**121/1**

**MATHEMATICS ALT A.**

**PAPER 1**

**OCT/NOVERMBER 2021**

**MARKING SCHEME**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **SOLUTION** | **MARK** | **COMMENTS** |
| **1.** | -2 (5 +3) – 9 ÷ 3 +5  - 16 – 3 +5  - 19 + 5 = -14  - 3 + 2 x 4  - 3 + 8 = 5  - 14  5  = - 2 4  5 | M1  M1  A1 | Numerator  Denominator  A0 Accept – 2.8 |
|  |  | **3** |  |
| **2.** | 1 + 1 = 2 + 1 = 3  6 12 12 12  4 x 9 = 1  9 12 3  1 + 1 + 1 = 2 + 1 + 4 = 7  6 12 3 12 12  1 – 7 = 5  12 12  12 x 10  5  24 ha | B1  B1  M1  A1 | Fraction for grazing  Fraction for unused land. |
|  |  | **4** |  |
| **3.** | 2y + 3x = 11  y = -3x + 11  2 2  M1 = - -3  2  M2 = 2  3  y + 4 = 2  x + 3 3  3y – 2x = - 6  A(3,0) B(0, -2) | B1  B1  B1 | Check equivalents.  For both coordinates of A and B. |
|  |  | **3** |  |
| **4.** | Kitale 400 km Lodwar  8.00 a.m. 8.30  Bus Car  80 km/h 120 km/h  30 x 80 = 40  60  400 – 40 = 360  Relative speed 120 + 80 = 200  T = 360 = 1.8 hrs  200  1hr 48 min.  8.30  + 1.48  10.18  10.18 am | B1  B1  B1 | Must have units |
|  |  | **3** |  |
| **5.** | x + x + 2 + x + 4+x + 6 > 24  4x + 12 > 24  4x > 12  x > 3  5, 7, 9, 11 | M1  A1  B1 | All four correct |
|  |  | **3** |  |
| **6.** | 1 Euro = ksh 112.32  6000 Euros =  6000 x 112.32  673920  673920 – 260,000  = 413920  Ksh 96.90 = 1 US dollar  Ksh. 413920 =  413920 x 1  96.90  4271.62 | M1  A1  M1  A1 |  |
|  |  |  |  |
| **7.** | **AB = OC - OA**  ~  ~  ~    = -3 - -6   1. -2   = 3  2  **AC = 3AB**  ~  = 3 3  2  = 9  6  **OC = OA + AC**  ~  ~  ~  = -6 + 9  -2 6  = 3  4  ∴**C** (3,4) | M1  M1  A1 |  |
|  |  | **3** |  |
| **8**. | x - 6 ÷  = x - 6 ÷ 2  y2  = 4y2 – 6 x y2  2  = 4y2 – 3y2  = y2 | M1  M1  A1 |  |
|  |  | **3** |  |
| **9.** | S.A = (5 x 3.5 x 2) + (5 x 2 x 2) + (3.5 x 2 x 2)  = 35 + 20 + 14  = 69 cm2 | B1  M1  A1 | Complete and√ labelled diagram |
|  |  | **3** |  |
| **10**. | QS = 4.8 ± 0.1cm | B1  B1  B1 | Construction of ∠450  Completetion of PQRS.  Measure of the shortest diagnol SQ. |
|  |  | **3** |  |
| **11.** | No. of oranges sold on Saturday;  6144 = 768  8  No. of oranges that remained on Friday;  768 – 560 = 208  No. of oranges bought on Thursday .  208 + 750 + 750 + 240  = 1948 | M1  M1  M1  A1 | √ division  √ subtraction  √ Addition |
|  |  | **4** |  |
| **12**. | x4 – x2y2 – x2y2 + y4  x2 (x2 – y2) – y2 (x2 – y2)  (x2 – y2) (x2 – y2)  (x + y) (x – y) (x + y) (x – y) | M1  A1 | Award marks for working by inspection |
|  |  | **2** |  |
| **13.** | Sin (3y – 500) = cos (2y + 100)  3y – 500 + 2y + 100 = 900  5y – 400 = 90  5y = 1300  y = 260 | M1  M1  A1 |  |
|  |  | **3** |  |
| **14**. | S.A of solid = πrl + 2πr2  = 3.142 x 6 x 10 + 2 x 3.14 x 62  = 188.52 + 226.224  = 414.744  = 414.74 cm2 (2 d.p) | M1M1  A1 | Exp. Of areas  Addition of areas |
|  |  | **3** |  |
| **15.** | Length of an arc = θ cr  Let OA = x  2x + 2 (x + 5) = 14  5 5  2x + 2x + 10 = 70  4x = 60  x = 15  ∴ OA= 15 cm | M1  M1  A1 | Perimeter  Solving |
|  |  | **3** |  |
|  | 16. L1 = χ ≥ 0  L2 (0, 4) (5, 0)      5y = -4χ + 20  5y < - 4χ + 20  y <  B1 |  |  |
|  |  | **3** |  |
| **17.** | a)Commission  480,000 – 120,000 = 360,000  8 x y = 360,000  100  y = 360,000 x 100  8  y = 4,500,000  1,000,000 + 4,500,000  5,500,000  b) (i) 118 x 5500,000  100  6,490,000  8 x (6,490,000 = 1,000,000)  100  8 x 5,490,000  100  = 439200  (ii) 70 x 6,490,000  100  4,543,000  80 x (4,543,000 – 1,000,000)  100  80 x 3,543,000  100  = 283,440  120, 000 + 283,440  = 403,440 | M1  M1  M1  A1  M1  M1  A1  M1  M1  A1 | Process of finding 4,500,000  Summation |
|  |  | **10** |  |
| **18.** | (a)  **20cm**  **20cm**  108 x 22 x 20 x 20  **1080**  360 7  377.14  (b) 3.77.14 = 22 x r x 20  7  r = 377.14 x 7  22 x 20  r = 6  (c) h2 + 62 = 202  h = √202 – 62  h = 18  (d) 18 = 6  12 r  r = 4  Volume of smaller cone = 1 π (14)2 x 12  3  Volume of larger cone 1 π (6)2 x 18  3  1 π (6)2 x 18 – 1/3 π(4)2 x 12  3  = 477.71 | M1  A1  M1  M1  A1  M1  A1  M1  M1  A1 | π cals = 3.76. 99  π = 3.142 = 377.04  Follow through.  Follow through.  Expressions for the two volumes.  Subtraction  Expression for the 2 Volume  Subtraction  π cal = 477.52  π = 3.142 = 477.584 |
|  |  | **10** |  |
| **19**. | (a) Det. ⏐42 - 20⏐=22  Inverse A-1 = 1 7 - 5  22 -4 6  (b) (i) 6 5 x = 520  4 7 y 530    (ii) 1 7 -5 6 5 x = 1 7 -5 520  22 -4 6 4 7 y 22 -4 6 530  1 0 x = 45  0 1 y 50  x = 45  y 50  ∴ x = 45; y = 50  (c) Total cost of loaves of bread  = (45 x 240) + (50 x 100)  = 10800 + 5000  = 15,800  Total cost with discount;  45 x 240 x 90 + 50 x 100 x 87  100 100  9,720 + 4350  = 14070  % discount = 15 800 – 14070  15800  = 10.94936709  = 10.95% | B1  B1  B1  M1  M1  A1  M1  M1  A1 | Alt |
|  |  | **10** |  |
| **20.** | (a)  (b) (i) 9.6 km + 0.1  750 + 0.1  (ii) 5.8 km + 0.1  2460 + 0.1  (iii) Area = ½ x 7 x 5 sin 1050 – ½ x 4 x 5.8 sin 154  = 16.90370196 – 5.085105303  = 11.81859666  = 11.82 cm2 | B1  B1  B1  B1  B1  B1  B1  M1 M1  A1 | Location of point Q  Location of point R  Location of point S.  Distance of R from P  Bearing of R from P  Distance of P from S  Bearing of P from S |
|  |  | **10** |  |
| **21**. | (a) (i) Length = 2x - 120  Width = x – 120  Volume = (2x – 120) (x – 120) 60  = (2x2 – 240x – 120x + 1440)60  = 120x2 – 14400x – 7200 + 864000  = 120x2 – 21600x +864800 .  (ii) Volume = 1920 000 cm3  (2x – 120) (x – 120) 60 = 1,920, 000  (2x – 120) (x – 120) = 32 000  2x2 – 240x – 120x +14400 = 32 000  2x2 – 240x – 120x = 17600  x2 – 180x – 8800 = 0  x= 180 +√ (-180)2 – 4 x 1 x -8800  2 x1  = 180 + √32400 + 35200  2  = 180 + 260  2  Either x = 220 or -40  x ≠ -40  x = 220 cm  Length = 440 cm  (b) Area of sheet = 440 x 220  = 96 800 cm2  = 96 800 = 9.68m2  10 000  Cost = 9.68 x 1000  = sh 9680  Labour = 300 x 6 = sh 1800  Total cost = 9680 + 1800  = sh 11480  S.P. = 130 x sh.11480  100  = sh 14924 | B1  M1  A1  M1  M1  M1  A1  B1  M1  A1 |  |
|  |  | **10** |  |
| **22**. | 1. PQRS drawn 2. 4 + -7 = -3 , P1 -3,0   6 -6 0  6 + -7 = -1 , Q1 -1, -3  3 -6 -3  4 + -7 = -3 , R1 - 3, -2  4 -6 -2  2 + -7 = -5 , S1 -5, -3  3 -6 -3   1. Line y = 1   Diagram PII QII RII SII   1. Image P111 QIII RIII  SIII      1. Two ⊥ bisectors   Centre of rotation, C (7.5, 0.5) + 0.1 for each coordinate.  Angle of rotation = -900 | B1  B1  B1  B1  B1  B2  B1  B1  B1 | Diagram  Diagram  Coordinates  (Line y – x = 0 can be implied  Accept 900 clockwise |
|  |  | **10** |  |
| **22**.  **23.** | (a) Time (Min) f. x fx cf  11 – 20 70 15.5 1085 70  21 – 30 100 25.5 2550 170  31 – 40 200 35.5 7100 370  41 – 50 100 45.5 4550 470  51 – 60 30 55.5 1665 500  = 500 = 16950  Mean, x =      = 16950  500  = 33.90  (b) Median position = 500 = 250th  2    Median class: 31 – 40  Median value = 30.5 + 250 – 170 x 10  200  = 30.5 + 80 x 10  200    = 30.5 x 4  = 34.5 | B1  B1  B1  B1  M1  A1  B1  B1  M1  A1 | f column  x column  fx column  and  √ exp. For x  Median class  For 250 – 170  Expression |
|  |  | **10** |  |
| **24.** | (a) (i) a = 5 – 2t  M1 C must be included  V = 5(0) + (0)² + C = 2 M1  t = 0 C = 2  V = 5t - t² + 2 A1   1. t = 2   V = 5(2) – (2)² + 2 M1  = 8m/s A1  (b) a = 5 – 2t = 0 M1 Max velocity t = 0  t = 2.5 seconds A1    M1  M1 Substitution of values  15.42 metres A1 |  |  |
|  |  | **10** |  |