multiply to give 33,649.

7. The factors of 10 are 1, 2, 5, and 10. The sum of the factors of 10, however, is 18. Find the sum of the factors of 2, 2^2, 2^3, and 2^4. Find a formula, using the variable n, for the sum of the factors of 2^n.

8. A hot-air balloon ride has been set up so that a paying customer is carried straight up at 50 feet per minute for ten minutes and then immediately brought back to the ground at the same rate. The whole ride lasts twenty minutes. Let h be the height of the balloon (in feet) and t be the number of minutes since the ride began. Draw a graph of h versus t. What are the coordinates of the highest point of the graph? Find an equation that expresses h in terms of t.

9. From its initial position at (1, 6), an object moves in a straght line with constant speed. It reaches (7, 10) after two seconds and (13, 14) after four seconds.
   (a) Predict the position of the object after six seconds; after nine seconds; after t seconds.
   (b) Will there be a time when the object is the same distance from the x-axis as it is from the y-axis? If so, when, and where is the object?