FORM 3 MATHS MARKING SCHEME

1. Solve for x: $2^{x-3} \times 8^{x^2+2}=128$ (3mks)

$2^{x-3} \times 2^{3x^2+2}=2^7$

$(x-3) +3 x276=7$

$3x^2+x-4=0$

$X=\dfrac{-1+ \sqrt{1 -4 \times 3x-4)}}{2 \times 1}$

$\dfrac{-1 + 49}{2}$

$X=-\dfrac{1+7}{2}$

$X=3$ or -4

2. Five shirts and four pairs of trousers cost a total of sh 6160. Three similar shirts and a pair of trousers cost sh 2800. Find the cost of four shirts and a pair of trousers. (4mks)

1(5s + 4t=6160	2160 + t=2800
4(3s+t=2800	t= sh 640
5s+4t=6160	(4 x 720) + (640x1)
12s+4t=11200	2880+640
7s = 5040	=sh 3520
S = sh 720	

3. Solve the equation $6X^2-13x+6=0$. Using the completing the square method. (3mks)

$6x^2-13x+6=0$ $x=13 + 0.4167$

$X2-13x+1=0$ $x=2/3$ or 1.5

$X2 + 13/6x + (13)^2= -1+(-13/12)^2$

$(x-13/12)^2=-1+1.1736$

$x-13/12= \sqrt{0.1736}$

4. The length of an arc of a circle is 1/5 of its circumference. If the area of the circle is 346.5cm². find the:

(a) The angle subtended by the arc at the centre of the circle. (2mks)

     $22/7x$ $r^2=346.5CM^2$ $1/5 X 66=13.2CM$

     $R^2=110.25$ $0/360X22/7X21=13.2$

     $R=10.5CM$ $11/60 X$ õ $=13.2$

     $22/7X21=66CM$

(b) Area of the sector enclosed by this arc. (2mks)

         $72^O/360 X 22/7 X 10.5^2= 69.3CM^2$

5. Use logarithms to evaluate $\sqrt[3]{\dfrac{1.23 \times 0.0468}{0.7782}}$ (4mks)

No	std form	log
1.23	1.23×10^{0}	0.0899
0.0468	4.68×10^{-2}	$\bar{2}.6702$ +
		2.7601
0.7782	7.782×10^{-1}	$\underline{\bar{1}.8911}$
		2.8690
0.4198	4.198×10^{-1}	$3/3 + \underline{\bar{1}.8690}$ = 1.6230

3 (4mks)

6. A perpendicular line is drawn from a point (1,2) to the line 3y+2x+1=0. Find the equation of the perpendicular in the form ay+bx+c=0 (3mks)

3y= -2x-1
Y=-2/3x – 1/3
M₁=-2/3
3/2x-2/3 M₂= -1x3/-2
M₂=3/2
$\underline{y-2=3}$
x-1   2
2y-4=3x-3
2y-3x-1=0
-3y+2y-1=0

7. Solve the equation of $0^{o} \le x \le 360^{o}$ (3mks)
Sin (2x)=0.8860
2x= sin-10.866= 60°, 120°, 420°, 480°
X= 30°, 60°, 210°, 240°

8. The sum of the ages of three sisters Rhoda, Tabitha and Sally is 39. Years. Sally is twice as old as Tabitha and one and half times as old as Rhoda. Determine their ages. (3mks)

Tabitha- x
Ally 2x
Rhoda 4/3x
X+2x+4/3x=39
3/13x 13/3x=39 x 3/13
X=9yrs
Sally=18 yrs
Tabitha=9 yrs
Rhoda= 12yrs

9. The length and breadth of a rectangular card were measured to the nearest millimeter and found to be 14.5cm and 10.6cm respectively. Find the percentage error in its area. (3mks)

Max area=14.55 x 10.65=154.9575cm2
Min area= 14.45 x 10.55= 152.4475cm2
Working area=14.5 x 10.6=153.7cm
%eror=1/2($\underline{154.975-152.4475}$) x 100%= 0.8165%
          153.7

10. Evaluate without using tables.
    Log (3x+8) – 3 log 2= log(x-4)   (3mks)
    Log (3x + 8) – Log 8 = log (x-4)
    Log $\underline{(3x+8)}$ = (log (x-4)
         8
       $\underline{3x + 8}$ = $\underline{x-4}$
        8   1
        3x + 8=8x-32
        5x=40
        X=40/5
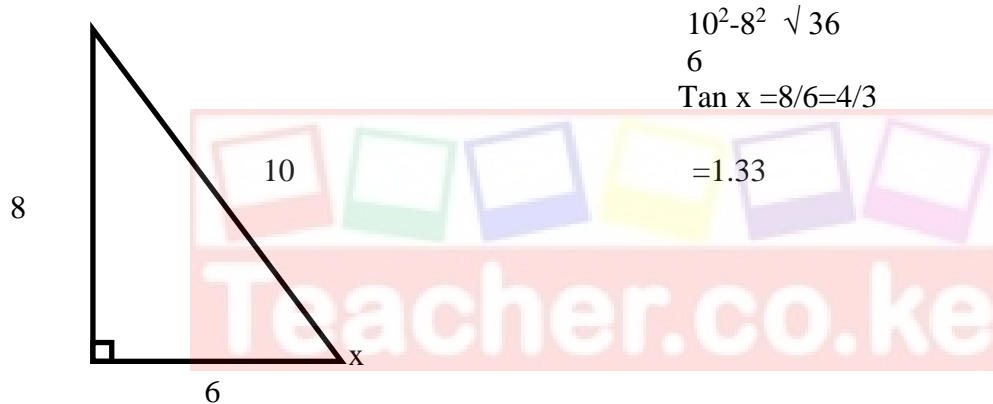   **X=8**

11. Given that sin x = 0.8 and x is an acute angle. Find tan x without using mathematical tables or a
    calculator.   (3mks)

10^2-8^2 √ 36
          6
Tan x =8/6=4/3

=1.33

8

10

6

x

12. The size of an interior angle of a regular polygon is $3x^o$ while the exterior angle is $(x-20)^o$. Find the
    number of sides of the polygon.   (3mks)

            (x-20) + 3x^o= 180°
4x=180°+ 20°
4x=200°
X=50°
Exterior angle = 50-20
= 30°
N=360°/ext
=360°/30°
=12 sides

13. Wanjiru, Atieno and Jeptoo shared the profits of their business in the ratio 3:7:9 respectively. If
    Atieno received sh 60,000. Find how much the business realized.   (3mks)

Atieno =7/19
7/19   60,000
19/19 60000 x 1x19/7= Sh 162,857.10

14. The volumes of two similar solid cylinders are $4752cm^3$ and $1408cm^3$. If the area of the curved surface of the smaller cylinder is $352cm^2$. Find the curved surface area of the larger cylinder. (3mks)

v.s.f=$\frac{4752}{1408}$ =3.375

l.s.f=3 √3.375=1.5
A.S.F=$(3/2)^2$=9/4
9/4=x/352
$\frac{4x/=9x352}{4}$ 4
X=792cm²

15. A classroom measures $(x+2)m$ by $(x-5)m$. If the area of the classroom is $60m^2$. Find its dimensions. (3mks)

(x+2) (x-5)=60
X2-5x+2x-10-60=0
X2-3x-70=0
X=$\frac{3+ 9-4x1x-70}{2}$
X=$\frac{3+17}{2}$=10m
Length=12m
Width=5m

16. Find the value of m and n given that   (2mks)

$$M\begin{pmatrix} -1 \\ 1 \end{pmatrix} -2\begin{pmatrix} 2 \\ 1 \end{pmatrix} = \begin{pmatrix} 3 \\ n \end{pmatrix}$$

-m-4=3

-m=7

M=-7

m-2=n

-7-2=n

N=-9

Section 2

Answer all questions in this section

17. Three solids, a cylinder, a sphere and a cone, are such that their radii are equal. It is also given that their surface areas are the equal. If the volume of the sphere is 904.9cm^3. Find the volume of;(Give your answers to 4 s.f)

a) The cylinder   (6mks)

$4/3$ x $22/7$ x r^3= 904.9

$21/88$ x $88/2r$ r^3=904.9 x $21/88$

R^3=215.84

R=6cm

S.A= $22/7$ x6^2x4=452.57cm^2

$22/7$x62x2=226.29cm^2

$22/7$x2x6xh=$\underline{264h}$
                              7

$\underline{264h}$ + 226.29=452.57
7

264h = 226.28

h=226.28 x 7/264

h=6cm

V $22/7$ x 6x6x6

=678.857cm^3

b) The cone.   (4mks)

$22/7$x6x6+$22/7$x6xl=452.57

113.14cm^2 + 132.l=452.57

$132/7$ x L339.43

L=339.43

L=339.43x7/132

L=18cm
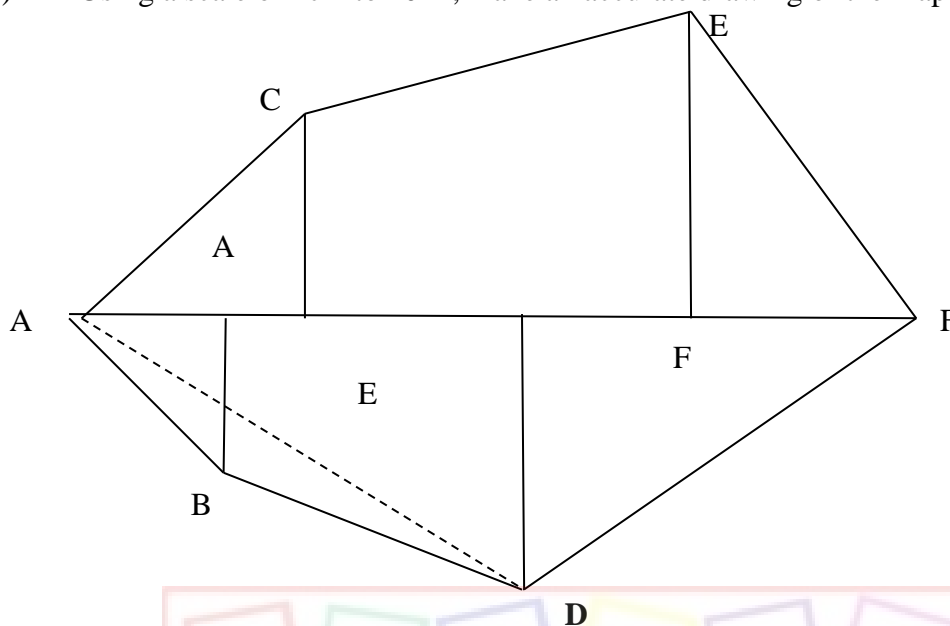
$\sqrt{18^2}$-6^2=16.97cm

V$1/3$x$22/7$x6^2x16.97

V=640.03cm^3

18. (a) A small filed was surveyed and the measurements recorded in the surveyor's filed book as in the table below.

			O	F
		100		
E	30	65		

		50	40	D
C	20	30		
		20	25	B
A	O	O		

(i) Using a scale of 1cm to 10m , make an accurate drawing of the map of the filed. (4mks)

(ii) Find the area of the field. (3mks)

A = ½ x 30x20=300m²
B = 1/2x20x25=250m²
C = ½(30+20) x 35=875m²
D= ½ x35x30=525m²
E =1/2 (25+40)30=975m²
F =1/2(50 40)=1000m²
Area= 3925m²=0.3925ha

b)Assuming that the baseline used in (a) runs in a northerly direction, give the position of D, relative to A, using bearing and distance. (3mks)

Distance = 6.4cm x 10= 64m
Bearing – 39°

19. The heights of trees seedlings in a nursery were measured and recorded as in the table below.

Height x cm	0-5	6-15	16-25	26-45	46-75
No of seedlings	7	46	71	64	11

(a) Calculate the mean height. (5mks)

Height	f	x	fx
0-5	7	2.5	17.5
6-15	46	10.5	483
16-25	71	20.5	1455.5
26-45	64	35.5	2272
46-75	11	60.5	665.5
	F199		$\Sigma fx=4893.5$

Mean(x)=$\dfrac{4893.5}{199}$

=24.59

(b) Using a scale of 1cm to represent 5 units along the horizontal axis, and a scale of 2cm to represent 5 units along the vertical axis, draw a histogram to represent the distribution. (5mks)

20. (a) Complete the table below for the equation $y=x^2+3x-6$ given $-6\leq x\leq 4$

X	-6	-5	-4	-3	-2	-1	0	1	2	3	4
Y	12	**4**	**-2**	-6	**-8**	**-8**	-6	**-2**	**4**	**12**	22

(b) using a scale of 1cm to represent 2 units in both axes draw the graph of $y=x^2+3x-6$

(c) Use the graph to solve the quadratic equations.

    (i) $X^2+3x-6=0$

        Y=x2+3x-6
        0=x2+3x-6
        Y=0 + 0 + y=0
        X=1.4 or -4.4

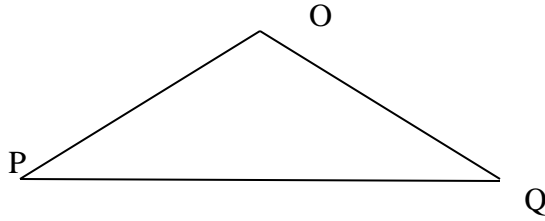   (ii) $X^2+3x-2=0$ (3mks)

Y=x^2+3x-6
0=$\underline{x^2+3x-2}$
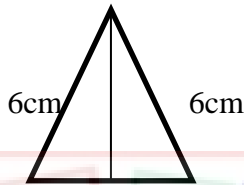**Y=0+0-4**
Y=-4

X=-3.4 or 0.5

21. (a) In the figure below O is the centre of the circle whose radius is 6cm and PQ is 9cm.

Calculate the area of major segment. (7mks)

Sin õ=4.5/6
Σ = sin $^{-1}$0.75

Õ=48.59°

2õ=97.18°

$\underline{97.18°x\ 22/7x36}=30.54cm^2$
 360

½ x 36 x sin 97.18=17.86cm²

30.54 – 17.86

=12.68cm²

$\underline{262.82°\ x\ 22/7\ x\ 36}= 82.60cm^3$
360

82.60-12.68

69.92cm²

(c) Find the area of a triangle ABC with sides 7cm, 9cm and 11cm long. (3mks)
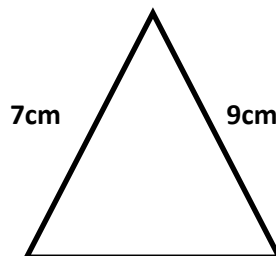
11cm

S= <u>11+9+7</u>
       2

S = 27/2=13.5

$A = \sqrt{13.5 x 2.5 x 4.5 x 6.5}$

A =31.42cm²