Sample Paper – 2009
Class – X
Subject – Mathematics

Maximum Marks: 80 Time: 3 hours

General Instructions:

1. All questions are compulsory.
2. The question paper consists. of 30 questions divided into 4 sections A,B, C and D. Section A comprises of 10 questions of 1 mark each, Section B comprises of 5 questions of 2 marks each , Section C comprises of 10 questions of 3 marks each and Section D comprises of 5 questions of 6 marks each.
3. All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.
4. There is no overall choice. However, internal choice has been provided in one question of 2 marks each, three questions of 3 marks each and two questions of 6 marks each. You have to attempt only one of the alternatives in all such questions.
5. In question on construction, drawings should be neat and exactly as per the given measurements.
6. Use of calculators is not permitted.

SECTION - A

1. $5\times7\times13\times17+17$ is a composite number because……

2. Find the zeroes of the quadratic polynomial $x^2 + 7x + 10$, and verify the relationship between the zeroes and the coefficients.

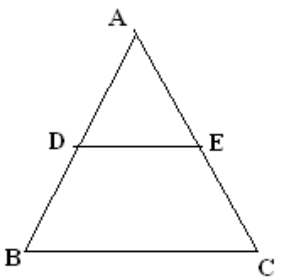
3. Find the value of **k** if $kx^2-2\sqrt{2}x+1=0$ has equal roots

4. Express $\sin 72^0+\cos 81^0$ in terms of trigonometric ratios of angles between 0^0 and 45^0

5. How many terms of the AP $-6,-\frac{11}{2},-5$..... will give the sum zero

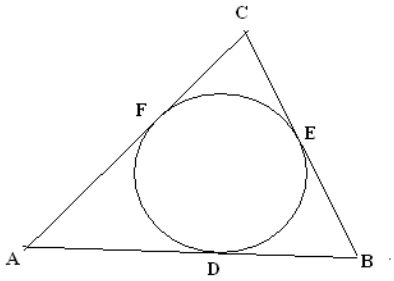
6. The lengths of two cylinders are in the ratio 3 : 1 and their diameters are in the ratio 1 : 2. calculate the ratio of their volumes.

7. In the given figure DE is parallel to BC and $AD:DB=2:3$ determine $ar(\Delta ADE):ar(\Delta ABC)$



8. A circle is inscribed in ΔABC having sides AB = 8 Cm ,BC = 10 Cm , and AC= 12 Cm

9. Find the value of (secα+tanα) (secα---tanα)



10. One letter is selected at random from the word '**UNNECESSARY**'. Find the probability of selecting an E.

SECTION --B

11. Prove that $(1-\sin^2\alpha)(\sec^2\alpha)=1$

12. Find the value of **k** for which the system of equations has infinite number of solutions

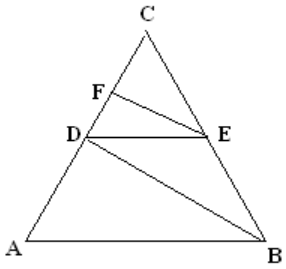
$$4x + y = 3$$
$$8x + 2y = 5k$$

13. Without using trigonometric table find the value of

$$\frac{Sin50^0}{Cos40^0} + \frac{Co\sec 40^0}{Sec50^0} - 4Cos50^0 \times Co\sec 40^0$$

14. Determine the ratio in which the point $(-6, a)$ divides the join of $A(-3,-1)$ and $B(-8,9)$ also find the value of **a.**

15. In the figure ,AB parallel to DE and BD parallel to EF , is $CD^2 = CF \times CA$ justify your answer



SECTION - C

16. In a single throw of dice , find the probability of getting

i) Prime numbers ii) even no.

17. Find the HCF of 426 and 576 using Euclid's division algorithm

18. Draw the graph of $x-y+1=0$ and $3x+2y-12=0$ and show that there is a unique solution .Calculate the area bounded by these lines and **x**-axis

19. A polygon has 10 sides .The lengths of the sides starting with the smallest form an AP .If the perimeter of the polygon is 420 cm and the length of the longest side is twice that of the shortest side .Find the first term and the common difference of the AP

20. Solve x and y: $\frac{3}{x+y}+\frac{2}{x-y}=2, \frac{9}{x+y}-\frac{4}{x-y}=1$

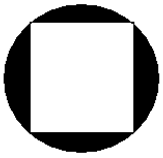
21. Prove that $(\sin A+\operatorname{cosec} A)^2+(\cos A+\sec A)^2=7+\tan^2 A+\cot^2 A$

22. Find the area of the triangle formed by joining the mid points of the sides of the sides of triangle whose vertices are $(4,-7)$, $(-8,7)$, $(10,13)$.

23. A two digit number such that the product of its digit is 35 when 18 is added to the number the digits inter change their places Find the number.

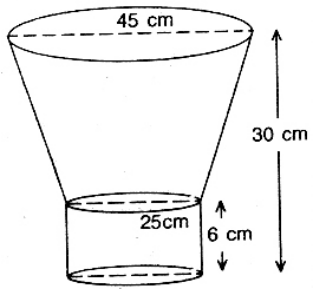
24. Draw a triangle ABC with side $BC=6cm$, $\angle B=30^0, \angle A=120^0$ then construct a triangle whose sides are $\frac{4}{3}$ times the corresponding sides of ΔABC.

25. A square ABCD is inscribed in a circle of radius 10 units .Find the area of the circle, not included in the square (use $\pi=3.14$)



SECTION- D

26A metallic bucket is in the shape of a frustum of a cone mounted on a hollow cylindrical base given in the figure. If the diameters of two circulars ends of the bucket are 45cm and 25 cm, total vertical height is 30 cm and that of the cylindrical portion is 6 cm, find the area of the metallic sheet used to make the bucket. Also find the volume of water it can hold.



27.A train covers a distance of 90 km at uniform speed .Had the speed been 15 km /hr more. It would have taken 30 minutes less for the journey find the original speed of the train

28.The angle of elevation of a jet plane from a point A on the ground is 60^0 .After a flight of 15 seconds , the angle of elevation changes to 30^0 .If the jet plane is flying at a constant height of $1500\sqrt{3}\ m$, find the speed of the jet plane

29.Prove that in a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

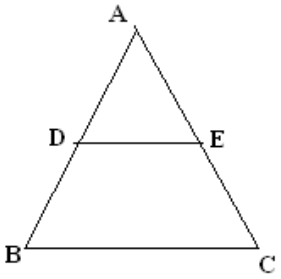
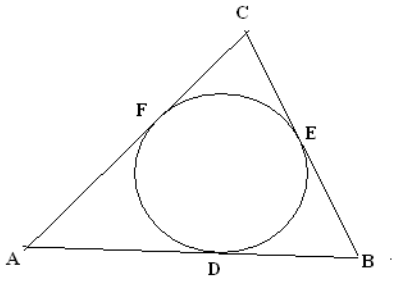
Using the above solve the following

L and M are the mid points of AB and BC respectively of ΔABC, right angled at B prove That $4LC^2 = AB^2 + 4BC^2$

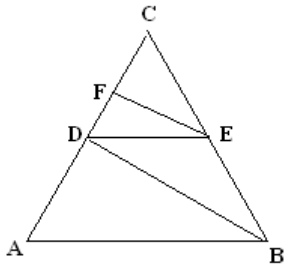
30.Find the median of the following data

Class interval	110-119	120-129	130-139	140-149	150-159	160-169	170-179
Frequency	5	25	40	60	40	25	5

Q NO.	VALUE POINTS	MARKS
1	5X7X13X17+17 is a composite number because of this is a product of all prime numbers 17(2x2x2x2x3x19)	1 marks
2	Factorise the polynomial $x^2+7x+10=0$ x—2, -5 sum of zeros- = --2+--5=-7 =--co-efficient of x/co-efficient of x2 =-7/1=-7 products of zeros= -2x-5=10 =constant term/co;efficient of x^2	1/2marks ½ marks
3	For equal roots b^2—4ac=0 a=k b=-2 $\sqrt{2}$ c=1 $(=-2\sqrt{2})^2$--- 4x1x1=0 8-4k=0 K=2	½ marks 1/2marks
4	$Sin72^0+cos81^0$) Sin(90-18) +cos(90—9) Cos18+sin9	1marks
5	a=-6 d=1/2 $s_n=n/2[2a+(n-1)d]$ n/2[2x(-6)+(n-1)1/2]=0	½ marks

	$-24n+n^2$—n=0 **$25n^2$=n** **n=25**	**1x1/2 marks**
6	**H_1=height of 1st cylinder =3x D_1=2y R_1=y** **H_2height of 2nd cylinder =x d_2=y R_2=y/2** **$V_1=\pi(R_1)^2H_1$** **$V_2=\pi(R_2)^2H_2$** **Ratio=π YxY X3x/ π X(y/2)x(y/2)X x=3:4**	**1marks** **1marks**
7	**DEII BC (given)** **AD:DB=2:3** **AB=2+3=5**  **Ar(ADE)/ar(ABC)=$(AD)^2/(AB)^2$=[2/5]^2=4:25**	**½ marks** **1/2marks**
8	 LET THE tangent drawn from the external point are eqal in length AD=AF= xsay AB=12cm BD=BE =y say BC=8cm CE=CF =z say AC=10cm X+y=12 cm Y+z=8cm Z+x=10cm X+y+y+z+z+x=12+8+10 2(x+y+z)=30 X+y+z=15 x+y=15 By solving z=3	**½ marks** **½**

	Similarly we can get AD=7 BE=5	**marks**
9	(secα+tanα) (secα---tanα)= ((sec^{2}α--tan^{2}α)=1 By using identity a^2—b^2= (a+b)(a—b)	**1 marks**
10	Total no. words =11 No. of words (E)=2 P(E)= 2/11	**½ Marks** **½ marks**
11	(1---sin^{2}α)(sec^{2}α)=1 L.H.S. (cos$^2\theta$)(sec$^2\theta$)= (cos$^2\theta$)X1/(cos$^2\theta$)=1	**1+1 marks**
12	For infinite no.of solutions $\frac{a1}{a2}=\frac{b1}{b2}=\frac{c1}{c2}$ $\frac{4}{5}=\frac{1}{2}=\frac{3}{3k}$ $By\ solvtng \quad k=\frac{6}{5}$	**½ Marks** **1 ½ marks**
13	$\frac{sin60}{cos40}+\frac{cosec40}{sec50}$- 4cos50^0 X cosec40^0 $(\frac{sin(90-40)}{cos40}+\frac{cosec(90-50)}{sec50}$--4cos50X Cosec(90-50) $\frac{cos40}{cos40}+\frac{sec50}{sec50}$-- 4cos50 X sec50 1+1—4 cos50x $\frac{1}{cos50}$ 1+1—4 x1x1= 2 -4=--2	**1 Mark** **1mark**
14	——————————— A(-3,-1) P(-6,a) B(-8,-9) Let point P divide the line AB in ratio k:1 By using section formula	

	$\frac{-6}{1}=\frac{-8k-3}{k+1}$ *By solving* We get k=3:2 To apply section formula $Y=\frac{3(9)+(-1)2}{3+2}$ Y=5 which is equal to a	**1 Marks** **1marks**
15	 In triangle BCD CF/CD= CE/CB (by BPT) ------ 1 In triangle ABC CD/AC= CE/ CB (by BPT)------2 R.H.S of both equqtion is equal So CF/CD= CD/AC CD xCD= AC XCF CD^2 =AC xCF	**1 Mark** **1 mark**
16	Total outcomes = [1,2,3,4,5,6] =6 Prime nmbers= (2,3,5) P (prime no.)= 3/6=1/2 Even no.= (2,4,6) P(even no.)= 3/6=1/2	**1mark** **1mark** **1mark**

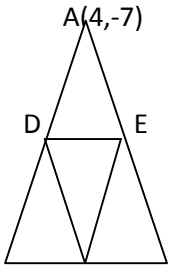
<table>
<tr><td></td><td></td><td></td></tr>
<tr><td>17</td><td>576=426x1+150
426=150x2+126
150=126x1+24
126=24x5+6
24=6x4+0</td><td>1mark
1mark
1mark</td></tr>
<tr><td>18</td><td>Draw the table of equation x-y=-1
<table><tr><td>X</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr><tr><td>y</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>Table for 3x+2y=12
<table><tr><td>X</td><td>2</td><td>4</td><td>6</td><td>8</td><td></td></tr><tr><td>y</td><td>-3</td><td>0</td><td>3</td><td>-6</td><td></td></tr></table>Draw neat & clean graph</td><td>1mark
2mark</td></tr>
<tr><td>19</td><td>N=10 perimeter=420
Let smallest side =x (1st term)
Largest side (a_{10})= 2x (last term)
S_n= n/2(a+l)
420=10/2(x+2x)
By solving we get x=28

Last term= 2x= 2x28=56
l= 2a+(n-1)d

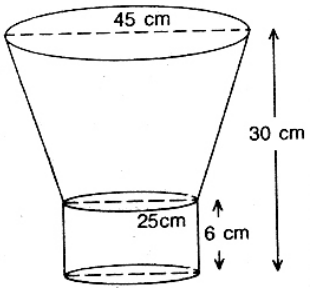
56=2x28+(10-1)d

D=28/9</td><td>1mark
1mark
1mark</td></tr>
<tr><td>20</td><td>3/x+y +2/x-y =2

9/x+y --- 4/x-y =1</td><td>1mark</td></tr>
</table>

	Let 1/x+y=a 1/x-y=b 3a+2b=2 9a-4b=1 By using elimination method A=1/3 b= ½ 1/x+y=1/3 1/x-y=1/2 X+y=3 x-y=2 By solving we get X=5/2 y=1/2	**1mark** **1mark**
21	$(\sin A+\operatorname{cosec} A)^2+(\cos A+\sec A)^2=7+\tan^2 A+\cot^2 A$ $\sin^2 A+\operatorname{cosec}^2 A+2\sin A\operatorname{cosec} A+\cos^2 A+\sec^2 A+2\cos A\sec A$ $(a+b)^2=a^2+b^2+2ab$ by using this identity $\sin^2 A+\cos^2 A+2\sin A\operatorname{cosec} A+2\cos A\sec A+\operatorname{cosec}^2 A+\sec^2 A$ $1+2\sin A \times 1/\sin A+2\cos A \times 1/\cos A+1+\cot^2 A+1+\tan^2 A$ $1+2+2+1+1+\cot^2 A+\tan^2 A$ $7++\cot^2 A+\tan^2 A$	**1mark** **1mark** **1mark**
22	 B(-8,7) F C(10,13) A(4,7) B(-8,7) C(10,13) D is the mid point of AB Eis the mid point of AC Fis the mid point of BC	

	By mid point formula The co-ordinate of D= 4-8/2=-2 7-7/2=0 (-2,0) The co-ordinate E=4+10/2=7 -7+13/2=-6 (7,-6) The co-ordinate of F= -8+10/2=1 , 13+7/2=10 (1,10) The co-ordinate of triangle DEF is (-2,0) (7,-6) (1,10) The area of triangle DEF is =1/2 $[x_1(y_2-y_3) + x_2(y_3-y_1)+x_3(y_1-y_2)]$ =1/2 [-2(-6-10) +7(10-0)+1(-2+6)] By solving we get = -81/2= -40.5 square unit	**2 Marks** **1marks**
23	LET the unit digit be =x Tens digit =y x X y= 35 According to the question 18 + (x +10y)=(10x +y) 9x-- 9y=18 x-y=2 y= x-2 x X (x-2)=35 x^2-2x-35=0 x^2-7x+5x-35=0 x(x-7) +5(x-7)=0 (x-7)(x+5)=0 X=7, x=-5 X=-5 is regect X=7 y=5	**1mark** **1mark** **1mark**
24	To draw neat and clean diagram Hint -- to calculate angle C= 180-30-120=30^0	**3marks**
26		



H= 30-6=26 r=25/2 R=45/2

Capacity of the bucket= volume of frustum

$V= 1/3\ \pi h(R^2+Rr+r^2)$

$=1/3 \times 22/7 \times 26 (45/2 \times 45/2 +45/2 \times 25/2 +25/2 \times 25/2)$

$= 16315/2= 8157.5\ cm^3$ **2mark**

Slant height of the frustum= $=\sqrt{h^2+(R^2+r^2)}$

$=\sqrt{24^2+[(45/2)^{2(}-25/2)^2]}$

$=\sqrt{4729/2}$cm

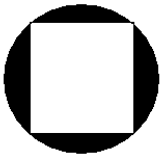
Area of metallic sheet required= c.s. of frustum +c.s. of cylinder **2mark**

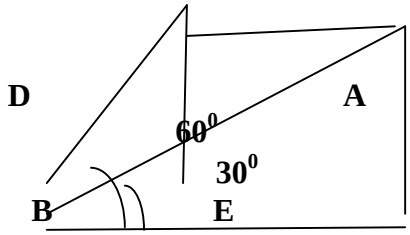
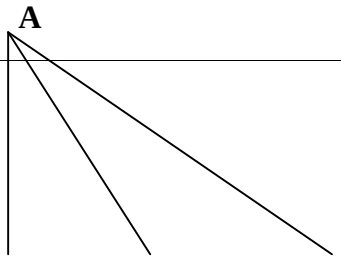
$= \pi l (R+r) + 2\pi rh$

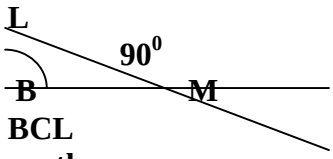
$= 22/7 \times \sqrt{4729/2} (45/2 + 25/2) \times 2 \times 22/7 \times 25/2 \times 6$

By solving youn get the solution of metal required

2marks

25	 Diagonal =20cm Raius of the circle= 20/2=10cm By pyrhagoros theorem $(side)^2+(side)^2=(\textbf{Diagonal})^2$	**2marks** **3marks**
	$2(side)^2=(\textbf{Diagonal})^2$ $(side)^2=(20)^2/2$ Side=$\sqrt{}200$ cm area of the square= =$\sqrt{}200$ x=$\sqrt{}200$ =200cm^2 area of the circle is =πr^2= 3.14x 10x10 314/100x 100= 314 cm^2 Area of the shaded region= 314-200= 114cm^2	**2marks**

27	**Total distance =90km** **Let the speed =xkm/hr** **Time = 90/x** **If the speed 15 km/hr is more then then time reduce ½ hr** **A.T.Q.** **90/x+15 +90/x= ½** **90/x+15= 180-x/2x** **90 x2x= (x+15) (180-x)** **By solving we get** **X=45 , -60** **-60 is not possible** **So speed is 45km/hr**	**2mark** **1mark**
28	 **AC is the height =DE=1500√3** **Let BC=y EC=x Distance covered in 15 sec =x** **In ABC AC/BC=tan30⁰** **1500√3/BC=1/√3** BC=4500m InBDE DE/BE=**1500√3**/BE=√3 BE=1500m Distance covered in 15 sec=EC=BC-BE=4500-1500=3000m Speed=D/T= 3000x 3600/15 x1000= 720 km/hr	**1mark** **2mark** **2mark** **1mark**
29	**To Draw diagram, Given,Construction,Toprove** **For proof**  	**2mark** **2mark**



In triangle BCL

By Pythagoras theorem

$LC^2=LB^2+BC^2$

$LC^2=(AB/2)^2+BC^2$ (L is the mid point of AB)

$LC^2=AB^2/4+BC^2$

$4\ LC^2=AB^2+4AC^2$ hence proved

1mark

1mark

30

C.I	C.I	f	c.f
110-119	109.5-119.5	5	5
120—129	119.5—129.5	25	30
130—139	129.5—139.5	40	70
140—149	139.5-149.5	60	130
150—159	149.5-159.5	40	170
160—169	159.5-169.5	25	195
170--179	169.5-179.5	5	200

2MARK

N/2= 200/2=100

Median class= 139.5—149.5 (because 100 near to 130 which is cf of this class)

Median= l + n/2—cf / f xh

2mark

=139.5 + 100- 70 /60 x 10

=139.5 + 5= 144.5

2mark

BEST OF LUCK FROM—

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