Short Answer

1. According to the relationship below, arrange *B, C, F* and *M* from largest to smallest.

$$B \div \frac{3}{4} = M \times 1\frac{1}{2} = C \times \frac{2}{3} = F \times 1\frac{3}{4}$$

2. Sum of five consecutive square numbers is 990. What is the largest number from the set?

3. Some of the unit squares of a 9 x 2 board are shaded. Every unit square must either be shaded or shares an edge with a square that is shaded. What is the smallest possible number of shaded squares on the board?

4. Fachri have 5 sticks, of lengths 12, 22, 32, 42 and 52 cm. How many non-congruent triangles can we form by choosing any three of the sticks?

5. Andrew and Lauren are 20 kilometers apart. They bike toward one another with Andrew travelling three times as fast as Lauren, and the distance between them decreasing at a rate of 1 kilometer per minute. After 5 minutes, Andrew stops biking because of a flat tire and waits for Lauren. After how many minutes *from the time they started to bike* does Lauren reach Andrew?

6. If $C = \dfrac{x-y}{x+y}$, $F = \dfrac{y-z}{y+z}$, and $M = \dfrac{z-x}{z+x}$ where *x, y* and *z* are positive numbers, then what is the value of the expression $\dfrac{(1-C)(1-F)(1-M)}{(1+C)(1+F)(1+M)}$

7. In how many ways can *A, B, C, D, E* and *F* sit on a bench so that *A* and *B* are not next to each other?

8. In the diagram, *AD* and *BE* are the bisectors of ∠*BAC* and ∠*ABC* respectively, and ∠*ACB* = 50∘. What is the size of ∠*AFE*?
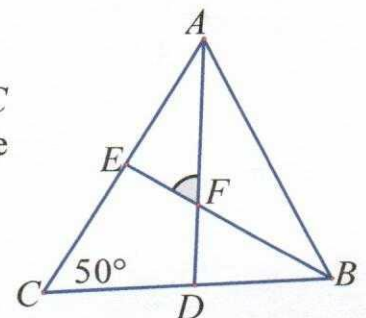
9. N is a 3-digit number which gives remainder 1 and 4 when divided by 9 and 13, respectively. What is the largest number that satisfies this condition?

10. Find the area of shaded region

4 cm

6 cm

8 cm
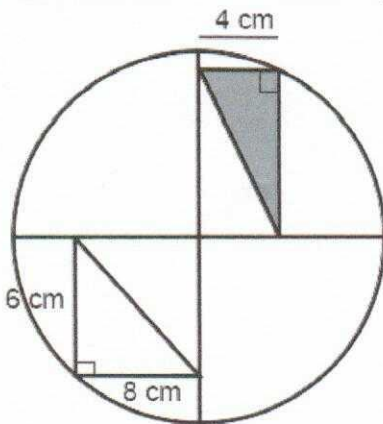
11. Given:

$$1+\frac{3\times 4}{2\times 5}+1+\frac{6\times 7}{5\times 8}+1+\frac{9\times 10}{8\times 11}+...+1+\frac{42\times 43}{41\times 44}=a\frac{b}{c}$$

Find $a-b+c$

12. The shape sequence below includes some squares and circles which are tangent following a pattern. The side length of the biggest square is 1. What is the area of the smallest gray circle in the Figure 5?
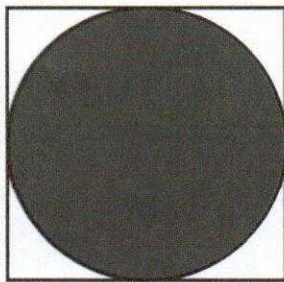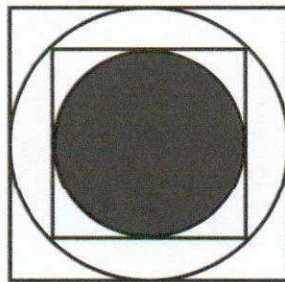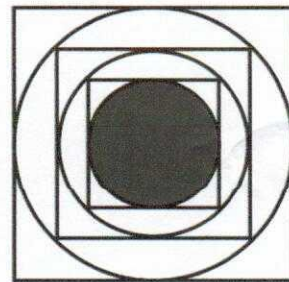
Figure 1 **Figure 2** **Figure 3**

13. A 4-digit integer contains one of each of the digits 1, 2, 3, 4 and 5 only once. How many integers are divisible by 4?

14. Each unit square in a 4 by 4 grid contains the letters C, F or M. The eight "words" spelt across and down were: CFMM, CMCF, CCFM, CMFC, MFCM, MFMF, FMFC and FMCM in some order. Find the "word" that is spelt down the diagonal from top-left to bottom -right.

15. Find largest possible 12-digit number, in which the numbers formed by two adjacent digits are distinct prime numbers.

16. Given a rectangle 2×4, divided into unit squares. In how many ways can a student color each of the squares in a single color (red, blue or green), so that two adjoins squares have different colors?

Essay

17. In the diagram, AD is the altitude of right-angled triangle ABC. Given that $AB = 15$, $AC = 20$, DE and DF are bisectors of $\angle ADB$ and $\angle ADC$ respectively. Find the area of the shaded region.
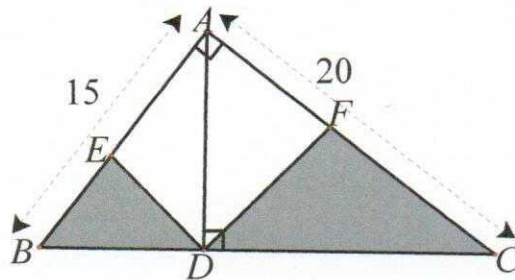
18. The greatest common factor of the two numbers $2n + 9$ and $7n + 5$ (n is an integer) is T. Find the sum of the possible values of T.

END of THE PROBLEMS