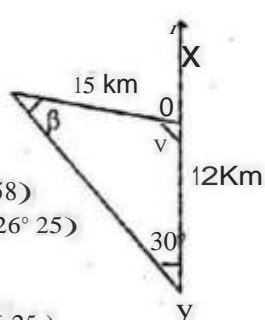


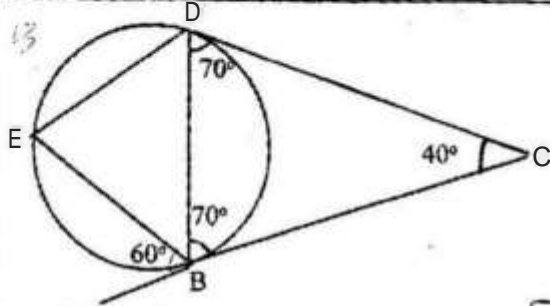
KC.S.E 2000 MATHEMATICS PAPER 121/I MARKING SCHEME

| SOLUTION | MARCS | ALTERNATIVE METHOD |
|--|---------------------------|---|
| 1. 218 $-15-12$ $-2 \quad -$ $=-23-1$ $=-24$ | ml ml AI 3 marks | Removal of each bracket Removal of denominators |
| 2. $(3a+b)(a+b)$ $(4a-b)(a+b)$ $=5a+b$ | ml ml AI 3 marks | Numerator factorised Denominator factorised |
| 3. a) $\angle BAE = 540^\circ = 108^\circ$ 5 b) $\angle BAE = 108^\circ - 36^\circ = 72^\circ$ c) $\angle BNM = 90^\circ - 36^\circ = 54^\circ$ | BI BI BI 3 marks | Award angle seen on diagram |
| 4. a) Modal class is 150- 154 b) Median = $149.5 + \frac{7}{19} \times 5$ $= 151.34$ $= 151 \frac{13}{38}$ | BI ml AI 3 marks | Accept $\frac{25^{\text{th}} - 26^{\text{th}}}{2} = \frac{57}{2}$ $= 151.475$ |
| 5. c) $(x+5)(x+2)=4$ $x+7+6=0$ $(x+6)(x+1)=0$ $x=-6$ or -1 $x=-1$ | ml ml AI | $=x+5 \quad 4$ Dropping of logs or equivalent Factorisation $10(s+5)(x+2) = 10$ Must disqualify $x = -6$ to score |
| 6. a) $29 + 28 = 43 \text{ cm}$ b) $43: 1075 \times 10^4 \times 10^4$ $1:25 \text{ m}$ $1:5 \times 10^5 = 1:50000$ | BI ml AI 3 marks | Accept 45, 46, 48 a.s.f. follow through a.s.f. |
| 7. a) $x = \frac{43T-27}{\dots}$ $\tan \theta = \frac{2}{\sqrt{5}}$ b) $\sec \theta = \tan \theta + 1$ $= \frac{4}{\sqrt{5}} + 1$ $= 1.8$ | ml AI BI 3 marks | [5 seen $\frac{2}{\sqrt{5}}$ $\sec^2 (\#)$ $= 1.8$ |

| SOLUTION | MARK | ALTERNATIVE METHOD |
|---|---|---|
| <p>B. $\sin 3 = \sin 30^\circ$</p> <p>n 7</p> <p>$\sin 3 = \frac{0.5 \times 12}{15} = 0.4$</p> <p>$\} - 23.58023^\circ 35'$</p> <p>$a = 180 (30^\circ + 23.58)$</p> <p>$= 126.42^\circ \quad (126^\circ 25')$</p> <p>Bearing of Z from X</p> <p>$180^\circ + 126.42^\circ$</p> <p>$= 306.42^\circ \quad (06, 25)$</p> <p>$N53^\circ 25' W$</p>  | <p>ml</p> <p>ml</p> <p>AI</p> <p>3 marks</p> | <p>After getting $= 23.50^\circ$</p> <p>$53.58 = (30 + 23.58)$</p> <p>$= 360 - 53.58$</p> <p>$= 306.42$</p> |
| <p>9. Area of rectangle = 19.5×16.5 cm</p> <p>$= 321.75$ cm</p> <p>Area of 4 triangles = $\frac{1}{2} \times 6 \times 4.5 \times 4$</p> <p>$= 54$ cm</p> <p>Area of octagon = $321.75 - 54$</p> <p>$= 267.75$ cm²</p> | <p>ml</p> <p>AL</p> <p>3 marks</p> | <p>Accept equivalent methods</p> <p>267.8 cm² when log used</p> |
| <p>10. Maximum perimeter $2(18.5 - 12.5) = 62$ cm</p> <p>Minimum perimeter $2(17.5 + 11.5) = 58$ cm</p> <p>Indicated perimeter $2(18 + 12) = 60$ cm</p> <p>Absolute error = $\frac{62 - 58}{2} = 2$</p> <p>$= \frac{2 \times 100}{60}$</p> <p>$= \frac{31}{3} \% \quad \text{Avoid } \frac{10}{3} \%$</p> | <p>ml</p> <p>ml</p> <p>AI</p> <p>3 marks]</p> | <p>Accept</p> <p>$\frac{100 - 58 \times 100}{60}$</p> <p>$\frac{100 - 96.2 - 31}{3} \frac{1}{3}$</p> <p>Accept</p> <p>62 - 60 or</p> <p>58 - 60</p> <p>3.3, 3.333 avoid 3.3 Or 3.33</p> |
| <p>11. Volume = $\frac{1}{3} \times 12 \times 9 \times 6$</p> <p>$= 216$ cm</p> | <p>ml</p> <p>AI</p> <p>2 marks</p> | <p>Accept step by step</p> |
| <p>12. 12% used - n = 4</p> <p>A-48000(1.12) substituting</p> <p>No. 15.2 4.61</p> <p>2</p> <p>0.1965</p> <p>$7.55 \times 10^4 + 8790$</p> <p>Answer: vile = Sh. 75510</p> | <p>ml</p> <p>ml</p> <p>AI</p> <p>3 marks</p> | <p>Accept step by step</p> <p>a</p> <p>A2</p> <p>3</p> <p>4</p> <p>7520</p> <p>3 marks</p> |

SOLUTION

MARKS ALTERNATIVE METH~



- (a) $\angle CBD = 70^\circ$
 Base angles isosceles triangles avoid
 (b) $\angle CDE = 130^\circ$
 Alternate segment theorem

BI
 BI
 BI
 BI

4 marks

14. a $V = 9t^2 - 4t + c$
 Initial velocity : $t=0$ when $V = 2 \text{ms}^{-1} : c = 2$
 $V = 9t^2 - 4t + 2$
 b) $9t^2 - 4t + 2$
 $9t^2 - 4t = 0$
 $t(9t - 4) = 0$ allow transfer of measures here
 $t = 0$ or $t = \frac{4}{9}$, can be given early
 • $t = 4 \text{sec}$
 $\frac{9}{9}$

MI
 AI

BI

3 marks

15. Korir, Wangari, Hassan
 $\frac{1x}{4} \quad \frac{2x}{5} \times \frac{3}{4} \text{ or } \frac{3x}{10} \quad \frac{2x}{2} \times \frac{3x}{4} \text{ or } \frac{3x}{8}$
 Bank - $\left[\frac{1}{4} - \frac{3x}{10} + \frac{3x}{8} \right]$
 $\frac{3}{40}$
 $\frac{2}{8}x - \frac{3x}{40} = 60000$
 $x = 200000$

ml

He can use number instead of unknown trials and errors accepted.

ml

Korir =
 Who gave $\frac{3x}{10}$

ml

Hassan $\frac{3x}{8}$

AI

Bank = $\frac{1}{4}x - 60,000$
 $x = \frac{1}{4}x - \frac{1}{4}x + \frac{1}{4}x - 60,000$
 $x = \frac{1}{4}x + \frac{1}{4}x - 60,000$

4 marks

16. (a) $4p + 6b = 66$
 $2p + 5b = 51$
 $4p + 6b = 66$
 $4p + 10b = 102$
 $4b = 36$
 $b = 9$
 $p = 3$
 Let the number of pencils be x
 $3x + 9(x + 4) = 228$
 $12x = 192$

ml

ml

AI

ml

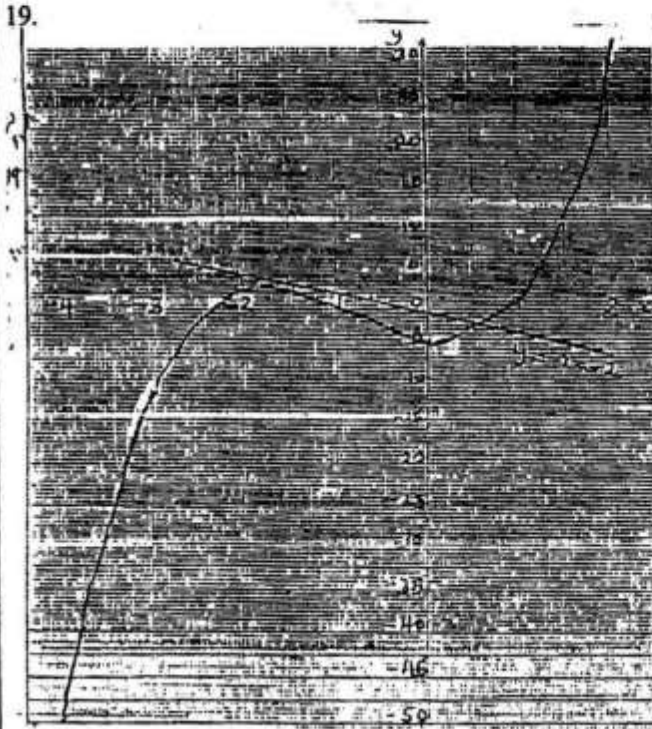
5 marks

C.A.O.

| SOLUTION | MARKS | ALTERNATIVE METHOD |
|---|--|---|
| <p>17. a) $S = \frac{1}{2}(36 + 40 + 42)$ $6 \text{ Ards } 55 - 569 - 10y5s - 2)$ $= 438311$ $- 662.1 \text{ n}$</p> <p>(ii) $\frac{1}{2} \times 36 \times 40 \sin \sim = 662.1$ $\sin \sim = \frac{662.1 \times 2}{36 \times 40}$ $= 0.9195$ $\sim = 66.9^\circ$ Accept 66.8°</p> <p>b) $\frac{OA}{\sin 23.1} = \frac{42}{\sin 133.8^\circ}$ $OA = 22.83$ Accept 22.84</p> | <p>ml ml Al ml ml Al ml Al 8 marks</p> | <p>59 seen Substitute Tables used } 438300 - 662m $2 \times 49 \times 360s \sim$ $= 402 + 362 - 422$ $\cos = 402 + 362 - 4 = 1132$ 2403 If 662.1 was 10* $2R = 42$ $\sin 66.9$ $= 42.66$ $R = 22.83$ if logs used follow through</p> |
| <p>18. a) $6) \overset{182}{1} \overset{3}{3} \overset{10}{0}$ $\left(\overset{9}{0} \right) \left(\overset{s}{40} = \frac{\quad}{100} \right)$ $" \overset{29}{53} \overset{(53)}{40} \overset{39}{39} = \overset{4}{5} \overset{(79)}{3} \overset{40}{39}$ $= \frac{22}{325}$</p> | <p>ml Al ml Al ml Al ml Al ml Al 8 marks</p> | <p>Accept equivalents For addition work out</p> |

SOLUTION

MARKS ALTERNATIVE METHOD



| | | | | | | | |
|-----------------|---|-----|----|----|---|---|----|
| x | 1 | -1 | -2 | -1 | 0 | 1 | 2 |
| 2x | | -16 | | | | | |
| 5x ² | | | | | f | | |
| -x | | | 2 | 1 | | | -2 |
| -6 | | -12 | 0 | -2 | | | 28 |

$y = 2x - 2$ BI
 $x = 0.7 \pm 0.1$ BI

Line must cut curve at any one point.

20 a) $A = \frac{22}{7} \times 4.2 \times 4.2 = 55.44 \text{ cm}^2$

BI

3.142 used

(i) Let slanting length cone be L

$\therefore L = 8 - 3.5$

$\frac{L}{4.2}$ or equivalent

ml

$L = 48 \text{ cm}$

Curved area of frustum

$= \frac{22}{7} (4.2 \times 48 - 3.5 \times 40)$

$= 193.6 \text{ cm}^2$

(ii) Hemispherical surface area

$= \frac{1}{2} \times 4 \times \frac{22}{7} \times 3.5 \times 3.5$

$= 77 \text{ cm}^2$

Al

ml

$A = 55.42 \text{ cm}^2$

$CS.A = \pi (Rr)l$

$22 (4 \text{ Cos } 3.5) 8$

$= 193.6$

ALTERNATIVE

$\frac{H}{36} \times 22 \times 4.2 \times 4.8 \text{ m}$

$= 193.6$

$2 \times \frac{22}{7} \times 3.5 \times 3.5 + 2 \times \frac{22}{7} \times 4.2$

(c) Ratio of areas = 81.51:326.04

$= 1:4$

Ratio of lengths = 1:2

Radius of base = 4.2

$\frac{2}{2}$

$= 2.1 \text{ cm}$

Al

ml

Al

8 marks

$= 77 + 110.00 = 187.88$

$187.85 + 193.6$

| SOLUTION | MARKS | ALTERNATIVE METHOD |
|---|----------------------|---|
| 21. a) $AN = ON - OA$ $= \frac{4b-a}{5}$ | BI | Use ratio theorem |
| b) $BM = OM - OB$ $= \frac{2b-ad}{5}$ | BI | |
| 22. (a) Angle change $52 - 38.5$ $S = \frac{2 \times 22 \times 6370 \times 13.5}{7 \times 360}$ $= 1501.5 \text{ km}$ | ml ml ml AI | 13.50 seen circumference O° expression whole expression 13.5×60 = 810 for 6400 |
| (b) $Ox = \frac{2 \times 22 \times 6370 \cos 52^\circ}{360 \times 7} = 2400$ $9 = \frac{2400 \times 7 \times 360}{2 \times 22 \times 6370 \cos 52^\circ}$ $= 35.05^\circ$ $\epsilon = (52 - N 21^\circ w)$ | ml AI BI | -34.04 If second A is lost |
| | 8 marks | Follow through |
| 23. a) $\frac{1}{3} - \frac{2}{5} = \frac{5-6}{15} = -\frac{1}{15}$ $8) 6 \text{ (} \$ 9 \text{)} \text{ (} ^\circ \text{)} \text{ (} 7699 \text{)} \text{ (} 7400 \text{)}$ $\frac{5}{16} \text{ (} 1 \text{)} \text{ (} 3 \text{)} \text{ (} 1 \text{)} \text{ (} 3 \text{)}$ $\frac{26}{2m} = \frac{1000}{500}$ Beans: Sh. 3500, maize Sh. 1400 (e) New price of beans $= \frac{105 \times 3500 \times 5}{160}$ $= 29400$ Balance maize $= 47600 - 2405$ $= 18200$ Bega c: $\therefore = \frac{18200}{1400} = 13$ | | $()$ BI Accept $\frac{4}{78} \text{ (} b \text{)} \text{ (} \frac{23800}{23700} \text{)}$ pre-multiplication by p-I $\frac{-12}{10} \text{ (} \frac{4}{9} \text{)} \text{ (} 16 \text{)}$ $\frac{m}{-12} \text{ (} \frac{4}{-10} \text{)} \text{ (} \frac{709}{157400} \text{)}$ $()$ $\frac{9}{1400}$ $= 35 \text{¢}$ $\therefore = 14 \cdot 0$ |

