# Bull's-eye, Page 1: Problem Solving

1. Dina runs 5 kilometres in 20 minutes. At this speed, how many seconds does it take her to run 100 metres?

   1. _____ seconds

2. This year, UBC has 14000 seats of classroom space, which is exactly enough to accommodate current student enrollment. An additional 4% of classroom space seats are under construction and will be available next year. UBC plans to admit 10% more students next year than this year. How many more seats of classroom space (beyond those available now or under construction) must be provided to accommodate next year's planned enrollment?

   2. _____ seats

3. The mass of 1000 cubic mm of a certain metal is 9 grams. A box with (inner) dimensions 4 cm by 3 cm by 2 cm is filled with the metal. What is the mass, in kilograms, of the metal in the box? Give your answer as a decimal, to 3 decimal places.

   3. _____ kg
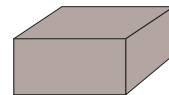
4. Alicia to Beti: "If you gave me one-half of your money, I would have $100." Beti to Gamal: "If you gave me one-third of your money, I would have $100." Gamal to Alicia: 'If you gave me one-quarter of your money, I would have $100." How many dollars do Alicia, Beti, and Gamal have between them?

   4. _____ dollars

Bull's-eye, Page 2: Combinatorics and Numbers

5. If 5 distinct circles are drawn, what is the largest possible number of points of intersection of the circles?

5. _____ points

6. On any standard die, the sum of the numbers on opposite faces is equal to 7. If two standard dice are tossed, what is the probability that the sum of the numbers on the 10 visible faces is equal to 31? Express your answer as a common fraction.

6. _____

7. What is the smallest positive integer n such that $11n + 1$ is a power of 2?

7. _____

8. In a school cafeteria, there are 2 different soups, 3 different main courses, and 3 different desserts. You are allowed to take at most one soup, at most one main course, and up to three desserts (but you cannot have two or more servings of the *same* dessert). How many different meals could you have? Include in your count the "meal" in which you eat nothing.

8. _____ meals

Bull's-eye, Page 3: Geometry

9. In the picture below (which is not drawn to scale) the large trape-
zoid has been cut into two trapezoids by a vertical line. Given that
dimensions are as shown in the diagram, what is the value of x?

9. _____

$\dfrac{}{}$

60 | x | 20

60 | 40
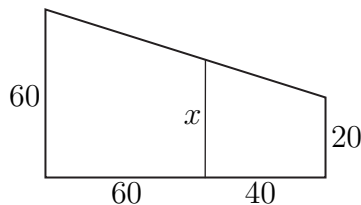
10. In the figure below, $\triangle ABC$ is right-angled at B, $AB = 12$ cm and
$BC = 14$ cm. The point D bisects the hypotenuse AC. What is the
area of $\triangle ABD$?

10. _____ cm^2
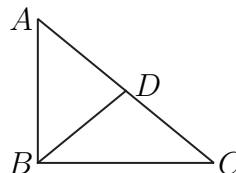
11. In the figure below, $ABCD$ is a rectangle whose length AB is 6 cm
and whose width BC is 4 cm. A circle of radius 2 cm is drawn, with
its center at the center of the rectangle. Point P on AB is such that
DP is tangent to the circle. What is the length of DP (in cm)?
Express your answer as a common fraction.

11. _____ cm
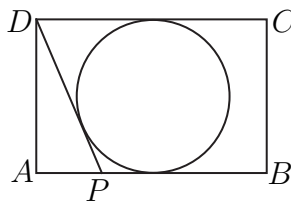
12. A triangle has vertices $A(0,0)$, $B(13,0)$, and $C(5,7)$. The triangle is
inscribed in a circle. What are the coordinates of the center of the
circle? Express your answer in the form (x, y), where x and y are
common fractions.

12. _____