K.C.S.E 2008
MATHEMATICS P1 121/1
MARKING SCHEME

1. $\frac{-8 + (-5) \times (-8) - (-6)}{-3 + (-8) \div 2 \times 4}$

$\frac{-8 + 40 + 6}{-3 + -4 \times 4}$ M 1

$\frac{38}{-19}$ A1

$= -2$ 2

2. $\frac{(3^3)^{2/3} \div 2^4}{(2^5)^{-3/5}} = \frac{3^2 \div 2^4}{2^{-3}}$ M 1 or equivalent

$= \frac{3^2}{2^4 \times 2^{-3}}$ M1 for $2^4 \times 2^{-3}$ or equivalent

$= 9/2$ or 4.5 A1 $9/2$ is not simplified

3

3. $\frac{a^4 - b^4}{a(a^2 - b^2)} = \frac{(a^2 + b^2)(a^2 - b^2)}{a(a^2 - b^2)}$ M1 Factorization of numerator $a^3 - ab^2$
M1 Factorization of denominator

$= \frac{a^2 + b^2}{a}$ or $a + \frac{b^2}{a}$ A1

3

4. 23.50 + (7 h 15 min + 45 min + 5 h 40 min)

=1330h B1

=1.30 pm on Monday B1

CD parallel and equal to AB B1 For trapezoidal x sectional faces GH parallel and equal to fit B1 for hidden lines dotted

Completion of sketch with
Hidden edges dotted B1 For 3 triangular faces

3

6. Sales Petrol $^1/_3$ x 900,000 } M1
Diesel $^2/_3$ x 900,000

Profit $\frac{1}{3} \times \frac{900,000}{1000} \times 520 + \frac{2}{3} \times \frac{900,000}{1000} \times 480$ M1

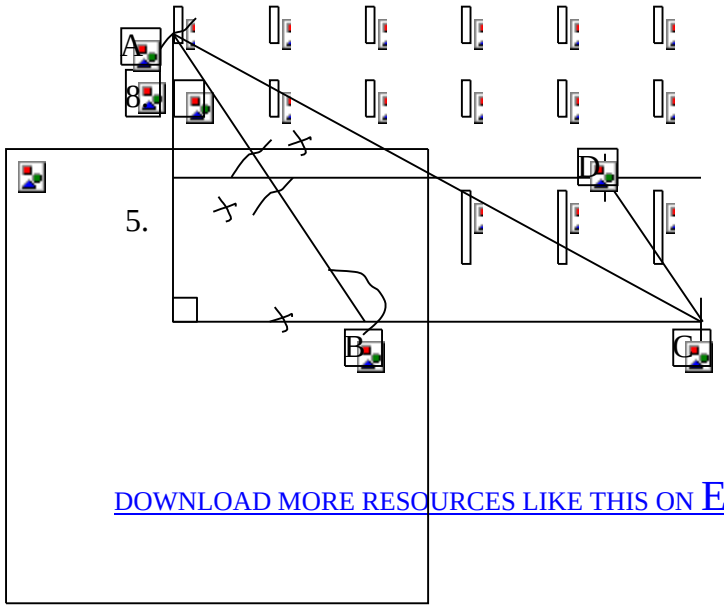
= 15600 + 288000
= 444000 A1

3

7. Volume of liquid = $\frac{384}{0.6}$ M1

Height of liquid = $\frac{640}{X\ 3.2^2}$ M1
= 19.89 A1

3



5. B1 (bisect height to determine E)
B1 Determination of point D and

B1 < 120^0 completion

B1 Drop b from A to CB Produced

completion of parallelogram

4

9. Volume of sphere = $^4/_3 \pi \times 4.2^3$ M1

$\therefore$Side of cube = $\sqrt[3]{^4/_3 \pi \times 4.2^3}$ M1

= 6.77 A1

3

10. Radius of circle $\frac{23.4}{1.8}$ M1

= 13 cm A1

Area of sector = $\frac{1.8}{2\pi} \times \pi \times 13^2$ M1

152.1 cm^2 A1

Are length $r\theta^c$ where θ is in radians

$\Rightarrow 243 = r \times 1.8$

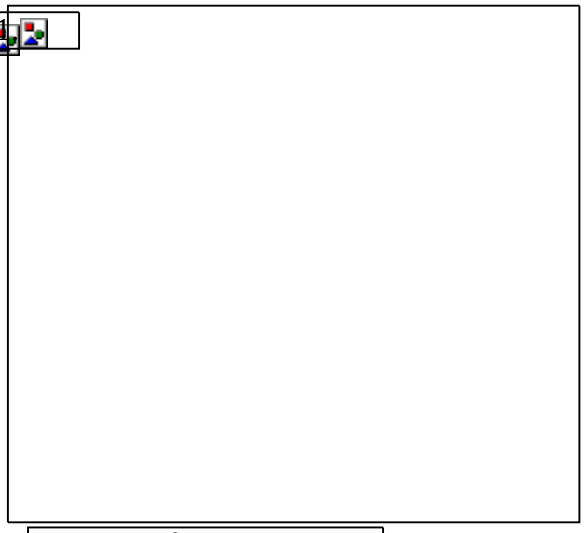
$\therefore r = 24.3$

1.8

Follow through

4

11



B1 Plotting points A, B and C

B1 Location of point D (-2, 2)

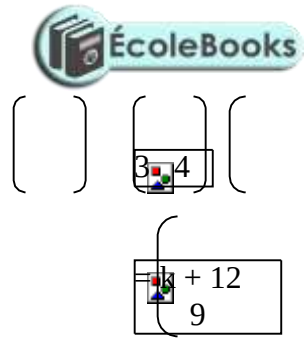
Equation of line AD

$\frac{y - -3}{x - -4} = \frac{5}{3}$ M1 or $y-2 = {}^5/_2$

$y = {}^5/_2 x + 7$ A1

4

12. $AB = \begin{pmatrix} k & 4 \\ 3 & 2 \end{pmatrix} \begin{pmatrix} 1 & 2 \\ 3+6 & 6+8 \end{pmatrix} = \begin{pmatrix} k+12 & 2k+16 \\ 9 & 14 \end{pmatrix}$ M1



Del AB = (k + 12) (14) – (2k + 16) (9) = 4 M1 If brackets missing wait for

11k + 168 – 18k – 144 = 4 - 18 k – 144 + 14 k + 168 = 4

-4 k = -20

k = 5 A1

3

13. Area of rectangular part = 2 x 5.2 x π x 18 M1

= 187. 2π

Area of circular parts = 2 x 5.2^2 x π M1

54.08 x

π (187.2 + 54.08) = 241. 28π A1

3

14. Log 0.096 = log (4^2 x 6 x $\underline{10}^{-3}$) M1

= 2 (0.6021) + 3.7782 M1

= 2.9824 A1

Or (-1. 0.76) 3

15. 2y = 5x + 8 y

$= {}^5/_2 x + 4$

Grad of $L_1 = {}^5/_2$ B1

Grad of L_2 $\frac{0 + 4}{-5 - 5} = + \frac{4}{-10} = \frac{-2}{5}$ B1 If the gradient of L_1 and L_2 Are negative reciprocals of each other then L_1 L_2

${}^5/_2 \times -{}^2/_5 = -1$

$\therefore L_1$ and L_2 are 1 B1

3

16. $2 \cos 2\theta = 1 \cos$

$2\theta = ½$

$\therefore 2\theta = 60^0, 300^0, 420^0, 660^0$ B1 B1

$\theta = 30^0, 150^0, 210^0, 330^0$ B1 B1

4

17. Juma's earnings before increase

112% → 8400

100% → $8400 \times \frac{100}{112}$

$= 7500$

Akinyis earnings before increase

$= {}^3/_5 \times 7500 = 4500$

Increase in Akinyis earnings

$= 14{,}100 - 8\,400 - 4\,500$

$= 1200$

% increase in Akinyis earnings $= \frac{1200}{4500} \times 100$

$= 26\,{}^2/_3$

ALT

M1 $112J = 8400$ M1

A1 $J/A = \frac{5}{3} = A = \frac{3}{5} \times \frac{100}{112} \times 8400$

M1 $= 4500$ A1

M1 now $8400 + A = 14100$

$A = 5700$ A1

Increase $\frac{(5700 - 4500)}{4500} \times 100$ M

$= \frac{12}{45} \times 100 \times 26^2/_3$

A1

M1

(b) No of bags bought

$= \frac{14100}{1175}$

$= 12$ bags

Profit $= (1762.50 - 1175) \times 12$

$= 7050$

Ratio: 5700:8400 = 19:28

Profit for Akinyi $= 7050 \times {}^{19}/_{47} = 2850$

Total earning for Akinyi $5700 + 2850$

$= 8550$

M1 or equivalent

Sale price 1762.50×12

$= 21150$ M1

M1 Ratio: 84: 57 $= \frac{57}{141} \times 21150$

A1 $= 8550$

18. Trapezium rule

x	-1	-2	0	1
y	7	5	5	7

ALT

B1 x y

Are ½ x1 [(11 + 11) + 2 (7 + 5 + 5 + 7)]

y = 6

= ½ (22 + 48) M1

$= x^2 + x - 6$

= 35 A1

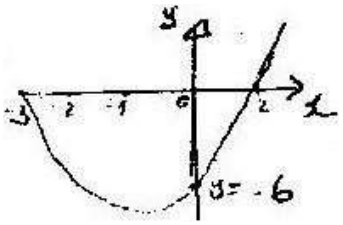
Are = 11 x 5 = 55 M1

= 55-35

= 20 (square unit) A1

-3	0
-2	4
-1	6

y



M1 A1

1 4

2 0

B1

A= ½ (0+2 (20)

M1

= 20A1

Mid ordinates

x	-2.5	-1.5	-0.5	0.5	1.5
y	8.75	5.75	4.75	5.75	8.75

AC = (8.75 + 5.75 + 4.75 + 5.75 + 8.75 x 1 B2 Alt Xm Ym A= 1 x 21.25 M1

= 33.75 M1 -2.5 2.25 = 21.25 A1

A= 55 – 33.75 M1 -1.5 6.25

21. 25 -0.5 6.25 Difference

Difference = 21.25- 20 0.5 5.25 = 21.25 - 20

= 1.25 sq units A1 1.5 2.25 = 1.25 B1

10 B2

→

19. (i) BD = q – p B1

→

(ii) BC = $^2/_3$ (q- p) B1

→

(iii) CD= $^1/_3$ (q- p) B1

→

(iv) AC = p + $^2/_3$ q – $^2/_3$ p M1 If ratio theorem used M1 will

A1 Be implied give M1 A1

= $^1/_3$ p + $^2/_3$ q

(b) (i) CE = CD + DE M1 Ratio theorem could be

= $^1/_3$ q – $^1/_3$ p + ½ p used or equivalent

A1

= $^1/_3$ q + $^1/_6$ p

→

AC = k ($^1/_3$ q + $^1/_6$ p)4

1 2 1 1 M1

$^1/_3\ p + {}^1/_3 q = {}^1/_3\ kq + {}^1/_6\ kp$

$^1/_6\ k = {}^1/_3\ k = 2$ A1

→

(ii) AC = 2CE

AC: CE = 2.1 B1 With no vector sign used at ab

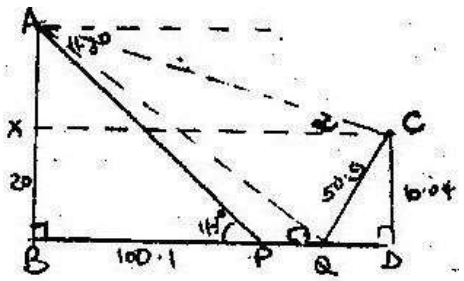
10

20. (a) $\tan x = \frac{20}{x}$ M1

$x \times \tan 11.3^0 = 20$

$= \frac{20}{0.1998197} = 100.09022$

= 100.1m A1



(b) PQ = $\frac{36 \times 1000}{60 \times 60} \times 5$ M1

= 50M

BQ = 100.1 + 50 = 150.1 M

$\tan \theta = \frac{20}{150.1} = 0.133245$ M1

$\theta = 7.5896$

$\theta = 7.59^0$

(c) (i) QD = 200 – 150.1 = 49.9 A1

$CD = \sqrt{50.9^2 - 49.9^2} = 10.03992$ M1

= 10.04 m A1

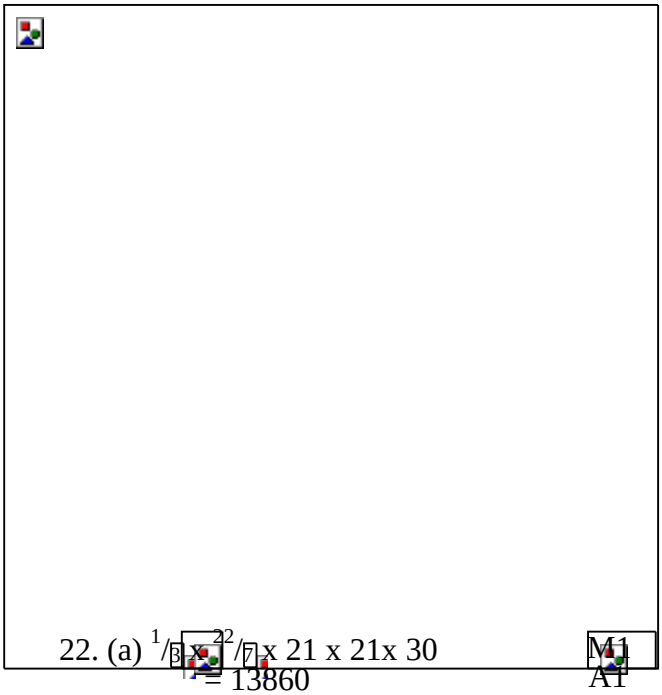
(ii) AX = 20- 10.4 = 9.96 M1

$\tan \propto = \frac{9.96}{200} = 0.0498$

$\propto = 2.85097$ M1

$\propto = 3^0$ A1

10



21. (a) Δ $A^1B^1C^1$ ∨ 1y drawing B2 Allow B1 for two vertices

(b) Δ A"B"C" ∨ 1y drawing B2 or B1 above

(c) Δ A"'B"' C"'∨ 1y drawing B2 for B1 above

(d) Reflection in line B2 B0 if B1 above

y= -x

x= 1..5 B1 y = 0

B1

10

22. (a) $^1/_3$ x $^{22}/_7$ x 21 x 21x 30 M1

= 13860 A1

13858.22 if π = 3.142

138544236 if π in the calculator used

(b) (i) $^8/_{21} = {}^{36}/_{30}$ M1

r = 360 x 21 / 30

= 25.2 A1

r = 3

(ii) $^1/_3$ x $^{22}/_7$ x 25. 2 x 25. 2 x 36 M1

= 23950.08

= 23950.08 – 13860

= 10090. 08cm^3 M1

Alt Ratio of height 30: 36 = 5:6

U.S.F = 125: 216

Volume of big cone = 216 x 13860 / 125

=23950

(ii) $^4/_3$ x $^{22}/_7$ x 8^3 = 10090.08 A1

r^3 = 10090.08 x 21 / 4 x 22 M1

= 13.40 cm M1

A1

10

Vol of sphere = 10090.08 M_1A_1

23950.08 – 13860 = 10090.08

ALT

$^4/_3$ πr = 10090.08 M1

r^3 = 2407.8 M1 2407.86

r = 13.40 cm A1

r^3 = 10090.08 x ¾ x $^7/_{22}$

23. Let the original number be n Original Contribution 2000 000 B1 For either 2000 000 / n or 2000 000 / n - 40

Amount per member after withdrawal of $40 = \frac{2000\,000}{n} - \frac{2000\,000}{n-40}$

$\frac{2000\,000}{n-40} - \frac{2000\,000}{n} = 2500$ M1 For removal of denominator and expression

$2000\,000n - 2000\,000 + 8000\,000 = 2500(n-40)$ M1

$2000\,000n = 2500n^2 + 2000\,000n - 1000\,000 - 80{,}000{,}000$ M1

$n^2 - 40n - 3200 = 0$

$(n-200)(n+160) = 0$

$n = 200$ A1

(b) New contribution $= \frac{55}{100} \times 2000\,000$ M1

Contribution per member

$= \frac{55}{100} \times 2000\,000 \times \frac{1}{160}$ M1

$= 6875$ M1

(c) Actual cash contribution by members M1

$\frac{55}{100} \times 2000\,000 \times \frac{19}{25} = 836{,}000$ A1

$= 836{,}000$ M1 or $6875 \times {}^{19}/_{25} \times 160$

10

24. (a) $\frac{ds}{dt} = 3t^2 - 12t + 9$ M1

$\frac{ds}{dt}(0.5) = 3(0.5)^2 - 12(0.5) + 9$ M1

$= 3.75$ A1

(b) $\frac{ds}{dt} \Rightarrow 0 \Rightarrow 3t^2 - 12t + 9 = 0$ M1

$t^2 - 4t + 3 = 0$

$(t-3)(t-1) = 0$ M1

$t = 3 \quad t = 1$ A1

	When t= 3 s = $3^3 - 6 \times 3^2 + 9 \times 3 + 5 = 5$	
	When t = 1 s= $1^3 - 6 \times 1 + 9 \times 1 + 5 - 9$	B1
		B1 y intercept
		B1 Turning points
		B1 Curve through the three points
		10