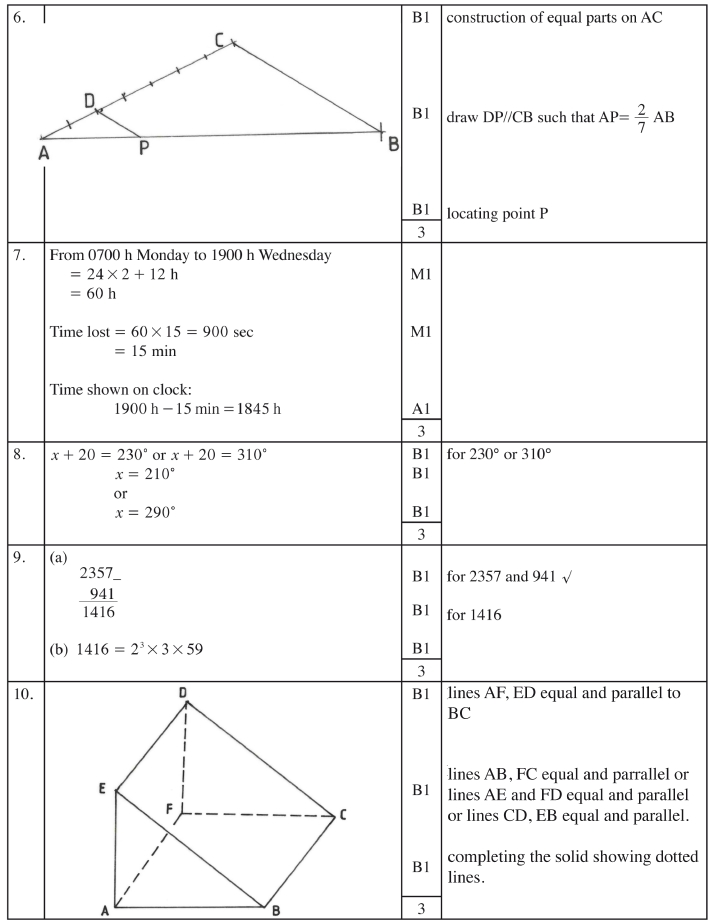


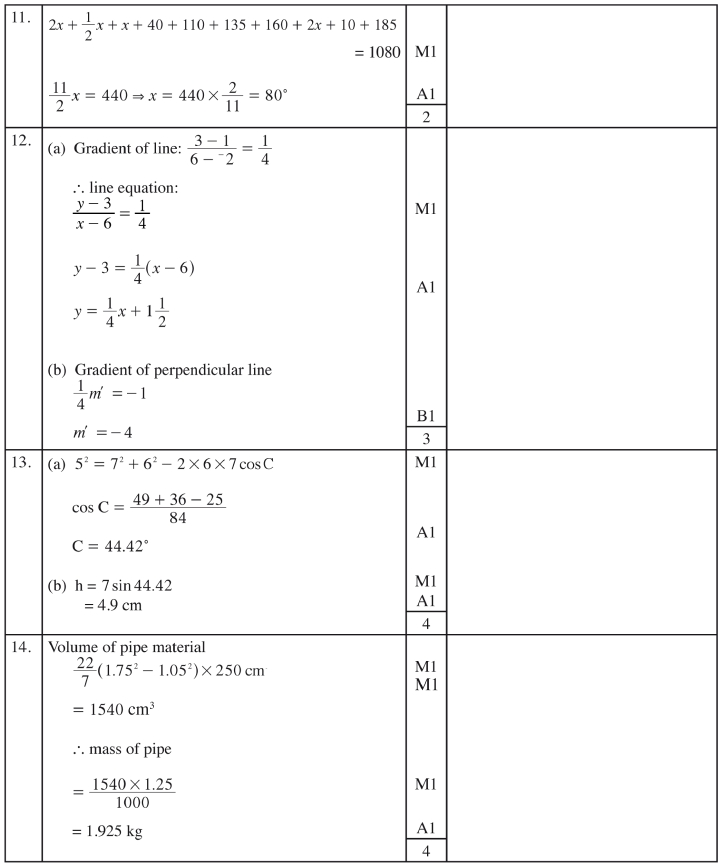
**4.3** **MATHEMATICS (121 AND 122)**

**4.3.1** **Mathematics Alternative A Paper 1 (121/1**

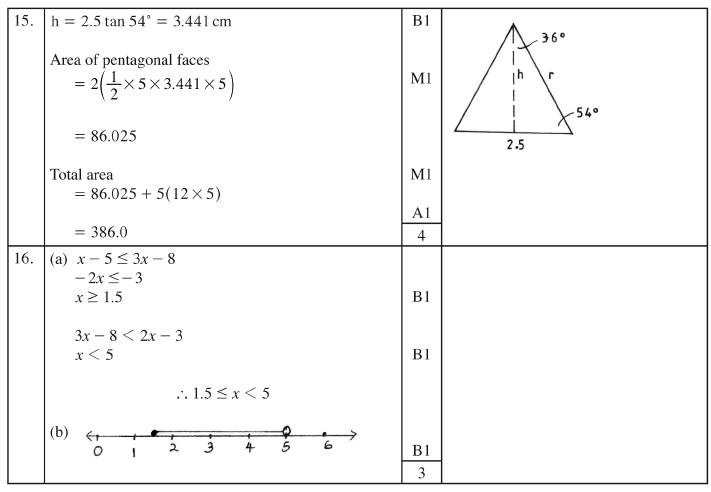
292



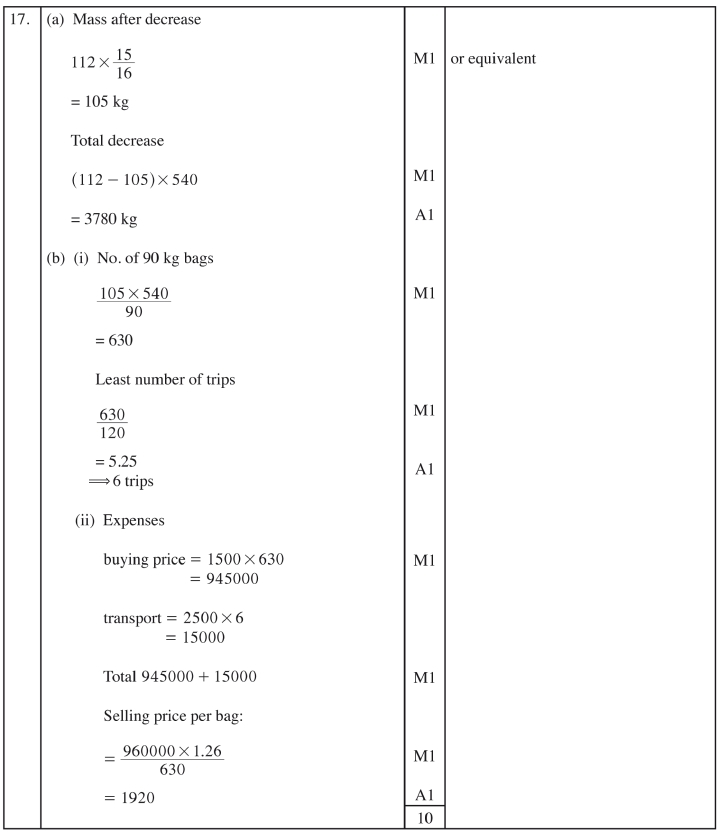
293



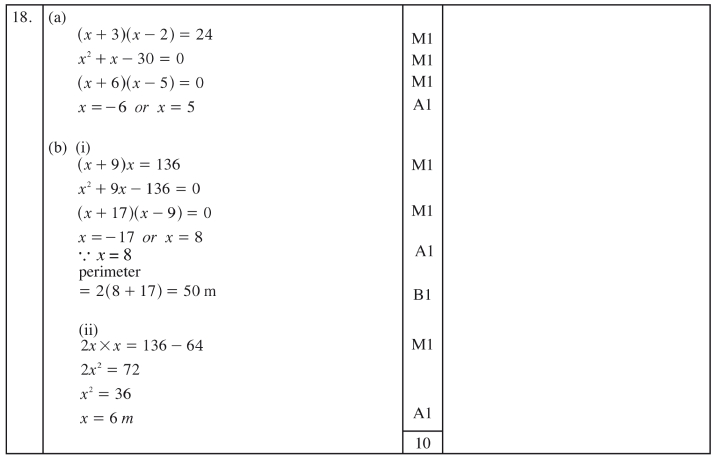
294



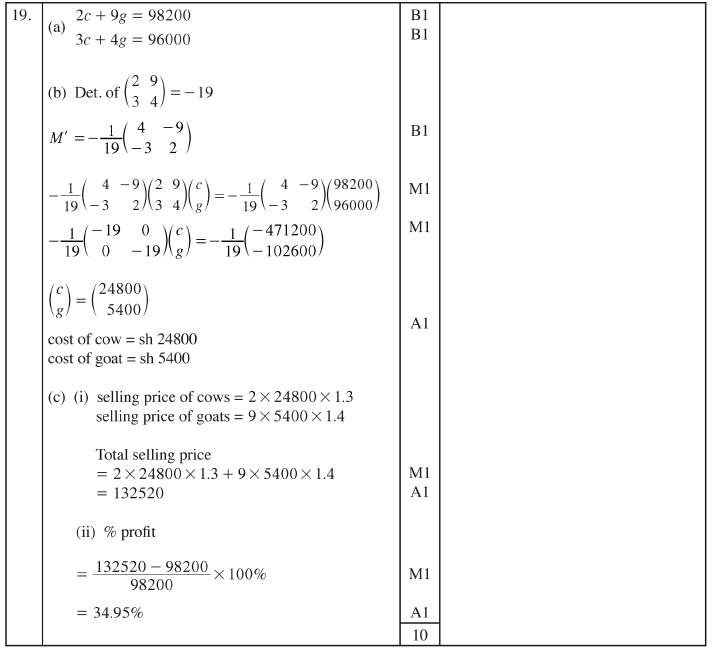
295



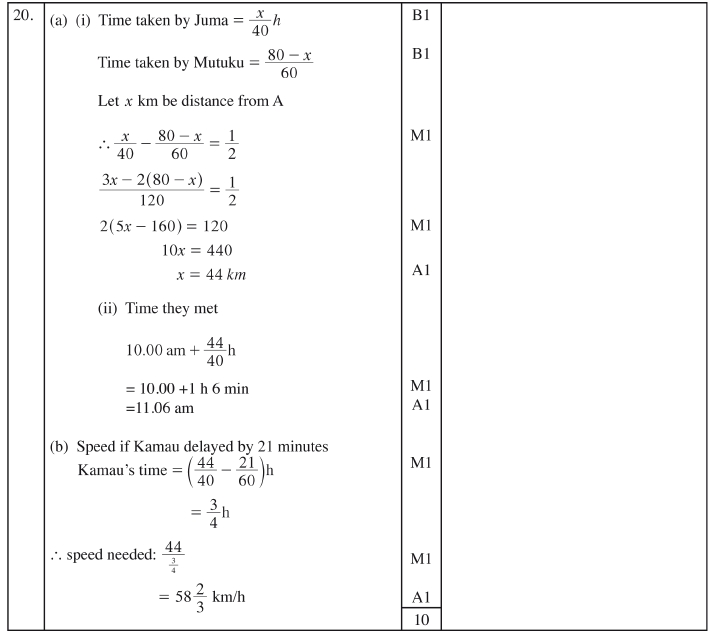
296



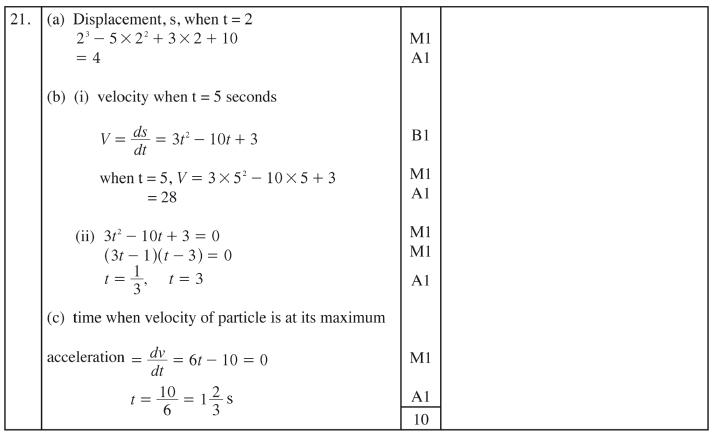
297



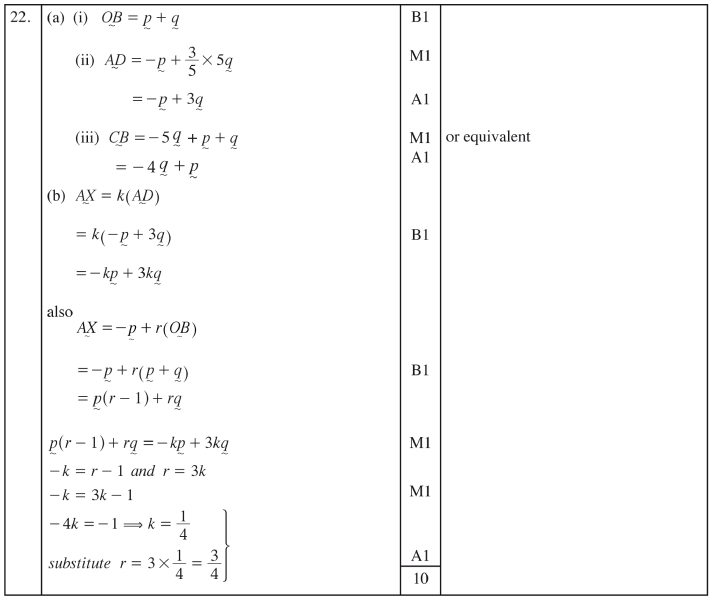
298



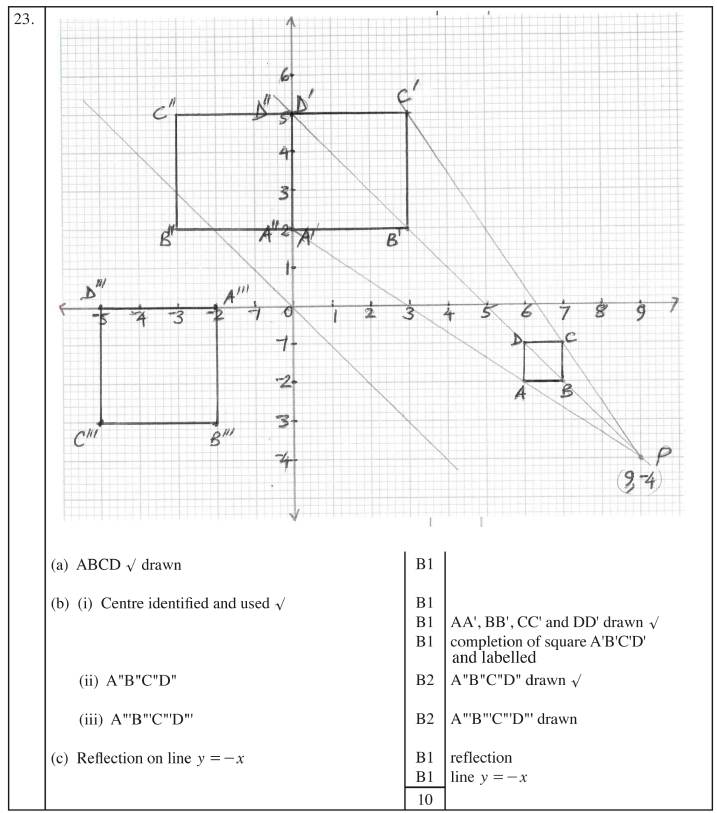
299



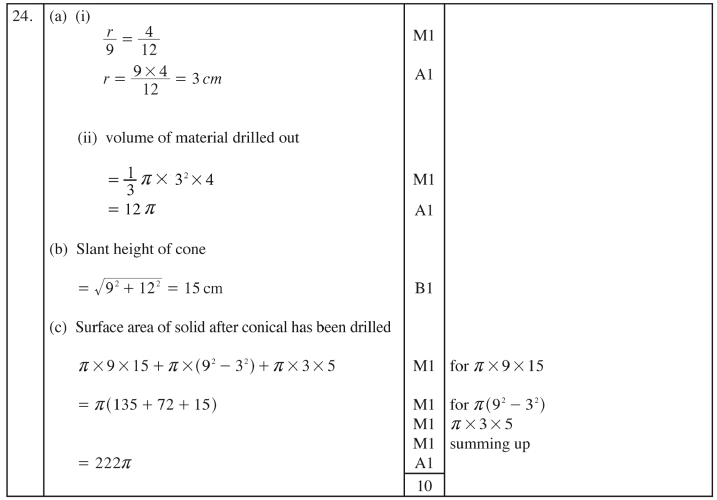
300



301



302



303

|  |  |  |  |
| --- | --- | --- | --- |
| 1. | st  1  term, a = 3; common difference, d = 6  *n*  7500 =     "2 # 3 + (*n* - 1) # 6,  2  2  3n      = 7500  n      =     2500  = 50 | B1  M1  A1 |  |
| 3 |
| 2. | y = (x + 2)(x - 1)  2  y = x  + x - 2 | M1  A1 |  |
| 2 |
| 3. | 1                    2*qd*2  *P* =*mn*  -  2*n*  2  *qd*        1                    2  =*mn*  -*P*  *n*        2  1                    3  2                     2*mn*  -*nP*  *d*  =*q*  1                    3  *d* =                     2*mn*  -*nP*  *q* | M1  M1  A1 |  |
| 3 |
| 4. | 2  *x*                                                                    2  *Log*                  = log 3  c (*x* - 2) m  *x*2  *x* - 2 = 9  2  x  - 9x + 18 = 0  (x - 6)(x - 3) = 0  x = 6 or x = 3 | M1  M1  A1 |  |
| 3 |



**4.3.2** **Mathematics Alternative A Paper 2 (121/2)**

304

|  |  |  |  |
| --- | --- | --- | --- |
| 5. | (a)  (b)  radius = 3.1 | B1  B1  B1  B1 | extending YX and YZ  bisecting +*s* VXZ and  XZW  escribed circle drawn  allow ± 0.1 |
| 4 |
| 6. | Completing square on L.H.S.  2                                 2  x  + 4x + 4 + y  - 2y + 1 = 4 + 4 + 1  2                        2  (x + 2)  + ( y - 1)   = 9  ` centre of circle :  (-2, 1)  radius of circle:  3 units   4 | B1  B1  B1 |  |
| 3 |
| 7. | 5                                                     2                       3                    4                5  (a)  (1 - x)  = 1 + 5(-x) + 10(-x)  + 10(-x)  + 5(-x)  + (-x)  2               3             4        5  = 1 - 5x + 10x  - 10x  + 5x  - x  5                               5  (b)   (0.98)  = (1 - 0.02)    &  x = 0.02  5                                                               2                           3  `  (0.98)  = 1 - 5(0.02) + 10(0.02)  - 10(0.02)  = 1 - 0.1 + 0.004 - 0.00008  = 0.90392 | B1  M1  A1 |  |
| 3 |

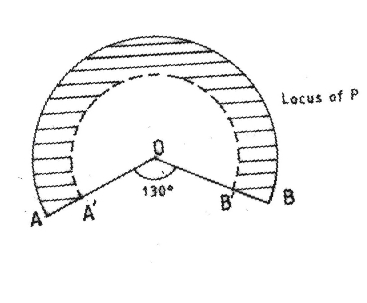
305

|  |  |  |  |
| --- | --- | --- | --- |
| 8. | - 1                      4  *h*+ =  4 + (- 1)*f*+  +  4 + (- 1)*g*+  - 1          4  =*f* +*g*  3            +       3      + | M1  A1 |  |
| 2 |
| 9. | P(defective) : M " 0.6 # 0.05 = 0.03  N " 0.4 # 0.03 = 0.012  P(defective)  0.03 + 0.02 = 0.042 | M1  M1  A1 | For  0.6 # 0.05 or 0.4 #  0.03  0.95  good  M  0.6            0.05      defective  0.4             0.97      good  N  0.03      defective |
| 3 |
| 10. | (a)  Fraction filled if A and R are open for 5h  1      1        5  5 #       -       =  c 3      6 m     6  5      1  Fraction of tank still empty = 1 -     =  6      6  (b)  Fraction filled if A, B and R are open for 1h  1      1      1      2  +     -      =  3      2      6      3  1     2       1      3  Time taken to fill the tank =      '     =      #  6      3       6      2  1  =     h or 15 min  4 | B1  B1  M1  A1 |  |
| 4 |
| 11. | 48                 4   3 ^   5 -    3 h  =  5 +    3       ^   5 +    3 h^   5 -    3 h  4 3 ^   5 - 3 h  =           5 - 3  = 2   3 ^   5 -    3 h  = 2   15 - 6 | M1  M1  A1 |  |
| 3 |



306

|  |  |  |  |
| --- | --- | --- | --- |
| 12. | +*AOB* = 130c  arc AB - solid curve  arc A´B´ - broken curve  region shown | B1  B1  B1  B1 |  |
| 4 |
| 13. | 9680 # 0.1  =  968  9120 # 0.15;  9120 # 0.2;  4580 # 0.25  = 1368            = 1824               = 1145  Net tax  = (968 + 1368 + 1824 +1145) - 1056  = 4249 | M1  M1  M1  A1 |  |
| 4 |
| 14. | 2  6(1 - sin  x) + 7 sin x - 8 = 0  2  6 - 6 sin  x + 7 sin x - 8 = 0  2  6 sin  x - 7 sin x + 2 = 0  (3 sin x - 2) (2 sin x - 1) = 0  2                      1  sin*x* =*or* sin*x* =  3                      2  x = 41.81° or x = 30° | M1  M1  M1  A1 |  |
| 4 |



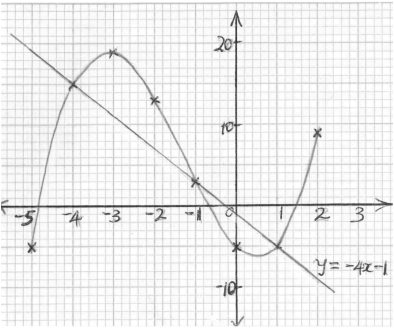
307

|  |  |  |  |
| --- | --- | --- | --- |
| 15. | Distance between towns K and S  =  2π # 6370 cos 2° #  37.4 - 30  360  = 822.2121281  = 822 km | M1  A1 |  |
| 2 |
| 16. | 1  *a  b*    1  4  3                           2   2~~23~~  =  c*c  d*mc2  2  4m    c 1   1  2m  *a* + 2*b* =~~21~~  4*a* + 2*b* = 2  3             1  3*a*          =      &*a* =  2             2  1               1  + 2*b* =      &*b* = 0  2               2  *c* + 2*d* = 1  4*c* + 2*d* = 1  3*c*           = 0 &*c* = 0  0 + 2*d*    = 1 &*d* =~~21~~  1  `*M* =               2   0  c 0         12m | M1  M1  A1 | : formation and solution  of simultaneous equations  : formation and solution  of simultaneous equations |
| 3 |
| 17. | (a)  (i)   276000 - 60000  18  = 12 000  (ii)  276000 # 0.9  = 248400  (b)  248400 # 0.95  =  235980  235980 # 1.22  =  339811.2  (c)  339811.2 - 276000  63811.2 # 100  276000  = 23.12 % | M1  A1  M1  A1  M1  M1  A1  M1  M1  A1 |  |
| 10 |

308

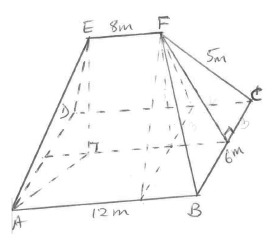
|  |  |  |  |
| --- | --- | --- | --- |
| 18. | (a)   +QPR = 90° - 72° = 18°  +PQR = 90° - angle subtended by diameter  (b)   +PQS = 180° - 2(72) = 36°  +PSQ =  72° - angle subtended at the circumference by  chord PQ equal and base  +’s of isosceles ∆QPS = 72°  (c)   +OQS = 36° - 18° = 18°  base angles of isosceles ∆ OPQ = 18°  (d)   +RTS = 180 - (36 + 18) = 126°  extension angle RTS equal to sum of opposite interior  angles TSP  and TPS  (e)   +RSV = 90° - 36° = 54°  +RSV =  +RPS - angle in alternate segment. | B1  B1  B1  B1  B1  B1  B1  B1  B1  B1 | or equivalent |
| 10 |
| 19. | (a)  (b)  (c)   (i)  x = -4.8, -0.7, 1.5  (ii)  y = -4x - 1  Solutions  x = -4, -1, 1. | B2  S1  P1  C1  B2  P1  L1  B1 | allow B1 for 4 correct  Suitable scale  All correctly plotted  ±0.1 allow B1 for 2  values : plotting for line |
| 10 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| x | -5 | -4 | -3 | -2 | -1 | 0 | 1 | 2 |
| y  3          2  =x +4x -5x-5 | -5 | 15 |  | 13 | 3 |  | -5 | 9 |



309

|  |  |  |  |
| --- | --- | --- | --- |
| 20. | (a)  = distance of EF from place ABCD  slant height from F to BC  2                       2  =    5  - 3  =4  `  =  distance of EF from plane ABCD  2                       2  =    4  - 2  =    12  = 3.46 m  (b)  (i)  angle between planes  ADE and ABCD  = tan-1    12  2  = 60°  (ii)  angle between line AE  and plane ABCD  = sin-1    12  5  = 43.9°  (iii)  angle between planes  ABFE and DCFE  = 2  tan-1    3  c             12 m  = 81.8° | M1  M1  A1  M1  A1  M1  A1  M1  M1  A1 | or equivalent  or equivalent  -1    3  tan              or equivalent  12  doubling |
| 10 |



310

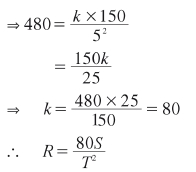
|  |  |  |  |
| --- | --- | --- | --- |
| 21. | (a)  (b)  (c)  (i)  2 sin (x + 20) =    3 cos*x*  x = 30°  and  x = 210°  (ii)  amplitude difference  2 - 1.7 = 0.3 | B1  B1  S1  P1  P1  C1  C1  B1  B1  B1 | suitable scale used  plotting 2 Sin (x + 20)  plotting    3  cos x  curve for 2 sin x + 20  curve for    3  cos x |
| 10 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| x | 0 | 40 | 80 | 120 | 160 | 200 | 240 |
| y=  2 sin x + 20 |  | 1.7 |  | 1.3 |  | -1.3 |  |
| y=  3 cos x |  |  | 0.3 |  | -1.6 |  | -0.9 |



311

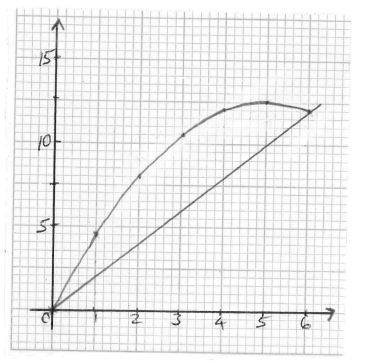
|  |  |  |  |
| --- | --- | --- | --- |
| 22. | *S                 kS*  (a)*R* \            2   &*R* =              2  *T                  T*  R  =  480 whe n S = 150 and T = 5  (b)  (i)    80 # 360  *R* =                                         2  (1.5)  =  80 # 360  2.25  = 12800  (ii)  S2 = 1.05s, T2 = 0.8T  80 # 1.05*S*  *R*2 =                                                 2  (0.8*T*)  80 # 1.05*S*  =                                          2     #           2  (0.8)*T*  *S*  *R*2 = 131.25           2  *T*  J*S*       80*S* N  131.25           2 -                  2  *R*2 -*R*                      K*T         T*    O  # 100% =                                     # 100%  c*R*     m                   K*S*            O  K           80           2           O  *T*  L                                P  *S*       2  *T*    131.25 - 80  =                                   # 100  *S*  *T*2 c         80         m  = 64.0625  = 64.06 % | B1  M1  A1  B1  M1  A1  B1  M1  M1  A1 |  |
| 10 |



312

|  |  |  |  |
| --- | --- | --- | --- |
| 23. | (a)  (b)                          6  1          2  #0  c5*x* -  2*x* m*dx*  5          2         1                    3     6  =*x*  -*x*  ; 2          2 # 3    E0  2  5 # 6        1                       3  =                -     # 6   -  0 - 0  ;    2          6         E    6          @  =   90 - 36  -  0  = 54  6              @    6  @  (c)  (i)  Drawing line y = 2x  1  (ii)  Area of ∆ :      # 6 # 12  2                = 36  ` Bounded area = 54 - 36 = 18 | B1  P1  C1  M1  M1  A1  L1  M1  A1  B1 | table may be implied  : plotting  : curve  : integral  : substitution |
| 10 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| x | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| y  = 5x-~~21~~ x2 | 0 | 4.5 | 8 | 10.5 | 12 | 12.5 | 12 |



313

|  |  |  |  |
| --- | --- | --- | --- |
| 24. | (a)  (b)  (i)  cfs  (c)  (i)  Identification of median  =  57.5 ± 0.5  (ii)  Identification of upper quartile mark  = 66.5 ± 0.5 | B1  B1  B1  S1  P1  C1  B1  B1  B1  B1 | : marks class column  : frequency column  : scale  : plotting  : curve |
| 10 |

|  |  |  |  |
| --- | --- | --- | --- |
| Marks | Frequency | cf |  |
| 25-34 | 4 | 4 |  |
| 35-44 | 5 | 9 |  |
| 45-54 | 8 | 17 |  |
| 55-64 | 12 | 29 |  |
| 65-74 | 9 | 38 |  |
| 75-84 | 3 | 41 |  |
| 85-94 | 1 | 42 |  |

314

|  |  |  |  |
| --- | --- | --- | --- |
| 1. | - 3^- 5 - + 7h '+ 2^- 3 + - 6h  = - 3^- 12h ' 2^- 9h  = 36 '- 18  =- 2 | M1  M1  A1 |  |
| 3 |
| 2. | (a)   Number is 7532  (b)   Total value of hundreds digit = 500 | B1  B1 |  |
| 2 |
| 3. | 2      27          3        18      23       13  #       - 2       =        -        =  3       5          10        5       10       10  3        1         3       3      2      8       26  ' 4     + 1     =      #     +      =  5        2         5       5      9      5       15  13     26       13      15       3  `        '       =        #       =  10      15       10      26       4 | M1  M1  A1 |  |
| 3 |
| 4. | Nekesa: Mwita: Auma = 600 : 750 : 650  = 12 : 15 : 13  Amount Mwita got more than Nekesa  15                    12  =        # 1200 -        # 1200  40                    40  = 450 - 360 = 90 | B1  M1  A1 | 3  =        # 1200  40  = 90 |
| 3 |
| 5. | h = 3*r* - 1 (*h* = 3 # 2 - 1 = 5  2                                                                                    2  7*r*  + 2*rh*       7 # 2 + 2 # 2 # 5  `                    =  4*h* - 2*r*             4 # 5 - 2 # 2  =  28 + 20  16  =  48  4  = 12 | M1  M1  A1 |  |
| 3 |



**4.3.3** **Mathematics Alternative B (122/1)**

315

|  |  |  |  |
| --- | --- | --- | --- |
| 6. | 1176  Area of each face =            = 196  6  Length of side    196  = 14 | M1  M1  A1 |  |
| 3 |
| 7. |  | B1  B2 | Line, PR, drawn and divided into  six (6) equal parts.  Joining QR and drawing five lines  parallel to QR intersecting with  PQ. |
| 3 |
| 8. | 3                          4  sin*x* =*and*   cos =  5                          5  3      4  ` 2 sin*x* - cos*x* = 2 #     -  5      5  6      4       2  =      -      =  5      5       5 | B1  M1  A1 |  |
| 3 |
| 9. | 5*x* + 6*x*^10h = 2600  5*x* + 60*x* = 2600  *x* =  2600  65  = 40  Total number of coins:  = 40 + 6 # 40 = 280 | M1  M1  A1  B1 |  |
| 4 |
| 10. | 3  -2                                                            -2                     2#3  2  3    # 81        3    # 3  -3                      1   =  3  4    ' 8             1  26 ' 2  4                     7  = 3  # 2  = 10368 | M1  M1  A1  B1 | √ powers of 3  √ powers of 2 |
| 4 |



316

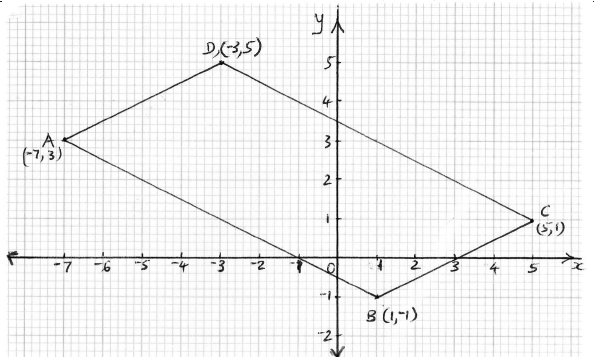
|  |  |  |  |
| --- | --- | --- | --- |
| 11. | Marked price = 5750 # 1.12 = 6440  % discount =  6440 - 6118 # 100  6440  = 5% | M1  M1  A1 |  |
| 3 |
| 12 | 2  2       16                                              2        4  9*a*  -             2        2 = ^3*a*h -                           2  *b c*                     ^*bc*h  4                4  =   3*a* +          3*a* -  c*bc* mc*bc* m | M1  A1 |  |
| 2 |
| 13. | (a)  12          28          54  2            6           14          27  2            3            7           27  3            1            7            9  3            1            7            3  3            1            7            1  7            1            1            1  2                     3  The height (LCM) = 2  # 3  # 7  = 756  756  (b)  Number of books =           = 63  12 | M1  M1  A1  B1 | : factorization |
| 4 |
| 14. | Let number of sides ben  ` ^2*n* - 4h # 90 = 1260  2*n* # 90 = 1260 + 360  1620  *n* =             = 9  180  1260  Size of each angle =             = 140c  9 | M1  A1  B1 |  |
| 3 |

317

|  |  |  |  |
| --- | --- | --- | --- |
| 15 | 7.5  L.S.F =         = 1.5  5  2  ` A.S.F = 1.5  = 2.25  Area of smaller triangle =  22 .5  2.25  2  = 10 cm | B1  M1  A1 |  |
| 3 |
| 16. | 2     22       45  *r*  #       #          = 77  7       360  *r* =      77 # 360 # 7  45 # 22  = 14  Circumference = 2 # 14 # 22  7  = 88 cm | M1  A1  M1  A1 |  |
| 4 |
| 17. | (a)   (i)  Volume of prism =  Area of crosssection # L  1      22                                         2  =   1.4 # 0.8 -      #       # ^0.7h   # 2  ;                     2       7                E  = 0.35 # 2  = 0.7 m3  (ii) Total S.A  22  = 0.8 # 2 # 2 + 2 # 1.4 += 0.7 #       # 2  ^rectangularh                           7  ^semicircularh  =+ 0.35 # 2  ^sectionh  = 6 + 4.4 + 0.7  = 11.1 m2  (b)   =           6 # 100  6 + 4.4 + 2^0.35h  = 54.05405405%  =- 54.1% | M1  M1  M1  A1  M1  M1  M1  A1  M1  A1 | Multiplication by length  rectangular  triangular  cross section |
| 10 |



318



18.

(a)

(b)   (i)  grad AB =  3 - - 1

- 7 - 1

=- 1

2

B1

B1

M1

A1

plotting vertices A, B and C.

identifying vertex D (-3, 5) and

competing parallelogram.

(ii)

= - 1  or

*y* - 3

*x* -- 7          2

*y* -- 1

*x* - 1

=- 1

2

M1

7                 1

*y* = - 1*x* - + 3 or*y* = - 1*x* + - 1

2 2 2 2

*y* =- 1*x* -  1

2 2

(c)   (i)  Let grad L be m

` - 1 m = - 1 ( m = 2

2

A1

B1

equation of line

*y* - 3

*x* - 1

= 2

M1

*y* - 2*x* = 1

(ii)  y - intercept: when*x* = 0

y = 2 # 0 + 1 = 1

A1

` co-ordinates ^0, 1h

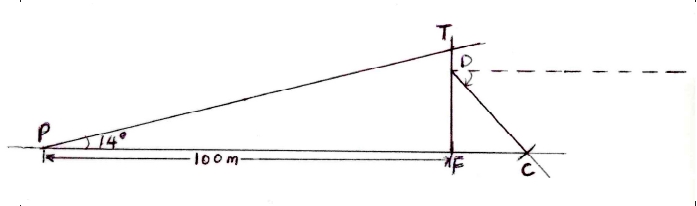
319

B1

10

|  |  |  |  |
| --- | --- | --- | --- |
| 19. | 1  (a)   c*x* -  2 m^*x* + 1h = 0  2             1         1  *x*  +*x* -*x* -      = 0  2         2  2      1         1  *x*  +*x* -      = 0  2         2  2  2*x*  +*x* - 1 = 0  (b)   (i)  ^2*y* + 1h^*y*h = 55  ^2*y* + 11h^*y* - 5h = 0  1  *y* = - 5      or*y* = 5  2  ` price of one mango Sh 5  (ii)  no. of mangoes Karau got  95 + 55  mangoes bought =                  = 30  5  30  ` extra mangoes =        = 5  6  Total mangoes = 30 + 5 = 35 | B1  M1  A1  B1  M1  A1  B1  M1  A1  B1 | or equivalent |
| 10 |

320



20.

(a)   : use of scale

angle of elevation 14° : drawn

completion of scale drawing

(b)   height of mast " 2.5 ! 0.1

= 2.5 # 10

= 25 m

B1

B1

B1

B1

B1

(c)   position of cable drawn

(d)   (i)  + of depression of C from D

48c ! 1c

(ii) Distance from P to C

^10 + 1.8 ! 0.1h # 10

= 118 ! 1*m*

321

B1

B1

B1

M1

A1

10

: positions of C and D

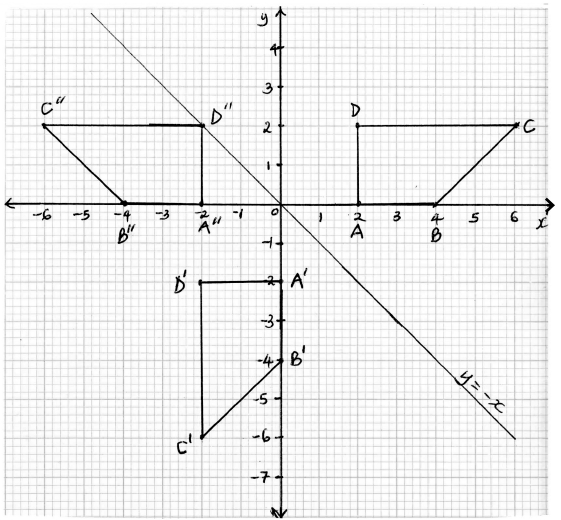
cable CD shown

|  |  |  |  |
| --- | --- | --- | --- |
| 21. | (a)   + ROP = 2 # 64c = 128c  angle subtended at centre is twice angle  subtended at O circumference.  (b)   + PSR = 180c - 64c = 116c  opposite angles of cyclic  quadrilateral add up to 180°.  (c)   + ORP = 90c - 64c = 26c  angle in semicircle (+ QRP) = 90°  and base angles of isosceles triangle equal.  (d)   + TRP = 64°  angle in alternate segment.  (e)   + RTP = 180 - 2^64h = 52c  + TRP = 64° angle in alternate segment and  sum of angles in triangle PRT = 180°. | B1  B1  B1  B1  B1  B1  B1  B1  B1  B1 | allow other valid reasons |
| 10 |

322

|  |  |  |  |
| --- | --- | --- | --- |
| 22. | 2                              2  (a)   (i)*r* =    15  - 12  = 9  (ii) Volume of cone:  1  =     r # 9 # 9 # 12  3  = 1017.87602  - 1017.88  h        6  (b)   (i)         =  12       9  12 # 6  h =               = 8  9  (ii) volume of smaller cone  1  =     r # 6 # 6 # 8  3  = 301.5928947  - 301.59  (iii) Volume of frustum  1017.88 - 301.59  = 716.29 | M1  A1  M1  A1  M1  A1  M1  A1  M1  A1 |  |
| 10 |

323



23

(a)   (i)  trapezium ABCD : drawn

B1

(ii) line of reflection*y* = -*x* drawn

trapezium A'B'C'D' : drawn

(iii) points A"B"C"D" plotted

trapezium A"B"C"D" drawn

(b)   transformation which maps

A"B"C"D" onto ABCD

reflection

on line*x* = 0

(c)   directly congruent pair

A'B'C'D' and A"B"C"D"

oppositely congruent pairs

ABCD and A'B'C'D'

ABCD and A"B"C"D"

324

B1

B1

B1

B1

B1

B1

B1

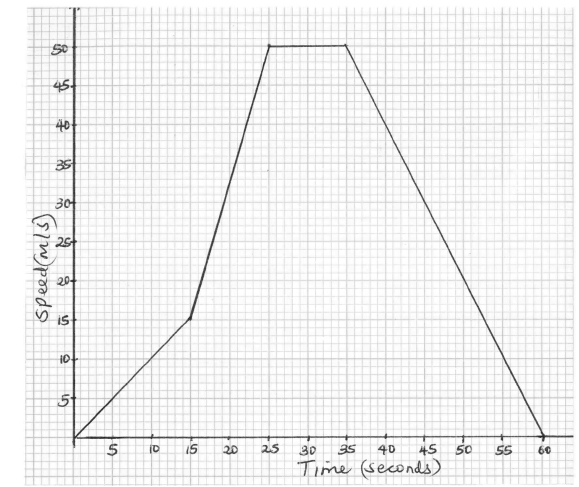
B1

B1

10

may be implied by : image

or y - axis



24

(a)   : scale

(b)   (i)  deceleration =  50

acceleration parts

constant speed

deceleration

25

= 2 m/s2

(ii) Total distance

S1

B1

B1

B1

M1

A1

=

1

2

^15 # 15h +   1 ^15 +  50h # 10 +  10 # 50 +   1 ^25 # 50h

2                                                                    2

= 112.5 + 325 + 500 + 625 = 1562.5

M1    or equivalent

A1

(iii) Average speed

=  1562.5

60

= 26.0416 = 26.0*m*/*s*

325

M1

A1

10

|  |  |  |  |
| --- | --- | --- | --- |
| 1. | 4.957                         4.96  =  0.2638 - 0.0149       0.263 - 0.015  = 20 | B1  B1 |  |
| 2 |
| 2. | *AB* =   2  4    2  3  c3  0mc 1  1m  =   8  10  c6     9m  8  10        10  15  *AB* - 5*B* =               -  c6     9m    c  5    5m  =   - 2  - 5  c   1      4 m | B1  M1  A1 | :  Substraction and multiplica-  tion by 5 |
| 3 |
| 3. | *A*:*B*:*C        A*:*B*:*C*  4:   3       ( 4:   3  1:   2              3:   6  combined ratio A:B:C  =  4:3:6  6  mass of type C =        # 52  13  = 24 | B1  M1  A1 |  |
| 3 |
| 4. | 5  *ar*        96  (a)                         3  =  *ar*        24  2  *r*  = 4 $*r* = !2  (b)   when  3                          24  *r* = 2 (*a* # 2  = 24 (*a* =        = 3  8  when  3                           24  *r* = - 2 (*a* # ^- 2h  = 24 (*a* =          = - 3  - 8 | M1  A1  B1  B1 |  |
| 4 |

**4.3.4** **Mathematics Alternative B Paper 2 (122/2)**

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|  |  |  |  |
| --- | --- | --- | --- |
| 5. | (a)  (b)*P*^6 1*x* 1 10h  15        5  =       =  36       12 | B2  B1 | : probability space |
| 3 |
| 6. | (a)                 2        4  *OB* =        +  +       c5m    c4m  =   6  c9m  (b)  co-ordinates of M  3  *OM* =*OA* +*AB*  +              +                   +  4  2            4  =        +  3  c5m     4 c4m  2        3         5  =        +        =  c5m    c3m     c8m  ` coordinates of M are (5, 8) | M1  A1  M1  A1 |  |
| 4 |
| 7. | Let angle APT =*x*c  `  3*x* + 75 = 180c  *x* = 35c  angle BAP = angle BPR = 2 # 35c  = 70° | B1  B1 |  |
| 2 |
| 8. | 2 cos^*x* - 30hc = - 0.9  cos^*x* - 30hc = - 0.45  -1  ^*x* - 30hc = cos    - 0.45  = 116.74c  *x* = 146.74c | M1  A1  B1 |  |
| 3 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| + | 1 | 2 | 3 | 4 | 5 | 6 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |

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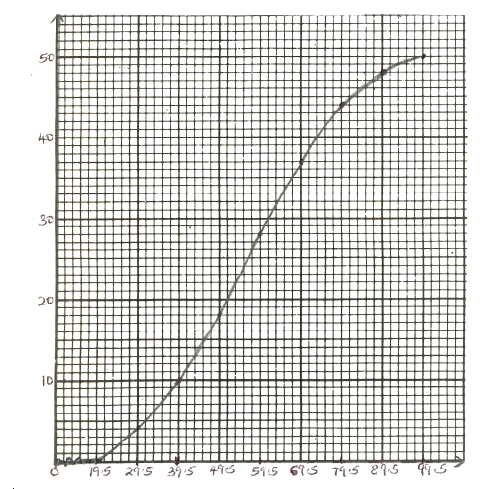
|  |  |  |  |
| --- | --- | --- | --- |
| 9. | 0  1    - 1      0  c 1  0mc   0  - 1m  =      0  - 1  c- 1      0m  0  - 1       1     1  - 1  c- 1      0mc   3      7      4m  =   - 3  - 7  - 4  c - 1  - 1     1 m  ` coordinates:  *R*l ^- 3, - 1h,*S*l ^- 7, - 1h*and  T*l ^- 4, 1h | M1  M1  A1 |  |
| 3 |
| 10. | 2  2*x*  + 8*x* = 15  2  *x*  + 4*x* = 7.5  2                                                                      2  2                 4                      4  *x*  + 4*x* +           = 7.5 +  c 2 m                 c 2 m  *x* + 2 =    11.5  = !3.4  = 1.4  or  - 5.4 | M1  M1  A1 |  |
| 3 |
| 11. | radius = 2.4 ! 0.1 | B1  B1  B1 | bisecting 2  or 3 angles  constructing radius and com-  pleting circle |
| 3 |



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|  |  |  |  |
| --- | --- | --- | --- |
| 12. | Fraction of food per person per day          1  2000 # 90  Fraction for 2000 persons for 20 days  = 2000 #        20  2000 # 90  =  2  9  Remaining fraction of food =  7  9  No of days to feed 2000 + 500 persons  7     1 # 2500  =      '  9       180000  7      72  #       = 56  9       1 | M1  A1  M1  A1 |  |
| 4 |
| 13. | 2                              2                              2  cos*P* =  75  + 80  - 40  2 # 75 # 80  10425  =               = 0.86875  12000  *P* - 30c  *SR*            40                      40 sin 68  =              (*SR* =  sin 68       sin 30                     sin 30c  = 74  m | M1  M1  A1 |  |
| 3 |
| 14. | 1st bracket $ 10164 #  10   = 1016.4  100  nd                                                           15                   \_  2   bracket $ ^19740 - 10164h #          = 1436.4  100                  bb  `  rd                                                           20  3   bracket $ ^21820 - 19740h #          = 416  100                  bb  a  Net tax = ^1016.4 + 1436.4 + 416h - 1162  = 1706.8 | M1  M1  M1  A1 |  |
| 4 |
| 15. | 2*p* + 3*r* = 66..... (*i*)  7*p* + 2*r* = 129...(*ii*)  4*p* + 6*r* = 132..(*iii*)  21*p* + 6*r* = 317.....(*iv*)  17*p*          = 255  *p*          = 15 | M1  M1  A1 |  |
| 3 |

329



16

Graph

cf: 4, 10, 18, 28, 37, 44, 48, 50 B1

P1

C1

3

330

can be implied

|  |  |  |  |
| --- | --- | --- | --- |
| 17. | (a)   300000 # 0.18  = 54000  (b)   (i)  300000 + 54000 - 134000  = 220000  (ii) 220000 # 1.18 - 134000  = 125600  (c)   125600 # 1.18  = 148208  (d)   Total interest charged:  ^300000 + 22000 + 125600h # 0.18  = 54000 + 39600 + 22608  = 116208 | M1  A1  M1  A1  M1  A1  M1  A1  M1  A1 | or equivalent  134000 # 2 + 148208 -  = 116208 |
| 10 |
| 18. | 2  (a)   (i)*U*10 = 10  - 10 + 3  = 93  (ii)  2                                                                                          2  *U*30 -*U*20 = ^30  - 30 + 3h - ^20  - 20 + 3h  = 873 - 383  = 490  2  (iii)*n*  -*n* + 3 = 243  2  *n*  -*n* - 240 = 0  ^*n* + 15h^*n* - 16h = 0  *n* = - 15*or  n* = 16  *n* = 16  (b)   (i)   Number after*t* hours  = 180 # 3*t*  (ii)  Number to the nearest million after 20 hours  180 # 312  = 95659380  = 96000000 | M1  A1  M1  A1  M1  M1  A1  B1  M1  A1 |  |
| 10 |

300000

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|  |  |  |  |
| --- | --- | --- | --- |
| 19. | (a)   Modal class: 4 - 5  8  (b)          # 360c  36  = 80c  (c)   mid values  0.5, 1.5, 2.5, 3.5, 4.5, 5.5, 6.5, 7.5  *fx* = 1, 6, 7.5, 17.5, 36, 33, 32.5, 22.5  /*fx* = 1 + 6 + 7.5 + 17.5 + 36 + 33 + 32.5 + 22.5  ` mean =  156  36  = 4 1  3  (d) | B1  M1  A1  M1  M1  M1  A1  S1  B2 | : scale and labelling  8 bars :  (allow B1 for 5 - 7 bars :) |
| 10 |

332

|  |  |  |  |
| --- | --- | --- | --- |
| 20. | (a)  (b)  (c)  (i)  Roots of equation  *x* = 0.5  or  *x* = 3  (ii) tangent line : drawn  gradient:   5 - - 1  2 - 0  =3 | B2  S1  P1  C1  B1  B1  B1  M1  A1 |  |
| 10 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *x* | -1 | 0 | 1 | 2 | 3 | 4 |
| *y* | -12 | -3 | 2 | 3 | 0 | -7 |

333

|  |  |  |  |
| --- | --- | --- | --- |
| 21. | (a)   (i)*AB*+   =*OB*+  -*OA*+   = 3*i* + 5*j* - ^- 2*i* +*j*h  = 3*i* + 5*j* + 2*i* -*j*  = 5*i* + 4*j*  (ii)*CD*+   =*OD*+   -*OC*+   = 2*i* - 4*j* - ^- 8*i* - 12*j*h  = 2*i* - 4*j* + 8*i* + 12*j*  = 10*i* + 8*j*  (b)   mid point of vector AD  - 2*i*            2*i*                  0  1                                      1  =                   +               =  2 'c*j* m    c- 4*j*m1      2 c- 3*j*m  =       0  c- 1.5*j*m  ` coordinates of mid point is  (0, -1.5)  (c)*BC*+   =*OC*+  -*OB*+   = - 8*i* - 12*j* - ^3*i* + 5*j*h  = 11*i* - 17*j*  2                             2  `*BC*  =    11  + 17  +  =    121 + 289 - 20.2 | M1  A1  M1  A1  M1  A1  B1  M1  M1  A1 |  |
| 10 |
| 22. | (a)   (i)  Longitude difference = 12° + 60°  = 72°  72              22  Distance PR =          # 2 #       # 6370  360              7  = 8008 km  72  (ii)  Time difference =         h  15  = 4 h 48 min  Local time at Q:  = 9.00 pm - 4 h 48 min  = 4.13 pm  (b)   Distance travelled in 2 h  = 1001 # 2 = 2002 km  i               22  `          # 2 #       # 6370 = 2002  360              7  i =  2002 # 360 # 7  2 # 22 # 6370  = 18°  Position of T:  (18°N, 60°W) | M1  M1  A1  M1  M1  A1  B1  M1  A1  B1 |  |
| 10 |



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|  |  |  |  |
| --- | --- | --- | --- |
| 23. | 2                                                                   2  *C                  kC*  (a)   (i)*R* \       (*R* =  *T                    T*  R = 30, C = 62 and T = 2.4  ( 30 =*k*6  2.4  30 # 2 .4  *k* =                   = 2  36  2*C*2  (ii) `*R* =*T*  (b)   (i)  when R = 402   and C = 8  *T* =  2 # 8  40  = 3.2  2  2 # ^0.9 # 8h  (ii)  New*R* =     1.08 # 3.2  = 30  % change in R  40 - 30  =                  # 100  40  = 25% | B1  M1  A1  B1  M1  A1  M1  A1  M1  A1 |  |
| 10 |

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|  |  |  |  |
| --- | --- | --- | --- |
| 24. | 1                    1  (a)   (i)  24 +     ^13h = 30  2                    2  1  (ii)      # 1"2 + 2 + 2^6 + 8 + 8 + 6h,  2  1  =     ^60h  2  2  = 30 cm  30   56 - 30  (b)   (i)  % error =                                      5       # 100  30   6  = 2 26  37  = 2.7  (ii)  1 cm / 120 m  2                                                                2  1 cm  / 14400 m  5           2      144000      185  ` 30   6  cm  /                 #  10000         6  =44.4 ha | M1  A1  B1  M1  A1  M1  A1  B1  M1  A1 | whole square and part square  ordinates 2, 6, 8, 8, 6, 2  substitution into formula  simplification |
| 10 |

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