

**TEST FOR SELECTING STUDENTS TO REPRESENT SRI LANKA AT THE
INTERNATIONAL MATHEMATICS & SCIENCE OLYMPIAD COMPETITION
(MATHEMATICS) - 2017**

General Instructions.

Index No: 2017/Oly/N/I/.....

This question paper consists of two parts. Answer all questions in both parts.

PART I – (marks - 4x15 = 60)

- Write the answer on the dotted line given under each question and it is necessary to mention the relevant units if any with the answer

PART II – (marks- 8 x 5 = 40)

- Answers to be written only spaces on the paper itself.
- How the answers were obtained has to be given step by step. No marks will be awarded if the answers are not clear.

Note – Diagrams are not to scale.

Time: 1 hour 30 minutes

Part I

1. If the product of 3 different prime numbers is 195 then what is their sum?

Answer:

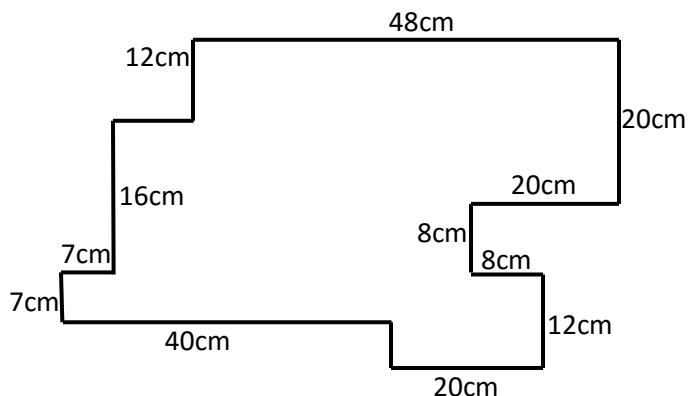
2. Fill in the blanks with the numbers 2, 0, 1 and 7 so that the equation is satisfied

$$3[(...) - 4] + [(...) (-5) + (...)] = (...)$$

3. Find the value of, $2017 + \frac{1}{2017} + \frac{2}{2017} + \frac{3}{2017} + \dots + \frac{2017}{2017}$

Answer:

4. Find the area of the diagram below

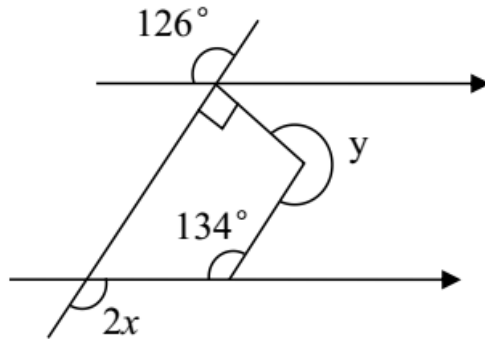


Answer:

5. If 20 birds can exchange for 5 rabbits, 30 rabbits can exchange for 4 goats, 9 goats can exchange for 3 pigs, 8 pigs can exchange for 2 cows. How many birds can exchange for 5 cows?

Answer:

6. Find the value of $x + y$ from the diagram given below



Answer:

7. How many ways can we choose 3 different numbers from 1 to 20 such that the sum of those three numbers is equal to 30?

Answer:

8. Select the least common multiple of $12!$ and $2^{11}3^45^37^2$
 $12! = 12 \times 11 \times 10 \times 9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$

(Clue:-

(a) $2^93^45^27^1$

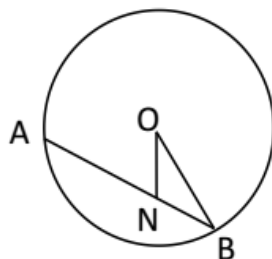
(b) $2^{11}3^55^37^211^1$

(c) $2^{20}3^95^57^311^1$

(d) $2^23^15^17^111^1$

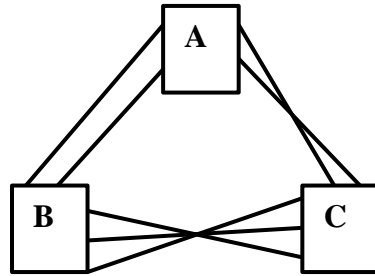
Answer:

9. AB is a chord in a circle with center O and radius 39cm. The point N divides the chord AB such that AN=56cm and NB=16cm. Find the length ON in cm.



Answer:

10. A,B and C are three towns in a city and they connect with the routes as shown in the diagram below.
How many ways are there to travel from town A to town C?



Answer:

11. If $\sqrt{n^3 + n^3 + n^3 + n^3 + n^3} = 25$, Find n

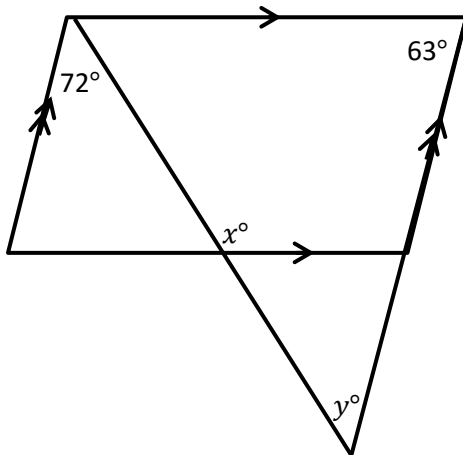
Answer:

12. Find the value of P

$$P = \frac{16^2 - 4}{18 \times 13} \times \frac{16^2 - 9}{19 \times 12} \times \frac{16^2 - 16}{20 \times 11} \times \dots \times \frac{16^2 - 64}{24 \times 7}$$

Answer:

13. Find the value of $x + y$

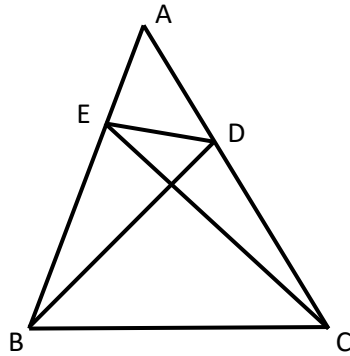


Answer:

14. Twelve distinct points on a circle are connected in all possible ways by chords (Some ways are mentioned in the figure below). How many chords are there?

Answer:

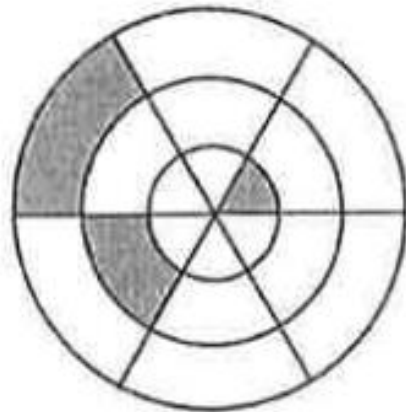
15. In the triangle ABC, $\angle CAB = 36^\circ$, $\angle BCA = 72^\circ$. D is a point on AC such that BD bisects $\angle ABC$. E is a point on AB such that $CE \perp BD$. How many isosceles triangles in the figure shown below?



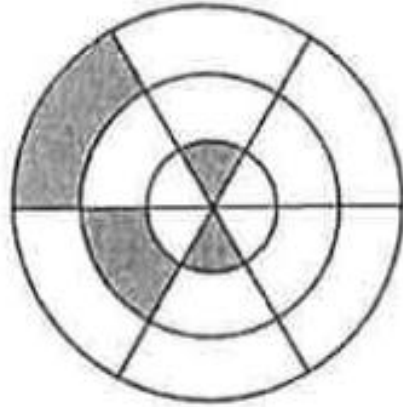
Answer:

Part II

1. (a) Shade in one more section on the grid below so that the overall shape has a single line symmetry, marking your mirror line on the diagram below.



(b) Shade two sections in the diagram given below so that the overall shape has an order of rotational symmetry of two.



2. a) If $a = 0.3$ and $b = 0.4$ then find

$$\frac{0.08}{0.2} - \frac{0.12}{0.036} \text{ in terms of } a \text{ and } b ?$$

b.)

$$\text{If } \frac{2}{a} + \frac{2}{b} = \frac{5}{3}, \quad \frac{2}{a} + \frac{2}{c} = \frac{4}{3}, \quad \frac{2}{b} + \frac{2}{c} = \mathbf{1}$$

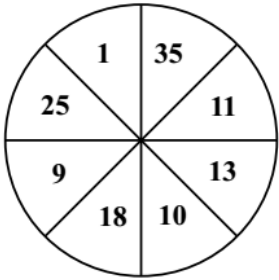
then find the value of $\frac{1}{a} + \frac{1}{b} + \frac{1}{c}$

c) Given that

$$x:y = 1:3, \quad y:z = 5:7, \quad z:k = 9:11$$

Find the value of $x:k$

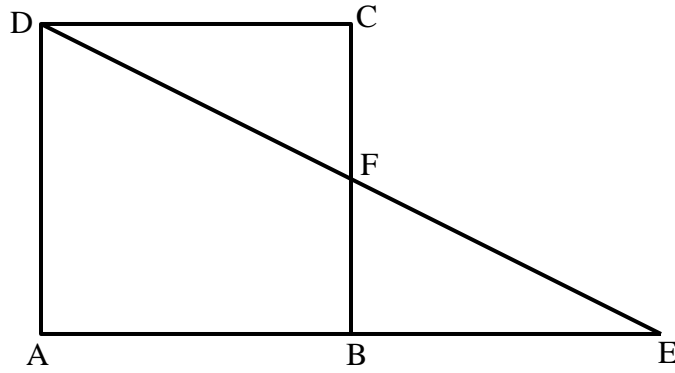
3. A group of people darts at the board shown (8 sectors) below. The number shown on sectors of the board represents the number of scores. Everyone darts maximum number of four times and every one scores a total of 62. Any player will have at least one score sector different from other.



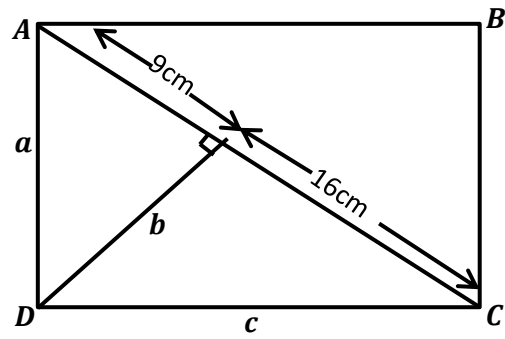
a) Write down all the ways of players can be score?

b) At most how many people are involved in the game?

4. a) Square ABCD has sides of length 6cm. Side AB is extended through B to E with BE= 6cm. segment DE intersects BC at point F. What is the area of the triangle BEF?



- b) In the figure below ABCD is a rectangle with side length in integer value. What is the value of $a+b+c$



c) a) Suppose that the numbers $1, 2, 4, 8, 16, 32, 64, 128$ and 256 are placed into the 9 squares in a 3- by 3 grid in such a way that each of the numbers appears exactly once, and the product of the numbers appears exactly once, and the product of the numbers appearing in any row or column is the same

i.) Fill the grid given below

ii.) What is the value of the product in each row and column

b) Arrange the numbers from 1 to 9 in 3×3 grid below so that each number occurs once, the product of the entries in the first row is 12, product of entries in second row is 112, product of entries in the first column is 216, and product of entries in the second column is 12, as indicated. Write the ordered triple (A, B, C) of numbers corresponding to the indicated boxes.

A			12
	B		112
		C	
216	12		