**MATHEMATICS FORM 3**

**MID TERM 1 EXAM, 2021**

**TIME: 2HOURS 30 MINUITES**

**Section 1: Answer all questions in this section**

1. Solve for x: 2 x-3 x 8x2+2=128 (3mks)

**2x-3 x 2 3x2+2=27**

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

**3x2+x-4=0**

**X=-1+ 1 -4x3x-4)**

**2 x 1**

**-1 + 49**

 **2**

**X=-1+7**

 **2**

**X=3 or -4**

1. 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**

1. Solve the equation 6X2-13x+6=0 . Using the completing the square method. (3mks)

**6x2-13x+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= 0.1736**

1. 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:
2. The angle subtended by the arc at the centre of the circle. (2mks)

**22/7x r2=346.5CM2 1/5 X 66=13.2CM**

**R2=110.25 0/360X22/7X21=13.2**

**R=10.5CM 11/60 X õ =13.2**

**22/7X21=66CM**

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

 **72O/360 X 22/7 X 10.52= 69.3CM2**

1. Use logarithms to evaluate 3 1.23 x 0.0468 (4mks)

 0.7782

**No std form log**

**1.23 1.23 x 10o 0.0899**

**0.0468 4.68 x 10-2 2.6702 +**

 **2.7601**

**0.7782 7.782 x 10-1 1.8911**

 **2.8690**

**0.4198 4.198x10-1 3/3 + 1.8690 = 1.6230**

 3 (4mks)

1. 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**

**y-2=3**

**x-1 2**

**2y-4=3x-3**

**2y-3x-1=0**

**-3y+2y-1=0**

1. Solve the equation of Oo< x <360o (3mks)

Sin (2x)=0.8860

**2x= sin-10.866= 60o, 120o, 420o, 480o**

**X= 30o, 60o, 210o, 240o**

1. 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**

1. 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(154.975-152.4475) x 100%= 0.8165%**

 **153.7**

1. Evaluate without using tables.

Log (3x+8) – 3 log 2= log(x-4) (3mks)

**Log (3x + 8) – Log 8 = log (x-4)**

**Log (3x+8) = (log (x-4)**

**8**

**3x + 8 = x-4**

 **8 1**

 **3x + 8=8x-32**

 **5x=40**

 **X=40/5**

 **X=8**

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

 102-82 √ 36

 6

 Tan x =8/6=4/3

 10 =1.33

8

 x

 6

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

 **(x-20) + 3xo= 180o**

**4x=180o+ 20o**

**4x=200o**

**X=50o**

**Exterior angle = 50-20**

**= 30o**

**N=360o/ext**

**=360o/30o**

**=12 sides**

1. 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**

1. The volumes of two similar solid cylinders are 4752cm3 and 1408cm3. If the area of the curved surface of the smaller cylinder is 352cm2. Find the curved surface area of the larger cylinder. (3mks)

 **v.s.f=4752 =3.375**

 **1408**

**l.s.f=3 √3.375=1.5**

**A.S.F=(3/2)2=9/4**

**9/4=x/352**

**4x/=9x352**

**4 4**

**X=792cm2**

1. A classroom measures (x+2)m by (x-5)m. If the area of the classroom is 60m2. Find its dimensions. (3mks)

**(x+2) (x-5)=60**

**X2-5x+2x-10-60=0**

**X2-3x-70=0**

**X=3+ 9-4x1x-70**

 **2**

**X=3+17=10m**

 2

**Length=12m**

**Width=5m**

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

M

 -1 -2 2 = 3

 1 1 n

**-m-4=3**

**-m=7**

**M=-7**

**m-2=n**

**-7-2=n**

**N=-9**

 **Section 2**

**Answer all questions in this section**

1. 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 904.9cm3. Find the volume of;( Give your answers to 4 s.f)
2. The cylinder (6mks)

**4/3 x 22/7 x r3= 904.9**

**21/88 x 88/2r r3=904.9 x 21/88**

**R3=215.84**

**R=6cm**

**S.A= 22/7 x62x4=452.57cm2**

**22/7x62x2=226.29cm2**

**22/7x2x6xh=264h**

 **7**

**264h + 226.29=452.57**

**7**

**264h = 226.28**

**h=226.28 x 7/264**

**h=6cm**

**V 22/7 x 6x6x6**

**=678.857cm3**

1. The cone. (4mks)

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

**113.14cm2 + 132.l=452.57**

**132/7 x L339.43**

**L=339.43**

**L=339.43x7/132**

**L=18cm**

**√182-62=16.97cm**

**V1/3x22/7x62x16.97**

**V=640.03cm3**

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

|  |  |  |
| --- | --- | --- |
|  | 100 | O F |
| E 30C 20 | 6550 3020 | 40 D25 B |
| A O | O |  |

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

 E

 C

 A

 A F

 F

 E

 B

**D**

1. 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 – 39o**

1. 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 |

1. 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 Σfx=4893.5**

**Mean(x)=4893.5**

 **199**

**=24.59**

1. 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)
2. (a) Complete the table below for the equation y=x2+3x-6 given -6<x<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=x2+3x-6

1. Use the graph to solve the quadratic equations.
2. X2+3x-6=0

**Y=x2+3x-6**

**0=x2+3x-6**

**Y=0 + 0 + y=0**

**X=1.4 or -4.4**

1. X2+3x-2=0 (3mks)

**Y=x2+3x-6**

**0=x2+3x-2**

**Y=0+0-4**

**Y=-4**

**X=-3.4 or 0.5**

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

 O

 P

 Q

Calculate the area of major segment. (7mks)

 6cm 6cm

**Sin õ=4.5/6**

**Σ = sin -10.75**

Õ=48.59o

**2õ=97.18o**

**97.18ox 22/7x36=30.54cm2**

 **360**

**½ x 36 x sin 97.18=17.86cm2**

**30.54 – 17.86**

**=12.68cm2**

**262.82o x 22/7 x 36= 82.60cm3**

**360**

**82.60-12.68**

**69.92cm2**

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

 **7cm 9cm**

 **11cm**

 **11cm**

**S= 11+9+7**

 **2**

**S = 27/2=13.5**

**A =**$13.5x2.5x4.5x6.5$

**A =31.42cm2**