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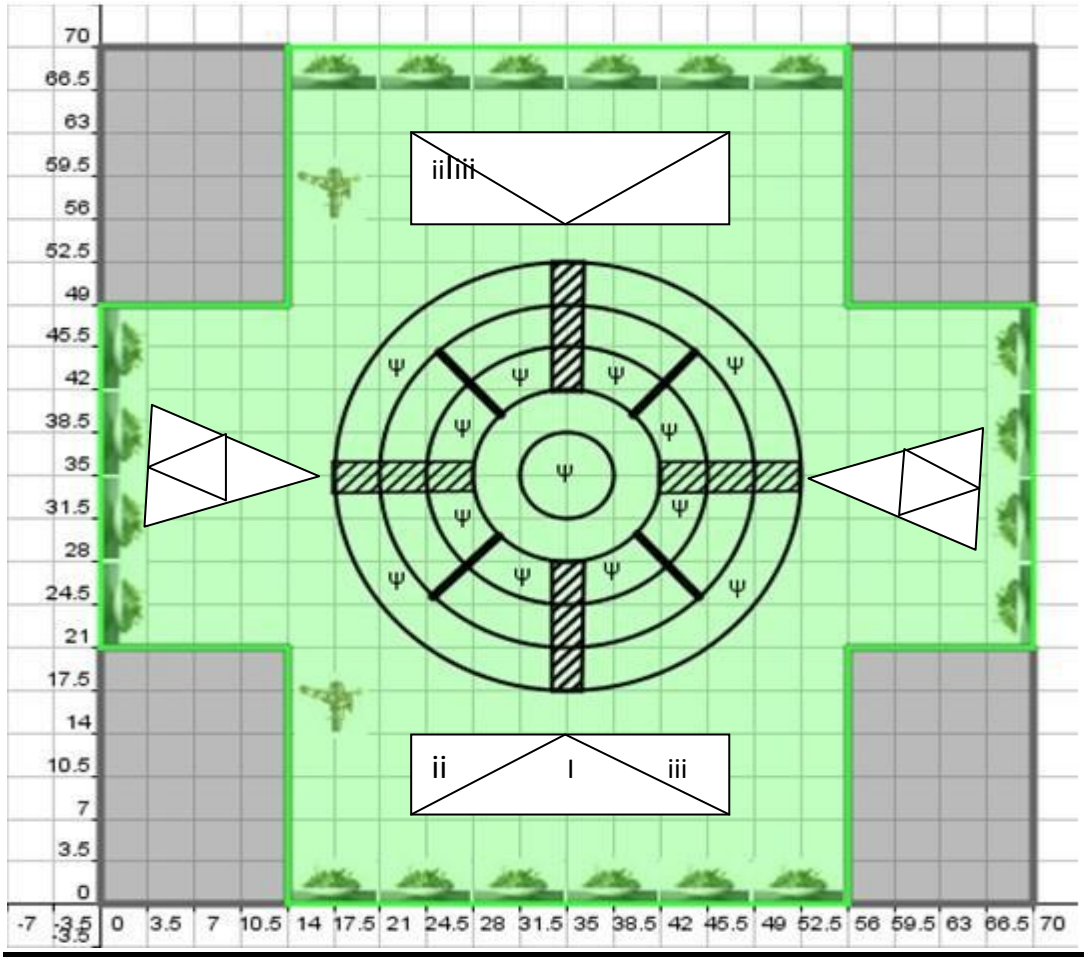
OTBA WORKSHOP IN MATHEMATICS ON 23-11-2013

THEME I

HOT QUESTIONS

QUESTION 1

Esha invited Mrs. Sharma to the garden site to show her the area selected to plant herbs. The teacher liked the way they set the area. She asked how they distributed the area. Esha explained it.



ABCD is a rectangle divided into 3 triangular regions and DEF is a triangle divided into 4 triangles where P,Q,R are the mid points of the sides of the triangle DEF.

(1) Are the triangles formed in the triangular region equal in area. Justify (3)
(2) Is the area of triangle I is equal to the sum of the areas of triangles II & III. Justify (2)

Ans :

(1) Using mid point theorem (2)
Each area of the smaller triangle = ¼ th the area of triangle DEF (1)

(2) If a parallelogram and a triangle are on the same base and between the same parallels then the area of triangle = ½ area of parallelogram. (1)
Area of triangle I = Area of triangle II + Area of triangle III

QUESTION 2

The school garden has a tank of capacity1m^3. Isl one tank of water enough to water the garden area, using the sprinkler . If each square feet of garden requires 500 ml of water,How many litres of water is required daily? How many tanks of water is required (approximately) daily?

Ans :

1m^3 = 1000 Litre($\frac{1}{2}$)

Area of the garden= $70 \times 70 - 4 \times 21 \times 4$

$= 4900 - 1176$

$= 3724$ Sq. ft (1)

Water required for 1 sq. ft of garden = 500 ml

Water required for 3724 sqft of garden = 3724×500

$= 1862000$ ml

$= 1862$ Litres (1)

One tank is not enough.

The garden requires 2 tanks of water daily approximately. ($\frac{1}{2}$)

QUESTION 3

From the given sprinkler, the water can go a maximum distance of 17.5 feet.

If the sprinkler rotates only 120^0 then how much area of the garden can wet it (3)

Ans :

$\theta = 120^0$

r = 17.5 feet ($\frac{1}{2}$)

area = 1/3 Area of the circle.

$= \frac{\pi r^2}{3}$ (1)

$= \frac{22}{7} \times 17.5 \times 17.5 \times \frac{1}{3}$ (1)

= 320.6 sq.feet ($\frac{1}{2}$)

QUESTION 4

1 (a) How many litres of pesticide is needed to apply in the herbal garden if 1 litre is required for 100 square feet (3)

(b) Pesticides are available in cans 1 litre each. How many cans are required to be purchased? What will be the cost of this pesticide (2)

Ans :

(a) Area of total land = $70 \times 70 = 4900$ sq. feet

Area of 1 room = (21×14) sq. feet

Area of 4 rooms = $4 \times (21 \times 14)$

= 1176 sq. feet (1)

Area of herbal garden = Area of land – area of 4 rooms

= 4900 – 1176 = 3724 sq. feet (1)

Quantity of pesticide needed for 100 sq. feet = 1 litre

Quantity of pesticide required for 3724 sq. feet = $\frac{3724}{100}$ = 37.24 litre (1)

(b) Quantity of pesticide in 1 can = 1 litre

So for 37.24 we have to buy 38 cans (1)

Cost of 1 litre of pesticide = ` 450

Cost of 38 cans = 450×38

= ` 17100 (1)

QUESTION 5

A sprinkler can throw water up to a distance of 10 feet. How much area correct to nearest sq. metre can be watered using four such sprinklers if they are placed in such a way that the area watered is maximum. ($\pi = 3.14$) (3)

Ans :

r = 10 feet

Area watered by one sprinkler = πr^2

$= \pi \times 10^2$

$= 3.14 \times 100$ sq. feet

= 314 sq. feet (1)

Area watered by 4 sprinkl = 3.14×4 sq. feet

$= 1256$ sq. feet

$= 1256 \times 0.0929\ m^2$

$= 116.68\ m^2$

$= 117\ m^2$ (1)

To make area watered by them maximum they must be placed so that area watered does not overlap (1)

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THEME II

HOT QUESTIONS

QUESTION 1

From the bar graph (pg 11) oftheme 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 1^{st}attempt= 10

% of group sucssesfull = 10/50x 100%=20% (1)

(b) No: of people successful in 2^{nd}attempt= 20

% of people sucssesfull in 2^{nd} attempt=$\frac{20}{50}$x100=40% (1)

QUESTION 2

You meet the manger 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 say the QE $B=T^2+150-1600$ 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.

So eln is $0= T^2+ 150T- 1600$ (1)

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

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

$T=10$ or $T=-160$ (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 4times its diameter and the volume of the cam 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?

$h=4 \times 2r = 8r$ (½)

$v= \pi r^2 h$ (½)

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

$= 8\pi^3$ (2)

$8\pi r3= 25$ (1)

$r=\sqrt[3]{25/8\pi}$(½)

$h=8\times\sqrt[3]{25/8\pi}$(½)

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×volume of cylindrical cup=volume of hemisphere

$2/3\times\pi\times R^2H=2/3\pi r3$

$2/3\times\pi\times3.5^2\times10.5=2/3\pi r^3$ (1)

$r^3=3.52 \times10.5$ (1)

$r^3=3.52 \times3.5\times3$

r3=3.5 3 3 cm(1)

QUESTION 5

If the canvas after utilising $1m^2$ 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:

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

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

2(l+b)h + l×b =550m2

2(25+15)h +25×15=550

80h+375 =550

80h=175

h=175/8O=2.1875m

Height of the tent =2.1875m

Volume of air=l×b×h =(25×15×2.1875)m3

=820.3125 m^3 =820 m^3(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 =$\pi r^2 h$

=22/7×7/2×7/2×21/2

=404.25 cm3

volumeof hemispherical bowl =$\frac{2}{3}\pi r^3$

=2/3×22/7×7/2×7/2×7/2

=89.83cm3

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

=2/3×22/7×7/2×7/2×7/2

22/7×7/2×7/2×21/2

=2/3×7/2×2/21

=2/9

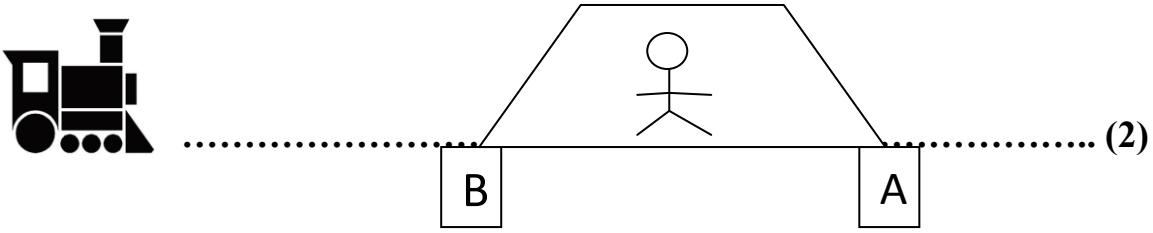
=2:9

(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 :



…… …….. **(2)**

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

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