

# KENDRIYA VIDYALAYA CRPF PALLIPURAM

## OTBA WORKSHOP IN MATHEMATICS ON 23-11-2013

### THEME I

### CRITICAL AND ANALYTICAL THINKING

#### QUESTION 1

An iron grill is to be put up all along the boundary (except there were is a wall) with one gate four feet wide at the centre of each side. What is the length of the grill ?

$$x = 70 - 2 \times 14 = 42 \text{ feet}$$

$$y = 70 - 2 \times 21 = 28 \text{ feet} \quad (1)$$

#### **The length of grill**

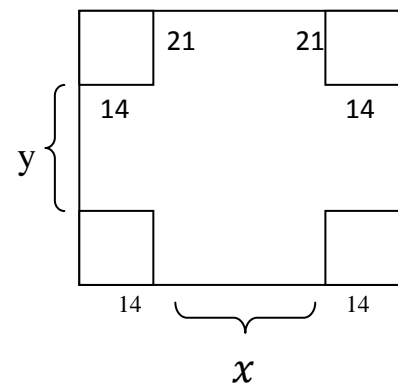
$$\begin{aligned} &= 2(x + y) - 4 \times \text{width of gate} \\ &= 2(42 + 28) - 4 \times 4 \end{aligned} \quad (1)$$

$$= 140 - 16$$

$$= 124 \text{ feet}$$

$$= 124 \times 0.3048 = 37.79 \text{ m}$$

$$= 38 \text{ m} \quad (1)$$



#### QUESTION 2

If three different types of herbs are planned to plant in the circular garden in the ratio 2:1:3. What is the area of the portion kept for each type of herb ?

$$r = 17.5 \text{ feet} \quad (1/2)$$

$$\begin{aligned} \text{Ar( Circular garden)} &= \pi r^2 = \frac{22}{7} \times (17.5)^2 \\ &= 962.5 \text{ sq ft} \end{aligned} \quad (1)$$

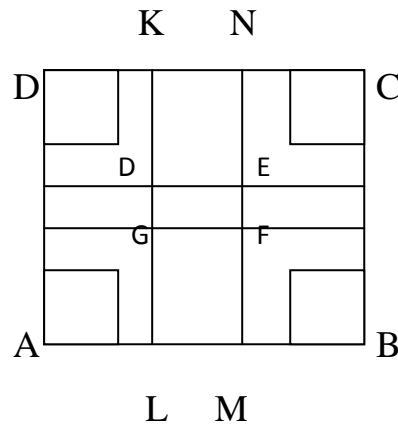
$$\begin{aligned} \text{Area for first type} &= \left(\frac{2}{6}\right) \times 962.5 \\ &= 320.8 \text{ sqft} \end{aligned} \quad (1/2)$$

$$\begin{aligned} \text{Area for second type} &= \left(\frac{1}{6}\right) \times 962.5 \\ &= 160.4 \text{ sq ft} \end{aligned} \quad (1/2)$$

$$\begin{aligned} \text{Area for third type} &= \left(\frac{3}{6}\right) \times 962.5 \\ &= 481.25 \text{ sq ft} \end{aligned} \quad (1/2)$$

### QUESTION 3

Cross paths are constructed each feet wide passing through the center of the garden such that one path is parallel to the horizontal side and the other arise parallel to the vertical side. What will be the area of these cross paths? (5)



$$\text{Area of PQRS} = PQ \times AR$$

$$PQ = AB = 70 \text{ FEET}$$

$$QR = 4 \text{ FEET}$$

$$= (70 \times 4) = 280 \text{ sq. FEET} \quad (1)$$

$$\text{Area of KLMN} = KL \times KN$$

$$KL = BC = 70 \text{ FEET}$$

$$KN = 4 \text{ FEET}$$

$$\text{Area} = 70 \times 4 = 280 \text{ sq. FEET} \quad (1)$$

$$\text{Area of DEFG} = 4 \times 4 = 16 \text{ sq. feet} \quad (1)$$

$$= 280 \text{ SQ. FEET}$$

$$\text{Area of cross paths} = \text{area of PQRS} + \text{area of KLMN} - \text{area of DEFG}$$

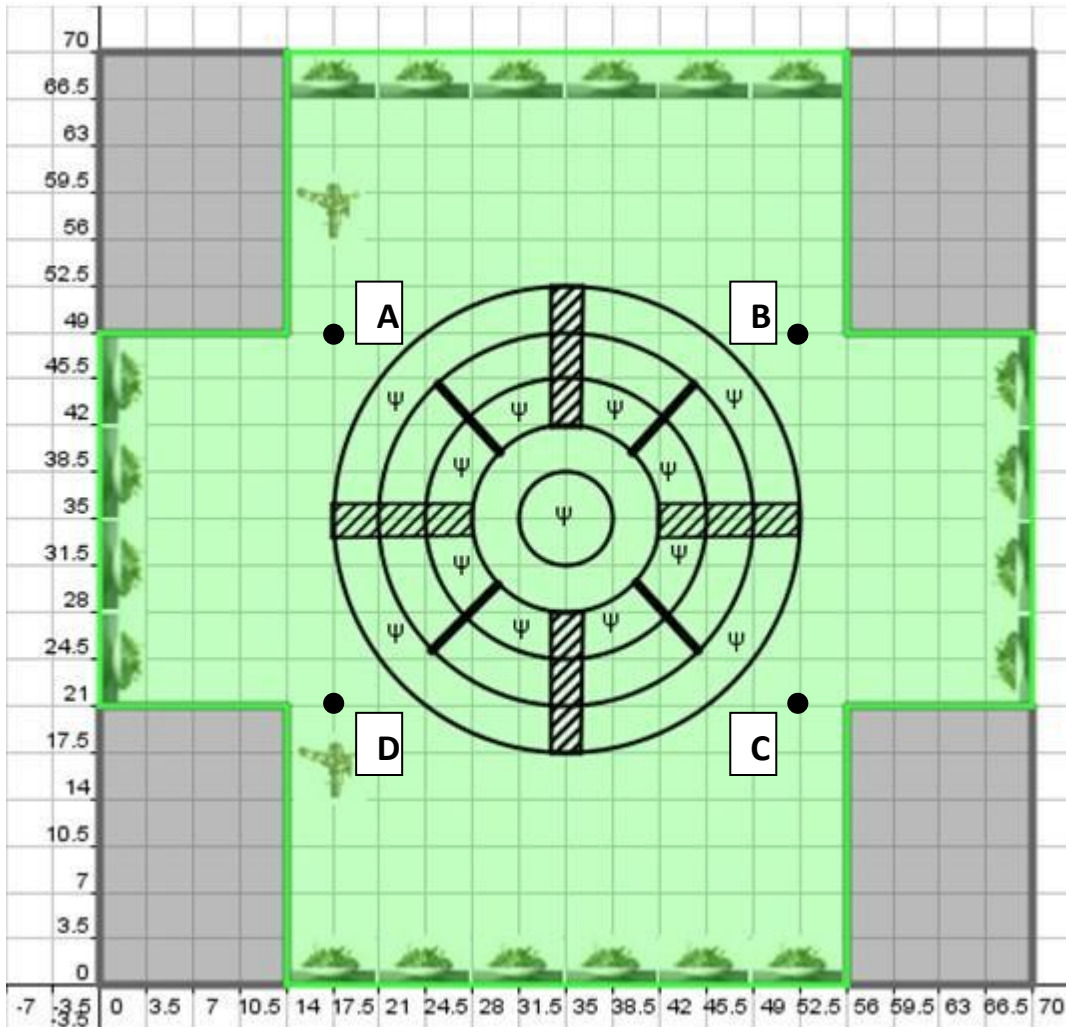
$$= (280 + 280 - 16)$$

$$= 560 - 16$$

$$= 544 \text{ sq. feet} \quad (1)$$

## QUESTION 4

Marked on the sketch of the garden are points A,B,C,D the spots located for planting 4 different herbs. Find the co-ordinates of A,B,C,D. Find the area of the region covered by ABCD. (3)



**Ans :**

A (17.5, 49)

B (52.5, 49)

C (52.5, 21)

D (17.5, 21)

Area = l X b = 35 X 28 Sq. Unit

= 980 sq.unit (3)

## QUESTION 5

A plant is selected at random from the list of herbs.

What is the probability of selecting

a) A plant of 1 foot (2)

b) A plant of 2 feet or more (1)

c) A plant selected is not of 2 feet (2)

a) No: of 1 foot plants=4

No: of 2 feet plants=3

No: of 3-4 feet plants=5

Prob. Of selecting a plant of 1 foot= $(\frac{4}{12})=(\frac{1}{3})$

b) No.of plants of 2 feet or more= $4+3=7$

Prob(Selecting a plant of 2 feet or more)= $(\frac{7}{12})$

c) No. of plants selected which are not of 2 feet

$$=12 - (4+5)=3$$

P(selecting a plant which is not of 2 feet)= $(\frac{3}{12})=(\frac{1}{4})$

## THEME II

### CRITICAL AND ANALYTICAL THINKING

#### QUESTION 1

If the radius of a tent is doubled, is it possible to make a conical tent to accommodate all the four students with a given canvas sheet (3)

**Ans :**

If the radius is doubled, then new radius = 14m (1/2)

$$l = \frac{550}{\pi r} = \frac{25}{2} \text{ m} \quad (1)$$

$$h^2 = l^2 - r^2$$

$$= (25/2)^2 - 14^2$$

$$= \frac{625 - 784}{4} = \frac{-159}{4} \quad (1)$$

The value of h is square root of a -venumber which is not possible . So it is not possible to make a conical tent with this measurement of radius. (1/2)

#### QUESTION 2

The group takes a break near an ice-cream parlor. There are two shops selling ice-cream with same rates. Shop I sells ice-cream in a cone of radius 4 cm with height 7 cm for Rs 25 where as shop II sells ice-cream in a spherical ball of radius 3.5 cm for 25.

(a) Find out which shop is providing more quantity of ice-cream? (Use  $\pi = \frac{22}{7}$ )

(b) Which shop you prefer?

SHOP I

$$\text{Quantity of ice-cream} = \frac{1}{3} \times \frac{22}{7} \times 4^2 \times 7 \text{ cm}^3 \quad (1)$$

$$= \frac{22 \times 16}{3} = 117.3 \text{ cm}^3 \quad (1)$$

SHOP I

$$\text{Quantity of ice-cream} = \frac{4}{3} \times \frac{22}{7} \times (3.5)^2 \quad (1)$$

$$= 179.6 \text{ cm}^3$$

(a) Shop II is providing more ice creams (1/2)

**QUESTION 3**

How to arrange the students so that 60 students and 10 teachers can be allotted to the 4 buses with least disturbance?

3 buses – 13 students + 2 teachers

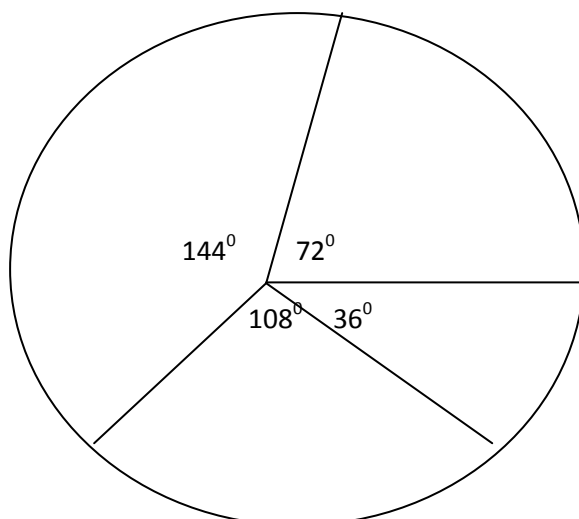
1 bus - 21 students + 4 teachers (2)

Bus	I	II	III	IV
A	3	2	2	3
B	2	3	2	3
C	2	2	3	3
D	2	2	2	4
E	2	2	2	4
F	2	2	2	4
Teacher	2	2	2	4
Total	15	15	15	25

**QUESTION 4**

Draw a pie chart for the success rate in rock climbing

No. of attempts	No. of people	
1 <sup>st</sup> attempt	10	$72^{\circ}$
2 <sup>nd</sup> attempt	20	$144^{\circ}$
More than 2 attempt	15	$108^{\circ}$
Did not attempt at all	5	$36^{\circ}$
Total	50	$360^{\circ}$



$(1\frac{1}{2})$

## QUESTION 5

While proceeding for the village walk the group take a break near the hotel, which is serving fruit salad in a hemispherical bowl and a cylindrical bowl of dimension given in page 9 of theme II.

- (a) Find the quantity of fruit salad in each bowl  
(b) Which type of bowl you choose (Use  $\pi = \frac{22}{7}$ )

**Ans :**

$$\begin{aligned} \text{(a) Quantity of fruit salad in hemispherical bowl} &= \frac{2}{3} \times \frac{22}{7} \times (3.5)^3 \\ &= 89.83 \text{ cm}^3 \quad (1) \end{aligned}$$

$$\begin{aligned} \text{Quantity of fruit salad in cylindrical bowl} &= \frac{22}{7} \times (3.5)^2 \times 10.5 \\ &= 404.25 \text{ cm}^3 \\ &(1) \end{aligned}$$

- (b) We choose cylindrical bowl

## QUESTION 6

If the camp manager would have exhausted all his stock of juice in serving teachers and students in full cylindrical cups, what quantity of juice did he have in the stock ?

(Use  $\pi = \frac{22}{7}$ )

**Ans :**

$$\begin{aligned} \text{(a) Volume of the cylindrical cup} &= \pi r^2 h \quad (1/2) \\ &= \frac{22}{7} \times (3.5)^2 \times 10.5 \quad (1/2) \\ &= 404.25 \text{ cm}^3 \\ &= 404.25 \text{ ml} \quad (1/2) \end{aligned}$$

$$\begin{aligned} \text{Quantity of juice in 70 cups} &= 70 \times 404.25 \text{ ml} \\ &= 28297.5 \text{ ml} \\ &= 28.3 \text{ l} \quad (1/2) \end{aligned}$$

## QUESTION 7

For the morning breakfast, they mixed tea powder in such a way that tea worth Rs 126 per Kg and Rs 135 per Kg are mixed with a third variety in the ratio 1:1:2. If the mixture is worth Rs 153 per Kg, find the price of the third variety per Kg.

**Ans :**

Since the first and second varieties are mixed in equal proportions so, their average

$$\text{price} = \frac{126 + 135}{2} = 130.50^{(1/2)}$$

The mixture is forward by mixing two varieties one at Rs 130.50 per Kg and the other at say , Rs x per Kg in theratio 2:2 ie, 1:1. We have to find x (1)

Cost of 1 Kg of 1 <sup>st</sup> kind =	Cost of 1 Kg of 2 <sup>nd</sup> kind	Rs x
130.30	Rs 153	22.50

$1^{(1/2)}$

$$\frac{x - 153}{22.50} = 1 \quad (1)$$

$$X = 175.50 \quad (1)$$

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