**TOP EVALUATION EXAMINATION - 2016**

**Mathematics Paper**

**FORM 2**

**JULY/AUGUST**

**MARKING SCHEME**

**SECTION I – ( 50 MARKS )**

1. Use squares, square roots and reciprocal tables only to evaluate the following giving

your answer correct to 2 decimal places. ( 3 marks )

2 + 2

√ 38.46 ( 8.67)2

2 + 2

6.2016 75.17 M1 for correct square

and square root

= 2 x 0.1612 + 2 x 0.0131 M1 for correct reciprocals

=0.3224 + 0.0262

= 0.3486 A1

2. Evaluate: (4 marks)

½ + 24/5 of 8 ÷ 6(2 x 42/5)

2/4 of 6(8 ÷ 31/3)

|  |  |
| --- | --- |
| ½ + 14/5 of 8 ÷ 6 (2 x 22/5)  ½ + 14/5 of 8 ÷ 6 x 44/5  ½ + 112/5 ÷ 6 x 44/5  ½ + 112/5 ÷ 1/6 x 44/5  ½ + 112/30 x 44/5  1 + 2464 = 75 + 4928  2 75 150  = 5003  150  Denominator  2/4 of 6 (8 ÷ 10/3)  2/4 of 6 (8 ÷ 3/10)  ½ of 6 x 12/5  3 x 3/10 = 36/5  5003 ÷ 36  150 5  5003 x 5  150 36  = 5003  1080 | M1  A1  M1  A1 |
|
|
|  | 04 |

3.The GCD of 6480, 7200 and a third number is 144. The L.C.M of the three numbers is 25 x 35 x 52 x 73. Find the smallest third number. (3 marks )

6480 = 24 x 34 x 5

7200 = 25 x 32 x 52 M1 for the prime factors

GCD = 24 x 32 M1 for GCD of 6480

LCM = 25 x 35 x 52 x 73 and 7200

Third number: 24 x 35 x 73 = 1,333,584 A1

03

4. Solve the simultaneous equations. (4 marks)

xy = 4

x + y = 5

xy = 4

x + y = 5

y = 5 – x

x ( 5 – x ) = 4

x2 – 5x + 4 = 0 B1

x ( x – 1 ) -4 ( x – 1 ) = 0 M1

( x – 1 ) ( x – 4) = 0 A1

x = 1 or x = 4

y = 4 or y = 1 B1

5. Find the equation of a line through the point (2, 1), perpendicular to the line ½ x +2y = -3. (3 marks )

½ x + 2y = -3

y = - ¼ x – 3/2

m1 = - ¼

m2 =4 B1

y = 4x + c ( 2 , 1 ) M1 accept y – 1 = 4

1 = 8 + c c -7 x – 2

y = 4x – 7 or A1 any

y – 4 x = -7 or

y – 4x + 7 =0

03

6. The size of an interior angle of a regular polygon is 6 ½ times that of its exterior angle. Determine the number of sides of the polygon. (3 marks )

Let the exterior angle be x0 Alt

Let the no. of sides be n

6.5x0 + x0 = 180 M1 360 x 6.5 = 180 – 360

7.5x = 180 n n

M1M1

x = 240  360 x 6.5 + 360 = 180 n n

180n = 2700

∴ No. of sides 360 M1 n = 15 A1

24

= 15 sides A1

7. Tap A takes 4 minutes to fill a tank and tap B takes 6 minutes to empty the tank. If the tank has a capacity of 3000 litres find the volume of the tank after 2 minutes when both taps are open.

(3 marks)

|  |  |
| --- | --- |
| Tap A in 1 minute ¼  Tap B in 1 minute 1/6  Retained ¼ - 1/6 = 1/12  In 2 min 1/12 x 2 = 1/6  Volume = 1/6 x 3000 = 500 litres | M1  M1  A1 |

1. Cleophas is 11 years old. In three years time he will be 1/3 of his mother’s present age. How old was his mother 10 years ago? (3 marks)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  | | --- | --- | --- | |  | Present | 3 yrs time | | Cleophas | 11 | 14 years | | Mother | 14 x 3 = 42 |  |   mother 42 – 10 = 32 years | M1  M1  A1 |

1. The figure below shows quadrilateral ABCD in which AB = 6cm. BC = , CD = DA and angle ADC = angle BCD = 900.

A

B

D

C

Calculate the area of the quadrilateral ABCD. (4 Marks)

|  |  |
| --- | --- |
| A  D  B  C  6cm  x  x  2x  x  2x  (2x)2 + x2 = 62  5x2 = 36  x = 2.683  Area = (x + 2x)(2x)  = (3 x 2.683) (2 x 2.683)  = 21.595467≈ 21.60 units | M1  A1  M1  A1 |
|
|  | 04 |

1. Reduce the following expression onto a single fraction. (3 marks)



 M1



 M1

 A1

1. A salesman is paid a salary of Sh. 10,000 per month. He is also paid a commission on sales above Sh. 100,000. In one month he sold goods worth Sh. 500,000. If his total earning that month was Sh. 56,000. Calculate the rate of commission. ( 3 Marks)

|  |  |
| --- | --- |
| Let the commission be x%  (500000 – 100000)  = 4000x  4000x + 10000 = 56000  x = 12.5% | M1  M1  A1 |

1. The curved surface area of a cylindrical container is 880cm2. Calculate to one decimal place the capacity of the container in litres given that the height is 17.5cm. (Take π = 22/7).

(3 marks)

|  |  |
| --- | --- |
| Curved surface = 2πrh  2πrh = 880  2 x 22/7 x 17.5r = 880  44 x 17.5r = 880  7  r = 880 x 7  44 x 17.5 r = 8cm  V = πrh  = (22/7 x 8 x 8 x 17.5)cm3  = 24640cm3  1000cm3 => 1l  24640 cm3  ? = 24640 x 1  1000  = 24.64 litres | B1  M1  A1 |

1. Given that ( 52.83)-1 = 0.01892 and (0.003735)-1 = 267.64, work out without using tables or calculators, the value of

7 + 0.5

0.5283 3.735 leaving your answer 4 s.f ( 3 marks )

7 + 0.5 M1 √expression in

52.83 x 10-2  0.003735 x 103 std form

7 x 1 x 102 + 0.5 x 1 x 10-3

52.83 0.003735

( 7 x 0.01892 x 102 ) + ( 0.5 x 267.64 x 10-3 ) M1 √ correct sub

13.244 + 0.133820

13.377820

13.38 A1C.A.O ( to 4 s.f )

03

1. 45 men can construct a road 210m long in 60 days. What length of road would be constructed by 72 men on 50 days, assuming all the work is done at the same rate? (2 marks )

45 men 210 m - 60 days

72 men ? 50 days

Men in the ratio 72 : 45 ∴ length by 72 : 45

Days by 50 : 60 ∴ length by 50 : 60

72/45 x 50/60 x 210 M1 √ sub & calcn

= 140 metres long A1

02

1. A piece of wood whose volume is 90cm3 weighs 81 grams. Calculate the mass in kilograms of one cubic meter of the same wood. (3 marks)

Volume =m3

Weight

Density

=900kgs.

1. Given that tan θ = 0.75, find without using mathematical table or calculators. (3 marks)

2 sin θ + Cos θ

2sin

2

**SECTION II(50 Marks)**

1. The following measurement were recorded in a field book using XY as the baseline. XY = 400m.

|  |  |  |
| --- | --- | --- |
| C60  B100  A120 | Y  340  300  240  220  140  80  X | 1200  160E  160F |

|  |  |  |
| --- | --- | --- |
| 17 | 098  a) Area A = ½ x 60 x 60 = 1800  B = ½ (60 + 100) x 200 = 2600  C = ½ (100 + 120) x 60 = 6600  D = ½ x 80 x 120 = 4800  E = ½ x 160 x 200 = 16000  F = 20 x 160 = 3200  G = ½ (120 + 160x 60 = 8400  H = ½ x 100 x 120 = 6000  72800  = 72800 = 7.28 ha  1000  c) 7.28 x 80,000 = sh.582400 | B1  B1  B1  B1  M1  M1  A1  B1 |

1. The figure below shows a cone from which a frustum is made. A plane parallel to the base cuts the cone two thirds way up the vertical height of the cone to form frustum ABCD. The top surface radius of the frustum is labelled r and the bottom radius R.

A

D

A

C

y

V

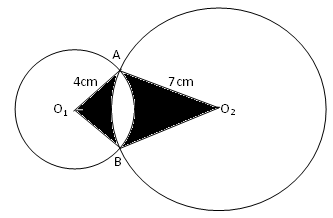
R

r

1. Find the ratio r:R. (1 Mark)
2. Given that r = 7cm, find R. (2 Marks)
3. If the height VY of the original cone is 45cm. Calculate to the nearest whole number the volume of the frustum. (Take ) (4 Marks)
4. The frustum represents a bucket which is used to fill a rectangular tank measuring 1.5m long, 1.2m wide and 80cm high with water. How many full buckets of water are required to fill the tank. (3 marks)

|  |  |
| --- | --- |
| (a) r : R  = 1:3  (b) =  R = 21cm  21  7  15  30  (c)  Vol. Big cone = x x x 45  = 20790cm3  Vol. Small cone = x x x 15  = 770cm3  Vol. of frustrum = 20790 – 770  = 20020cm3  (d) Vol. tank = 150 x 120 x 180  Buckets = = 71.93  ≅ 72 full buckets | B1  M1  A1  M1  M1  M1  M1  A1  B1 |
|
|

1. In the figure below, O1 and O2 are the centres of the circles whose radii are 4 cm and 7 cm respectively. The circles intersect at A and B and angle AO1O2 = 60˚



Find by calculation; take π = 3.142

1. The angle AO2O1 (1 mark)
2. The area of the quadrilateral AO1BO2 (4 marks)
3. The shaded area (5 marks)

|  |  |
| --- | --- |
| 1. Sin 600 =   Sin  Sin O2 =  O2 = Sin                    Unshaded Area =  Shaded Area = 27.9989 – 14.1273  = 13.8716 | M1  A1  M1  M1  A1  M1  M1  M1  M1  A1 |
| **10** |

1. A swimming pool is 20m by 12m and it slopes gently from a depth of 1m at the shallow end to a depth of 3m at the deep end.
2. Calculate the volume of water in the swimming pool (in m3) when it is full. (3marks)
3. If the swimming pool is to be drained by a pump which removes water at the rate of 2.5m3 per minute, how long will it take this pump to drain the swimming pool if it was full? (3marks)
4. If the sides of the swimming pool and its floor are to be covered with square tiles of side 20cm, find to the nearest 100 the number of tiles required. (4marks)

|  |  |
| --- | --- |
| 1. Cross Sectional Area =   Volume =  Volume =        Time =   1. Surface Area               Total Area =  Number of Tiles =  Number of tiles = - to the nearest 100 | M1  M1  A1  M1  A1  M1  M1  A1  M1  A1 |
| **10** |

1. A hotel bought a number of hens at sh. 500 each and a number of cocks at sh. 600 each. They paid a total amount of shs. 12,300. If they had bought twice as many as many hens and two cocks less, they would have spent sh. 5,300 more.
2. Find the number of each type of animals they bought. (6 marks)

Hens x and cocks y

1. The hotel sold all the animals at a profit of 20% per hen and 25% per cock. Determine the total profit they made. (4 marks)

Hens profit

Cocks profit

Total profit