**Term 2 - 2022**

**MATHEMATICS (121/1) –PAPER 1**

**FORM FOUR (4)**

 **Time: 2 ½ Hours (MARKING SCHEME)**

|  |  |  |  |
| --- | --- | --- | --- |
| **NO.** | **WORKING** | **MARKS** | **REMARKS** |
|  |  | M1M1A1 | Removal of decimal placesExpressing as product of prime factors |
|  | **Total**  | **3** |  |
|  | Also Hence | M1M1M1A1 | Expressing as a fractionExpressing as a fractionDifference between the 2 fractions |
|  | **Total** | **4** |  |
|  | Other number | M1M1, A1 | Expressing HCF, GCD and the 2 given numbers in power form |
|  | **Total**  | **3** |  |
|  | From the graph,  and Hence  and  | M1A1B1 | Factorization by grouping |
|  | **Total** | **3** |  |

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| **NO.** | **WORKING** | **MARKS** | **REMARKS** |
|  | Hence  | B1M1A1 |  |
|  | **Total** | **3** |  |
|  | Curved Surface Area of cylinderNumber of revolutions | M1M1A1 |  |
|  | **Total**  | **3** |  |
|  | Total cost  | M1M1A1 | Total cost in USDConversion of USD to Ksh |
|  | **Total** | **3** |  |
|  | Let Also | M1M1A1 | Expressing AB in terms of tan 320 and tan 400Equating AB to AB145.9 seen |
|  | **Total**  | **3** |  |
|  |  |  |  |
|  | **Total** | **3** |  |

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| **NO.** | **WORKING** | **MARKS** | **REMARKS** |
|  |  | M1M1A1 | Expressing right hand side in terms of base 3 |
|  | **Total** | **3** |  |
|  | Let the slant length of the smaller cone be  | M1M1, M1A1 |  |
|  | **Total** | **4** |  |
|  |  | B1B1B1 | For and Compound inequality shownNumber line drawn  |
|  | **Total** | **3** |  |
|  | Frequency distribution table

|  |  |
| --- | --- |
| Marks |  |
| 10 – 14 | 2 |
| 15 – 19 | 5 |
| 20 – 24 | 7 |
| 25 – 29 | 12 |
| 30 – 34  | 4 |

Ʃ | B1B1B1 | All classes/class boundaries 🗸All frequencies 🗸Total frequency30 seen |
|  | **Total** | **3** |  |
|  | Logarithms

|  |  |  |
| --- | --- | --- |
| Number | Std Form | Logarithm  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

 | M1M1M1M1 | All logs 🗸Correct +/- of logsCorrect multiplication by 2 and division by 3Accuracy |
|  | **Total** | **4** |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **NO.** | **WORKING** | **MARKS** | **REMARKS** |
|  | Commission Total value | M1M1A1 | Amount from commissionExpression for excess of 80 000 |
|  | **Total** | **3** |  |
|  | 1. Lines of symmetry

1. Net

 | B1B1B1 | For all the 4 lines of symmetry drawnCorrect net drawnCorrect measurements transferred from the solid |
|  | **Total** | **2** |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **NO.** | **WORKING** | **MARKS** | **REMARKS** |
|  | 1. (i) Equation of

(ii) If – -intercept1. (i) Gradient of

(ii) Equation of 1. Equation of
2. Acute angle of and -axis
 | M1A1B1B1M1A1B1M1A1 | Substituting in  seen 2.5 or equivalent seen seen |
|  | **Total** | **10** |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **NO.** | **WORKING** | **MARKS** | **REMARKS** |
|  | 1. Amount of water delivered in 1 minute

Capacity1. Area of base of tank

Time difference1. Monthly water bill

Bill | M1A1B1M1M1M1A1M1M1, A1 | Time differenceCapacity in 400 minutesExpression for base area |
|  | **Total** | **10** |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **NO.** | **WORKING** | **MARKS** | **REMARKS** |
|  | 1. (i) Equations

(ii) Cost of each item 1. Let the number be

Hence the number is  | B1B1B1M1M1M1A1M1M1A1 | Accept if all elements as fractions Matrix equationPremultiplying by Both values 🗸Forming 2 equations in and Solution for and using any method |
|  | **Total** | **10** |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **NO.** | **WORKING** | **MARKS** | **REMARKS** |
|  | 1. Consider ΔAPT
2. Shaded area

Let ∠ in ΔAPTArea of segmentBoth segmentsArea of APBQShaded area  | M1A1B1M1, M1A1M1M1M1A1 | Angle APTArea of sector, area of ΔAPBArea of both segmentsArea of APBQShaded Area |
|  | **Total** | **10** |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **NO.** | **WORKING** | **MARKS** | **REMARKS** |
|  | 1. (i) ∠RTP

 ∠RQT – opposite angles of cyclic quadrilateral QRST are supplementary ∠TQP∠UPT – angle between a chord and a tangent is equal to the angle subtended by the same chord on the circumference of the alternate segment. ∠RQP Hence ∠RTP – opposite angles of cyclic quadrilateral QRTP are supplementary(ii) Join O to Q and consider ΔRQO ∠RQO – base angles of isosceles ΔRQO ∠ROQ – sum of angles in ΔRQO is 1800 ∠RTQ – angle at the centre is twice angle at the circumference  Hence  ∠QTP1. Consider

∠QPT∠TQO In ΔQPTLet M be the midpoint of QTConsider ΔOQM | B1B1B1B1B1B1M1M1M1A1 | ∠RQT∠RQP∠RTP∠ROQ∠RTQ∠QTPSine Rule appliedHalf of QTAttempt to get radius |
|  | **Total** | **10** |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **NO.** | **WORKING** | **MARKS** | **REMARKS** |
|  | 1. Time

Total length Relative speed 1. (i) Value of m

(ii) No acceleration(iii) Deceleration Hence, a deceleration of  | M1M1M1A1M1M1A1B1M1A1 | Total lengthRelative speedEquation distance to area of trapeziumCollecting like terms |
|  | **Total** | **10** |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **NO.** | **WORKING** | **MARKS** | **REMARKS** |
|  | 1. Sketch

1. Value of for maximum volume

For maximum volumeEither And Hence 1. Mass of empty box

External dimensions  cm by cm by Internal dimensions188 cm by 68 cm by 24 cm | B1B1M1M1A1B1M1M1A1 | Correct sketchDimensions shown on the sketchExpression for volumeEquating volume to 0 at maximum volumeBoth values of Value of Internal and external dimensions |
|  | **Total** | **10** |  |
| **NO.** | **WORKING** | **MARKS** | **REMARKS** |
|  | 1. Table

|  |  |  |  |  |  |  |  |  |
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1. Graph

1. Roots

 – all  | B2S1P1C1B1B1M1L1B1 | All the values 🗸 (B1 for at least 5 values 🗸)Linear scales used on both axes – accommodates all table valuesAll points plotted within the graph paperSmooth curve drawn shown or implied in the rootsAll the values of 🗸🗸 attempt to get Line drawn🗸 value of  |
|  | **Total** | **10** |  |