DELHI PUBLIC SCHOOL

SESSION 2017-18

Question Bank

Class:- IX Subject:- Maths

1. If $a=b^{3x}$, $b=c^{3y}$ and $c=a^{3z}$, then find xyz

Sol:- $a= b^{3x}$

Or $a= (c^{3y})^{3x}$ ($\because$ $b=c^{3y}$)

Or $a= c^{9xy}$

$a= (a^{3z})^{9xy}$ ($\because c=a^{3z}$)

$a= a^{27xyz}$

$27\ xyz= 1$

Or $xyz= \frac{1}{27}$

2. If $x= 2+\sqrt{3}$ **,** find the value of $x^3+ \frac{1}{x^3}$

Sol:- $x= 2+\sqrt{3}$

$\frac{1}{x} = \frac{1}{2+\sqrt{3}}$

$\frac{1}{x} = \frac{1}{2+\sqrt{3}} \times \frac{2-\sqrt{3}}{2-\sqrt{3}}$

$\frac{1}{x} = \frac{2-\sqrt{3}}{2^2-(\sqrt{3})^2}$

$\frac{1}{x} = \frac{2-\sqrt{3}}{4-3}$

$\frac{1}{x} = 2 - \sqrt{3}$

$X^3+\frac{1}{x^3} = (2+\sqrt{3})^3 + (2-\sqrt{3})^3$

$= 8+3\sqrt{3}+ 6\sqrt{3}(2+\sqrt{3}) +8- 3\sqrt{3}- 6\sqrt{3}(2-\sqrt{3})$

3. If $x^2 - 1$is a factor of $ax^4+bx^3+cx^2+dx+e$, show that a+c+e = b+d.

Sol:- $P(x) = ax^4+bx^3+cx^2+dx+e$

And $g(x) = x^2 - 1=(x-1)(x+1)$

when (x+1) is factor of P(x) then P(-1) = 0

or $a(-1)^4+b(-1)^3+c(-1)^2+d(-1)+e = 0$

a-b+c-d+e= 0

a+c+e = b+d

4. Factorise $x^2 - 1- 2p - p^2$

Sol:- $x^2 - (1+2p+p^2)$

$=x^2 - (1+p)^2$

= (x+1+p)(x-1-p)

5. In which quadrant or on which axis the following points lies

(1,-2), (2,3), (-4,3), (0,5), (-6,-7)

Sol:- (1,-2)---------- IV quadrant

(2,3)---------- I quadrant

(-4,3)----------II quadrant

(0,5)---------- on y-axis

(-6,-7)----------III quadrant

6. find k if x=2 and y=1 is solution of x+5y = k

Sol :- at x=2 and y= 1,

2+ 5(1) = k

2+5 = k

K = 7

7. If F = 9/5 C + 32, find (i) C if F=40∘ (ii) F if C=-40∘

Sol:- (i) if F= 40∘ then 40 = 9/5C + 32

40-32= 9/5C

8×5= 9C

C= 40/9

(ii) if c= -40∘ $F = \frac{9}{5}(-40) + 32$

F = -72+32

F = -40∘

8. If x+y =10 and x=z, then show that y+z=10, by using appropriate Euclid's axom.

Sol:- x+y=10

or x= 10 – y

But x=z

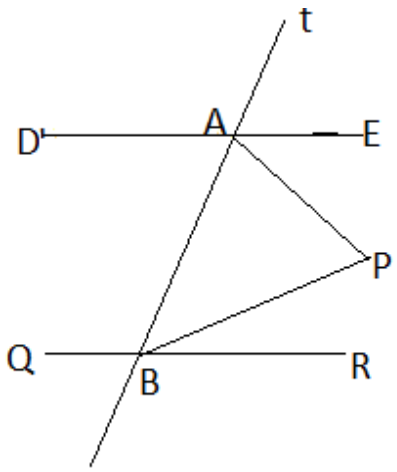
By using Euclid's axiom 1 .i.e. things which are equal to same thing are equal to one another.

So, x= 10- y

$$\therefore \boldsymbol{y + z = 10}$$

9. DE‖ QR and AP and BP are bisectors of $\angle EAB$ and $\angle RBA$ respectively. Find $\angle APB$.

Sol. DE‖ QR



$\angle PAB = \frac{1}{2}\angle EAB$

$\angle PBA = \frac{1}{2}\angle ABR$

AB is transversal,$\therefore$ $\angle EAB+\angle ABR = 180°$

$\frac{1}{2}\angle EAB+\frac{1}{2}\angle ABR = \frac{1}{2}180°$

$$\angle PAB + \angle ABP = 90°$$

In ΔABP,

$$\angle PAB + \angle ABP + \angle APB = 180°$$

$$90° + \angle APB = 180°$$

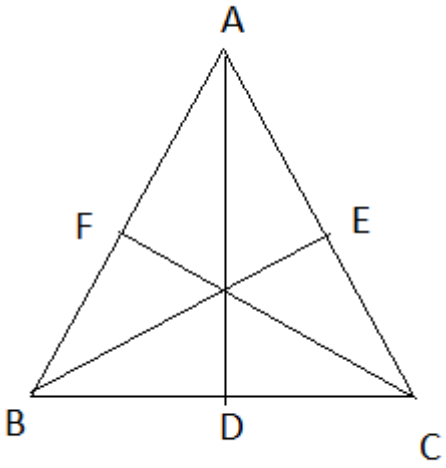
$$\angle \mathrm{APB} = 90°$$

10. Prove that medians of equilateral triangle is equal.

Sol.

Given:- ABC is an equilateral triangle in which AB=BC=CA and $\angle A = \angle B = \angle C = 60°$. AD, BE and CF are the medians.

To Prove:- AD=BE=CF



Proof:- AB=AC

$\frac{1}{2}$ AB = $\frac{1}{2}$AC

BF = CE

In ΔBCF and ΔCBE

BC = CB (common)

$\angle FBC = \angle ECB$ (Each 60°)

BF = CE (proved)

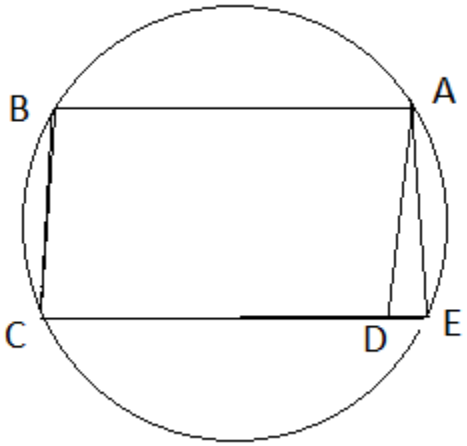
∴ ΔBCF≅ ΔCBE (SAS)

So, CF = BE (cpct)

Similarly, AD = BE

Hence AD = BE = CF

11**.** ABCD is a parallelogram. The circle through A,B,C intersect CD



produced at E. Prove that AD=AE.

Sol. Given:- ABCD is a parallelogram and ABCE is a cyclic quadrilateral.

To Prove:- AD=AE

Proof:- ABCD is a parallelogram

$\angle ABC = \angle ADC$ (opposite angles of parallelogram)-----1

ABCD is a cyclic quadlateral

$\angle ABC + \angle AEC = 180°$

$\angle ADC + \angle AEC = 180°$ --------(use 1)

But $\angle ADE + \angle ADC = 180°$ (linear pair)

$\angle ADC + \angle AEC = \angle ADE + \angle ADC$

0r $\angle AEC = \angle ADC$

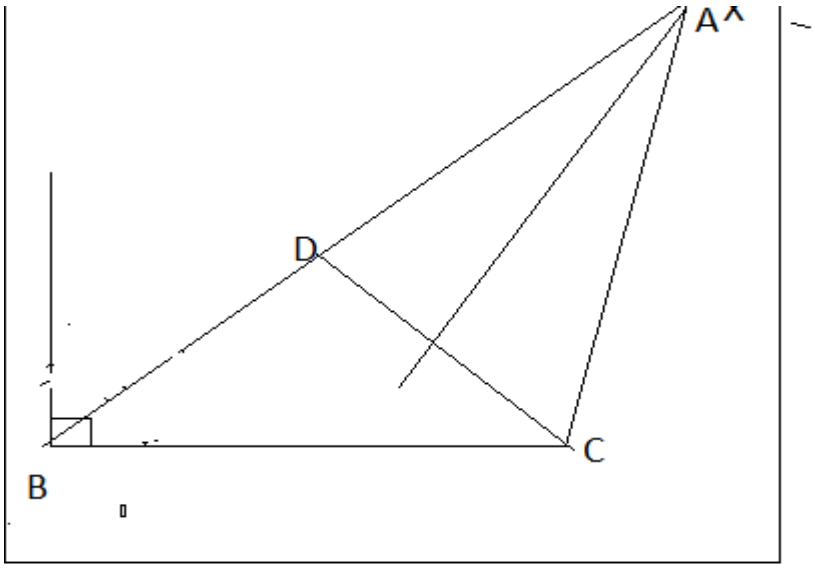
$\therefore In$ **ΔADE. AD=AE**

($\because$ ***In a*** Δ ***sides opposite to equal angles are equal***)

12. Construct a triangle ABC in which BC = 8cm, $\angle B = 45°$, and

AB – AC = 3.5 cm.

Sol:-



steps of construction:-

1. Draw a line segment of length 8 cm
2. At B draw an angle of 45° i.e $\angle XBC = 45°$
3. With B as centre and radius = 3.5 cm cut an arc on BX at D
4. Join DC
5. Draw perpendicular bisector of DC so that it intersect BD produced at A

6. Join AC

   Hence ABC is required triangle.

13. If each side of triangle is doubled , then find the ratio of area of new triangle formed and of given triangle.

Sol. let a, b and c are sides of given triangle

$S=\frac{a+b+c}{2}$

Then area of triangle, according Heron's formula

$A=\sqrt{s(s-a)(s-b)(s-c)}$

When sides are doubled,

$S_1=\frac{2a+2b+2c}{2}$ = a+b+c = 2s

Then area of new triangle (A_1) = $\sqrt{s_1(s_1-a)(s_1-b)(s_1-c)}$

$=\sqrt{2s(2s-2a)(2s-2b)(2s-2c)}$

$= \sqrt{2\times 2\times 2\times 2\times s(s-a)(s-b)(s-c)}$

$= 2\times 2\sqrt{s(s-a)(s-b)(s-c)}$

$A_1 = 4\times A$

Hence, $\frac{\mathbf{A1}}{\boldsymbol{A}} = \frac{\mathbf{4}}{\mathbf{1}}$

14. Length, breadth and height or room are 5m, 4m, and 3m respectively. Find the cost of whitewashing its wall and ceiling at the rate of Rs 7.50 per m^2.

Sol. length(l) = 5m, Breath(b) = 4m, Height(h) = 3m.

Area of room to be whitewashed = Lateral surface area + area of ceiling

= 2h(l+b) + l×b

= 2×3(5+4) + 5×4

= 6(9) + 20

$= 54 + 20$

$= 74\ m^2$

cost of painting = 7.50 × 74 = Rs 555

15. A hemispherical bowl is made of steel of thickness 0.25cm. the inner radius of bowl is 5cm. find the outer curved surface area.

Sol. rad.(r) = 5cm

Thickness = 0.25cm

outer radius (R) = 5+ 0.25 = 5.25cm

outer curved surface area = $2\pi r^2$

$= 2\times\frac{22}{7} \times 5.25\times 5.25$

$= 173.25\ cm^2$

16. How many lead balls, each of radius 1cm, can be made from sphere of radius 8cm.

Sol. radius of big sphere (R) = 8cm.

Radius of lead ball (r) = 1cm

No. of lead balls = $\frac{volume\ of\ big\ sphere}{volume\ of\ lead\ ball}$

$= \frac{\frac{4}{3}\pi R^3}{\frac{4}{3}\pi r^3}$

$= \frac{R^3}{r^3}$

$= \frac{8^3}{1^3}$

$= \frac{512}{1}$

$=$**512**

17. Conical pit of top diameter 3.5m is 12m deep. Find capacity of pit in kilolitres?

Sol. Diameter = 3.5 m

Radius (r) = 3.5/2 = 1.75m

Height (h) = 12m

Volume of pit = $\frac{1}{3}\pi r^2$h

$=\frac{1}{3} \times \frac{22}{7}$ 1.75×1.75×12

= 38.5m^3 = 38.5 kl ($\because 1kl = 1m^3$)

18. Number of runs scored by a cricket player in 25 innings are as follow:

26, 35, 94, 48, 82, 105, 53, 0, 39, 42, 71, 0, 64, 15, 34, 67, 0, 42, 124, 84, 54, 48, 139, 64, 47.

Sol. smallest value = 0

Largest value = 139

Range = 139-0 = 139

score	Tally marks	frequency	Cumulative frequency
0-20	IIII	4	4
20-40	IIII	4	8
40-60	~~IIII~~ II	7	15
60-80	IIII	4	19
80-100	III	3	22
100-120	I	1	23
120-140	II	2	25

19. Median for the data is 63. Find x for data arranged in ascending order

29, 32, 48, 50, x, x+2, 72, 78, 84, 95.

Sol. median = $\frac{x+x+2}{2}$

$63 = \frac{x+x+2}{2}$

$63 \times 2 = 2x + 2$

$126 - 2 = 2x$

$2X = 124$

X= 62

20. Find mean, mode and median for data.

12, 18, 13, 19, 15, 14, 17, 16.

Sol. Mean = $\frac{sum\ of\ values}{total\ values}$

$= \frac{12+18+13+19+15+14+17+16}{8}$

$= 124/8$

$= 15.5$

For median arrange data on ascending order

12, 13 , 14, 15, 16, 17, 18, 19

Here, n= 8 , which is even

Median = $\frac{n}{2}th, (\frac{n}{2}+1)$th

$= \frac{4th+5th}{2}$

$= \frac{15+16}{2}$

$= \frac{31}{2}$

=15.5

Mode = 3median – 2 mean

$= 3 \times 15.5 - 2 \times 15.5$

$= 46.5 - 31$

= 15.5

21. In sample of a die. Find the probability of

(i) an odd prime
(ii) a number less than 6
(iii) an even number.
(iv) a number more than 7.

Sol. total out comes = 6

P(odd prime) = 2/6 =1/3
P(a number less than 6) = 5/6
P(an even) = 3/6 = ½
P(a number more than 7) = 0/6 = 0.

22. From a deck of playing cards, find probability of

(i) a red king
(ii) an ace of club
(iii) a face card
(iv) a black card.

Sol. total cards = 52

P(red king)=2/52=1/26
P(an ace of club) = 1/52
P(a face card) = 12/52=4/13
P(a black card) = 26/52=1/2

23. A box contain 550 bulbs out of which 22 are defective. One bulb is taken out at random from a box. find the probability of getting (i) a defective bulb

(ii) a good bulb.

Sol. total bulbs = 550

No. of defective bulb = 22

P(defective bulb) = 22/550 = 0.04

P(good bulb) =528/550= 0.96

24. Find 6 rational number between 1/3 and 2/5

Sol. a=$\frac{1}{3}$ and b= $\frac{2}{5}$

LCM of 3 & 5 = 15

a=$\frac{1\times5}{3\times5}$ = $\frac{5\times10}{15\times10}$ =$\frac{50}{150}$

b= $\frac{2\times3}{5\times3}$ = $\frac{6\times10}{15\times10}$ = $\frac{60}{150}$

required numbers are $\frac{51}{150}, \frac{52}{150}, \frac{53}{150}, \frac{54}{150}, \frac{55,}{150}, \frac{56}{150}$

25. If a+b = 9, ab= 7 find $a^3+ b^3$

Sol. a+b = 9

cubing both sides

$(a+b)^3= 9^3$

or $a^3+ b^3+ 3 ab (a+b) = 729$

$a^3+ b^3+ 3 \times7\times 9 = 729$

$a^3+ b^3+ 189 = 729$

$a^3+ b^3= 729 – 189$

$a^3+ b^3 = 540$