

KENDRIYA VIDYALAYA CRPF PALLIPURAM

OTBA WORKSHOP IN MATHEMATICS ON 23-11-2013

THEME II

HOT QUESTIONS

QUESTION 1

From the bar graph (pg 11) of theme II "successes rate in rock climbing", answer the following questions

(a) What % of the group was successful in their first attempt (1)

(b) What % of the group was successful in 2 attempt. (1)

Ans:

(a) Number of people successful in 1st attempt = 10

% of group successful = $10/50 \times 100\% = 20\%$ (1)

(b) No. of people successful in 2nd attempt = 20

% of people successful in 2nd attempt = $\frac{20}{50} \times 100 = 40\%$ (1)

QUESTION 2

You meet the manager of a restaurant that has buffet system. You need to make sure that it is bacteria free so that students do not get food poisoning. The health inspector says the QE $B = T^2 + 150T - 1600$ represent the number of bacteria B based on temperature of the food T. How hot or cold do you need to keep your food so that your Buffet does not give food poisoning? To prevent food poisoning the bacteria should be nil.

$$\text{So when } 0 = T^2 + 150T - 1600 \quad (1)$$

$$0 = T^2 + 160T - 10T - 1600 \quad (2)$$

$$0 = T(T + 160) - 10(T + 160)$$

$$T = 10 \text{ or } T = -160 \quad (1)$$

QUESTION 3

You are designing a new can for your trip. The only specification that is given to you is that the can height must be 4 times its diameter and the volume of the can must be 25 m^3 . What polynomial will represent the volume of the can that you design. How would you find the height of the can that you design?

$$h = 4 \times 2r = 8r \quad (1/2)$$

$$v = \pi r^2 h \quad (1/2)$$

$$v = \pi \times r^2 \times 8r$$

$$= 8\pi r^3 \quad (2)$$

$$8\pi r^3 = 25 \quad (1)$$

$$r = \sqrt[3]{25/8\pi} \quad (1/2)$$

$$h = 8 \times \sqrt[3]{25/8\pi} \quad (1/2)$$

QUESTION 4

what is the radius of the hemispherical cup if the quantity of juice served in the cylindrical cup is equal to the quantity of juice in the hemispherical cup?

Ans:

$2/3 \times \text{volume of cylindrical cup} = \text{volume of hemisphere}$

$$2/3 \times \pi \times R^2 H = 2/3 \pi r^3$$

$$2/3 \times \pi \times 3.5^2 \times 10.5 = 2/3 \pi r^3 \quad (1)$$

$$r^3 = 3.5^2 \times 10.5 \quad (1)$$

$$r^3 = 3.5^2 \times 3.5 \times 3$$

$$r^3 = 3.5^3 \text{ cm} \quad (1)$$

QUESTION 5

If the canvas after utilising 1 m^2 for stitching margins was used to make walls and roof of a tent in the form of a cuboid 25 m long and 15m broad, what will be the volume of air contained in it? (5)

Answer:

$$\text{Areas of canvas to make the tent} = (551 - 1)\text{m}^2 = 550\text{m}^2$$

$$\text{Area of 4 walls + area of roof} = 550\text{ m}^2$$

$$2(l+b)h + l \times b = 550\text{m}^2$$

$$2(25+15)h + 25 \times 15 = 550$$

$$80h + 375 = 550$$

$$80h = 175$$

$$h = 175/80 = 2.1875\text{m}$$

$$\text{Height of the tent} = 2.1875\text{m}$$

$$\text{Volume of air} = l \times b \times h = (25 \times 15 \times 2.1875)\text{m}^3$$

$$= 820.3125\text{ m}^3 = 820\text{ m}^3(\text{appr})$$

QUESTION 6

- (a) Find the volume of the drink served in both types of cups as per the measurements given in the text page no 9 (2)
- (b) Find the ratio of the volumes of the drinks served in hemispherical cup and cylindrical cup (2)
- (c) Find the percentage decrease in the quantity of drink served in the hemispherical bowl? (1)

Ans :

(a) volume of one cylindrical glass $= \pi r^2 h$

$$= 22/7 \times 7/2 \times 7/2 \times 21/2$$

$$= 404.25\text{ cm}^3$$

$$\text{volume of hemispherical bowl} = \frac{2}{3} \pi r^3$$

$$= 2/3 \times 22/7 \times 7/2 \times 7/2 \times 7/2$$

$$= 89.83\text{cm}^3$$

(b) ratio of the volumes of the drink served in two types of cups

$$= \frac{2/3 \times 22/7 \times 7/2 \times 7/2 \times 7/2}{22/7 \times 7/2 \times 7/2 \times 21/2}$$

$$22/7 \times 7/2 \times 7/2 \times 21/2$$

$$= 2/3 \times 7/2 \times 2/21$$

$$= 2/9$$

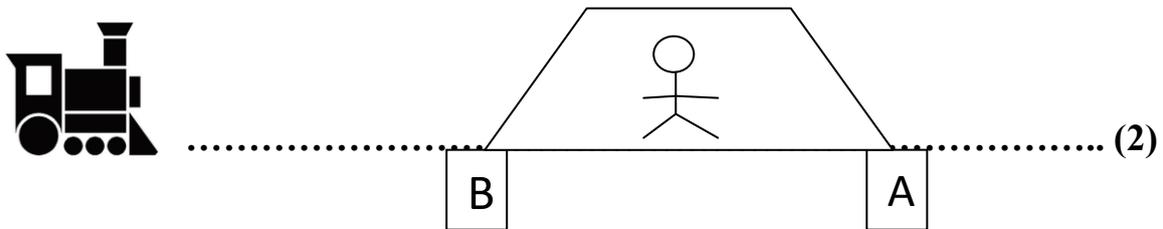
$$= 2:9$$

(c) percentage decrease = $(404.25 - 89.83 / 404.25) = 77.78\%$

QUESTION 7

A boy walks two-third of the distance across a rail road bridge above a river from point A to point B when he sees a train approaching at a the rate of 45 Km/Hour he does a very quick calculation and realizes that if he runs at a certain speed, let us call it r , he can make it either end of the bridge and avoid the train. What is this value of r (5)

Ans :



If we know that the man and the train can get to point B at the same time, then if he travels in the other direction, the man will be at point C when the train gets to point B . We also know that the man and the train will arrive at point A at the same time, showing that the man can only travel $1/3$ of the length of the bridge in the time it takes the train to travel the whole length of the bridge. This means that the man can only travel the speed of the train. So, $r = 1/3 \times 45 = 15$ km/hr. (3)

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THEME II

VALUE BASED QUESTIONS

QUESTION 1

While proceeding to rock climbing, the entire group takes rest at a place where there were two juice shops

Shop 1-is offering juice in a hemispherical bowl of $r=4\text{cm}$ at Rs.10/glass with full bowl.

Shop 2-is offering juice in $\frac{3}{4}$ of a cylindrical glass of $r=4\text{cm}$ and $h=4\text{cm}$ at Rs. 10/glass.

(i) which shop is providing more juice?

(ii) What value is depicted in this situation?

Ans :

$$\begin{aligned} \text{(i) Amount of juice provided by shop-1} &= \frac{2}{3} \times 3.14 \times 4^3 \\ &= 133.97 \text{ cm}^3 \end{aligned}$$

$$\begin{aligned} \text{Quantity of juice provided by shop-2} &= 3.14 \times 4^2 \times 4 \times \frac{3}{4} \\ &= 150.72 \text{ cm}^3 \end{aligned}$$

So shop 2 is providing more juice.

(ii) Generous, kind, not greedy.

QUESTION 2

The following table gives the no. of attempts and no. of students succeeded in their attempts .

No. of attempts	no. of people
1 st attempt	10
2 nd attempt	20
More than two attempts	15
Has no attempts at all	5

Total	50
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- (a) Find the probability of team members who succeeded in at least two attempts?
(2)
- (b) Find the probability of team members who succeeded in more than two attempts?
(1)
- (c) Find the percentage of successful students in their attempts? (1)
- (d) What value of the students attitude is depicted from the success rate? (1)

Ans :

(a) No:of students succeeded in at least two attempts=20+10=30 (1)

Total no:of students=50

$$\text{Required probability} = \frac{30}{50} = \frac{3}{5} \quad (1)$$

(b) No:of members succeeded in more than two attempts=15+5=20 (1/2)

$$\text{required probability} = \frac{20}{50} = \frac{2}{5} \quad (1/2)$$

(c) No:of successful students=50-5=45

$$\text{percentage of successful students} = \frac{45}{50} \times 100 = 90\% \quad (1)$$

(d) Team spirit and desire for success. (1)

QUESTION 3

- (a) If each room is allotted to either 4 students or 2 teachers, how many rooms are required to accommodate them? (2)
- (b) What are the values the students learn from this action? (1)

Ans :

(a) Total no: of students=60

No:of rooms for students=60/4=15

Total no:of teachers=10

No:of rooms required=10/2=5 (1)

Total rooms required=15+5=20rooms. (1)

(b) Sharing, accommodative, love for fellow being.. (1)

QUESTION 4

what is the slant height of conical tent. After the trekking the trekkers visited villager's organic farm and went for bird watching and river crossing .what value is depicted here:

$$\pi r l = 550$$

$$l = \frac{550}{\pi r} = \frac{550}{\frac{22}{7} \times 7} = 25 \text{ m} \quad (1)$$

$$h = \sqrt{l^2 - r^2} = 14 \text{ m} \quad (1)$$

(ii) love for nature

Develop self confidence

Eco-friendly

Avoid air pollution..

QUESTION 5

what percent of students succeeded by facing more than two attempts ?

What is the moral value depicted here?

(a) Percentage of students successes by taking more than two attempts $= \frac{15}{50} \times \frac{10}{10} = 30\%$

(b) Persistence

QUESTION 6

(a) What is the significance of bonfire ? (2)

(b) What are the educational outcomes of the adventure trip? (1)

(c) What qualities will the students acquire attending such a trip? (1)

a) Team-work, enjoying as a team.

b) Learnt how to apply maths skills in real-life situation..

c) Sharing, making decisions, problem solving, empathy, removing fear, love for nature.

QUESTION 7

In a cleanliness drive, students of adventure camp joined together to clean the tent area. Participation of boys was 20 more than that by girls taking x as number of girls and y as number of boys

- (a) Form a linear equation (2)
- (b) Draw the graph of the linear equation (2)
- (c) What values are depicted here (1)

Ans :

(a) $Y = x + 20$

(b) Drawing the graph

(c) Value : Co-operation, happiness, sincerity , environmental protection

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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

$$\begin{aligned} \text{Quantity of ice-cream} &= \frac{4}{3} \times \frac{22}{7} \times (3.5)^2 & (1) \\ &= 179.6 \text{ cm}^3 \end{aligned}$$

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

(b) We prefer shop II (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

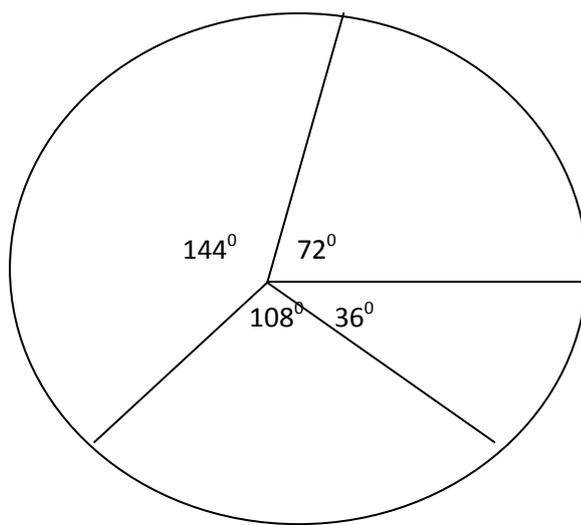
1 bus - 21 students + 4 teachers (2)

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 st attempt	10	72°
2 nd attempt	20	144°
More than 2 attempt	15	108°
Did not attempt at all	5	36°
Total	50	360°



(1 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 st kind =	Cost of 1 Kg of 2 nd kind	Rs x
130.30	Rs 153	22.50

1^(1/2)

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

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