

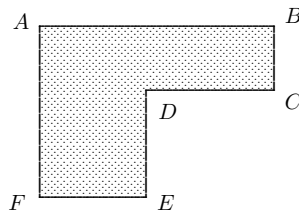
# The 2015 Jamaican Mathematical Olympiad

## Practice Problem Set 3

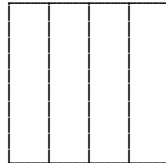
- 1) Each of the boys Alan, Bob, Carl, and Doug has one and only one of the following animals: a cat, a dog, a goldfish, and a canary. Bob has an animal with fur. Doug has a pet with four legs. Carl has a bird, and Alan and Bob don't like cats. Which of the following sentences is not true?

- (a) Doug has a dog.                      (b) Carl has a canary.                      (c) Alan has a goldfish.  
 (d) Doug has a cat.                      (e) Bob has a dog.

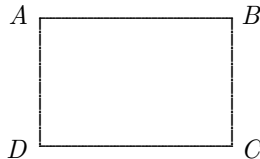
- 2) In the figure below, the angles at  $A$ ,  $B$ ,  $C$ ,  $E$ , and  $F$  are all  $90^\circ$ . If  $BC = 3$ ,  $CD = 6$ ,  $DE = 5$ , and  $EF = 5$ , what is the area of the shaded region?



- 3) A rosebush in a garden has three branches. On each branch there is a cluster of three roses, and in each rose there are two bees. How many bees are in the rosebush?
- 4) A square of area  $64 \text{ cm}^2$  is cut into four equal rectangles, as indicated below. What is the perimeter of one of the rectangles?



- 5) An aeroplane has 24 rows numbered from 1 to 25 (excluding 13). Four passengers are seated in Row 15 and six passengers are seated in all the other rows. How many passengers are on the plane?
- 6) In the figure below,  $ABCD$  is a rectangle and  $AD : AB = 2 : 3$ . If the area of  $ABCD$  is  $150 \text{ cm}^2$ , what is its perimeter?

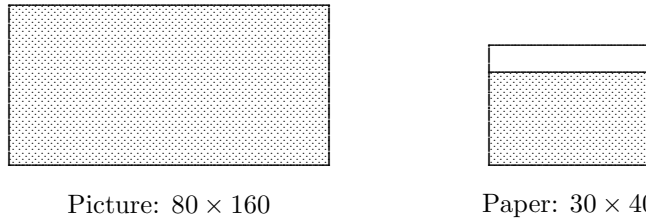


- 7) Two litres of fruit juice containing 10% sugar are mixed with 3 litres of another juice containing 15% sugar. What percentage of the mixture consists of sugar?

- 8) A square is divided into three equal rectangles. The middle rectangle is removed and placed on the side of the original square to form the octagon shown. If the perimeter of the square is  $A$  and the perimeter of the octagon is  $B$ , what is the value of the fraction  $A/B$ ?



- 9) Martha sold eggs at the market every day from Monday to Friday. On Wednesday she sold 60 eggs and on Thursday she sold 96 eggs. Friday evening, she noticed something interesting. After Monday and Tuesday, the number of eggs she sold each day was equal to the sum of the number of eggs she sold the previous two days. How many eggs did Martha sell on Monday?
- 10) A rectangular picture of size  $80\text{ cm} \times 160\text{ cm}$  is scaled down to fit onto a sheet of paper of size  $30\text{ cm} \times 40\text{ cm}$ . Given that the longer side of the picture fits exactly onto the longer



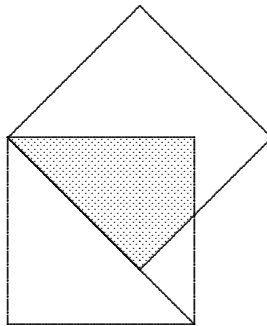
side of the sheet of paper, determine the area of the sheet of paper not covered by the picture.

- 11) Adam is in jail and needs to have some money sent to his lawyer. The amount of money he needs is a dollar amount with seven digits. Eve, his wife, is very smart and Adam did not want to say openly how much he needed. Instead, he sent a numerical code to Eve. He wrote:

“The sum of any four adjacent digits is 16 and the sum of any 5 adjacent digits is 19”

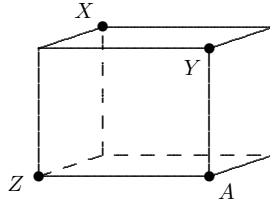
Eve decoded the message and sent the money to his lawyer. What amount of money did Eve send the lawyer?

- 12) In the figure below, the two overlapping squares each have side length 1. What is the area of the shaded region?



13) A number less than 3568 is odd, has remainder 2 when divided by 3, and has remainder 4 when divided by 5. What is the sum of the digits of the largest number which meets these conditions?

14) The diagram below shows a cuboid with four of its vertices marked  $X$ ,  $Y$ ,  $Z$ , and  $A$ , respectively. If  $XY = 8$ ,  $XZ = \sqrt{55}$ , and  $YZ = 9$ , what is the length of  $XA$ ?



15) The numbers 257 and 338 have the property that when their digits are put in reverse order the new numbers, 752 and 833 respectively, are larger. How many 3-digit numbers have this property?

16) In the figure below, triangles  $PQR$  and  $LMN$  are equilateral. If  $\angle QSM$  is  $55^\circ$ , what is the value of  $x$ ?

