121/2
MATHEMATICS
JULY, 2018
PAPER 2
TIME: 2½ HOURS

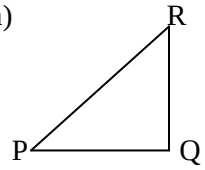
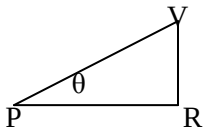
BUURI EAST STANDARDS

Kenya Certificate of Secondary Education
MATHEMATICS Alt. A

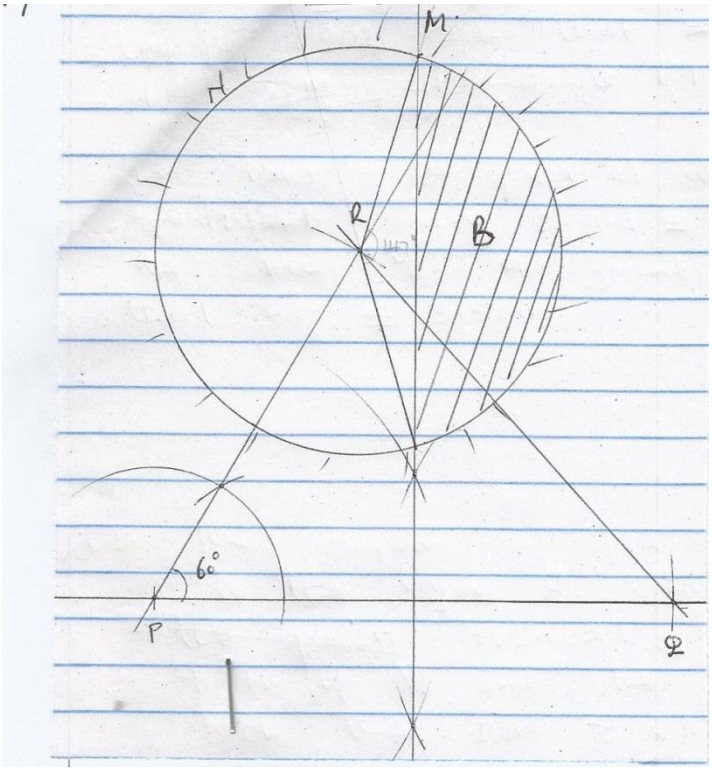
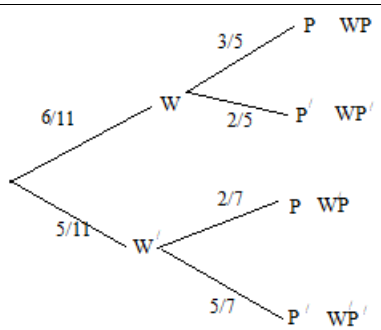
MARKING SCHEME

No.	Calculations	Marks	Remarks
1.	$x^2 = \frac{py - y^2}{p - 1}$ $x^2p - x^2 = py - y^2$ $x^2p - py = x^2 - y^2$ $p(x^2 - y) = x^2 - y^2$ $p = \frac{x^2 - y^2}{x^2 - y}$	M1 M1 A1	Removing √ Factoring P
		3	
2.	a) A.E in length = 0.1 = 0.005 A.E in width = $\frac{0.01}{2}$ = 0.005 R.E in area = 0.05 + 0.05 8.3 5.45 = 0.006942 b) % = 0.006942 x 100% = 0.6942	 M1 M1 A1 B1	
		4	
3.	B = 30^0 x 2 = 60^0 C = $360^0 - 60^0$ = 300^0 A = ½ x 300 = 150^0	B1 B1 B1	
		3	
4.	a) -5, -2, 1, 4, 7 b) 540 = 40 (2(-5) + (40 – 1) 3) = 20 (107) = 2140	B1 M1 A1	
		3	
5.	a) $\boldsymbol{P} = 2(3\boldsymbol{i} - \boldsymbol{j} + 2\boldsymbol{k}) - 4\boldsymbol{i} + 2\boldsymbol{j} - \boldsymbol{k}$ $= 6\boldsymbol{i} - 2\boldsymbol{j} + 4\boldsymbol{k} - 4\boldsymbol{i} - 2\boldsymbol{j} + 4\boldsymbol{k}$	M1	Substitution Opening of brackets

			and simplifying
	$= 2\boldsymbol{i} - 4\boldsymbol{j} + 8\boldsymbol{k}$	A1	
	b) $\|p\| = 2^2 + (-4)^2 + (8)^2$	B1	
	$= 9.165$		
		3	
6.	a) $x = kyz^2$		
	$k = \frac{x}{yz^2}$		
	$= \frac{150}{2 \times 5^2}$	M1	Getting K.
		A1	
	$= 3$		
	$X = 3YZ^2$		
	b) $X = 3 \times 4 \times 32$		
	$= 108$	B1	
		3	
7.	$A = \int (x 2 + 5)$		
	$= \frac{x3 + 5x}{3}$	M1	✓ integration range should be shown
	$= 33 + 5(3) - {}_{1/3} + 5$	M1	
	$= 18\,{}^{2}/_{3}$ or 18.6…	A1	Deny it rounded up to 4 s.f should be accurate area.
		3	
8.	$\frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}} \times \frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}-\sqrt{2}}$	M1	Mutiplying with conjugate
	$\frac{3-\sqrt{6}-\sqrt{6}+2}{3-2}$	M1	Multiplying and simplifying
	$5 - 2\sqrt{6}$	A1	
		3	
9.	$\text{Log}_{10} 4^3 + \log_{10} 125 - \log 10 2^3$		
	$\text{Log}10(\frac{42 \times 125)}{23}$	M1	Applying laws of log
	$\text{Log } 10\ (1000) = x$		
	$10^x = 10^3$	M1	Expressing in power form
	$X = 3$	A1	
		3	

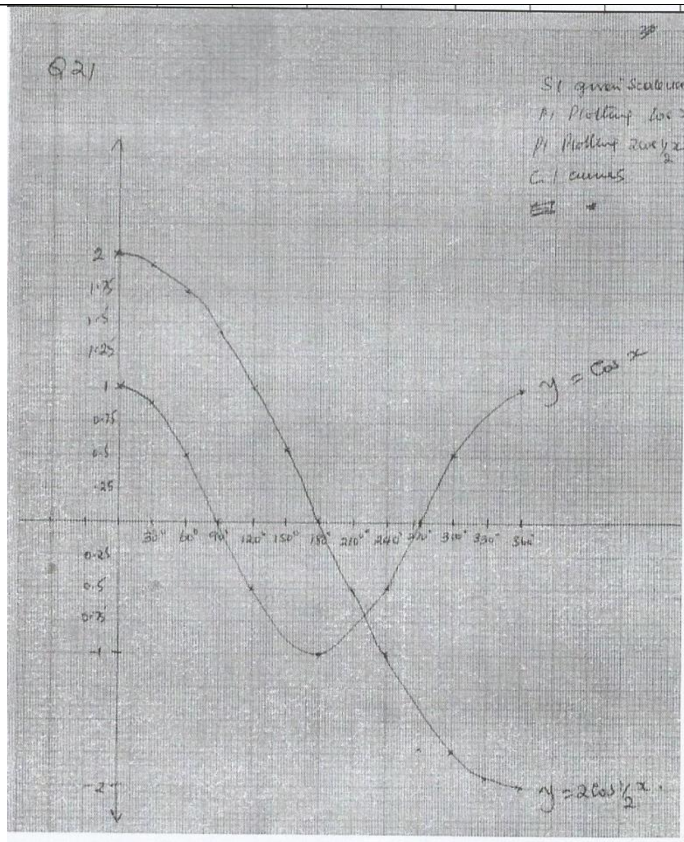
10.	a)  PR = $20^2 + 82$ = 21.54  b) $\tan\theta = \frac{6}{21.54}$ $= 0.2786$ $\theta = \tan^{-1} 0.2786$ $\theta = 15.57^0$	B1 B1 M1 A1	
		4	
11.	a) $(4 + x)^6 = 1 + 6x + 15x^2 + 20x^2 + \ldots\ldots$ b) $x = 0.9$ $(1.9)^6 = 1 + 6(0.9)^2 + 20(09)^3$ $= 33.13$	B1 M1 A1	
		3	
12	$X + y \leq 50$ $Y \leq 2x$ $2x + 3y \geq 120$	B1 B1 B1	
		3	
13	$X^2 - 4x + 4 + y^2 + 8y + 16 = 5 + 4 + 16$ $(x - 2)^2 (y + 4)^2 = 25$ Centre (2, -4) Radius 5	M1 A1	Both centre and radius
		3	

14	$X2 - 7x + (-7)^2 = -10 + (-7)2$ $2 \qquad 2$ $(x - 7)^2 = -10 + 49$ $2 \qquad 4$ $(x - 3.5)^2 = +9$ 4 $X = 3.5 + 1.5$ $X = 5$ or $x = 2$		M1 M1 A1
			3
15.	Taxable income 42000 First 10 000: 10 000 x $\frac{5}{100}$ = 500 Next 10 000: 10 000 x $\frac{10}{100}$ = 1000 Next 10 000: x $\frac{20}{100}$ = 2000 Remaining 12 000: 12:000 x $\frac{30}{100}$ = 3600 Group tax: 7 100 Relief: 3 000 Net tax 4 100	M1 M1 A1	All gross tax correct
		3	
16.	Det T = Area scale factors = (1 x 2) – (2 x 3) = -4 ASF = 4 Area = 25.6 4 = 6.4cm^2	B1 M1 A1	
		3	

17.	 A = 147 x 22 x 3.5 – ½ x 3.5 360 7 X 3.5 sin 147 = 1.2 384 cm^2	B1 B1 B1 B1 B2	For ✓ 600 For ✓ PQR For ✓ M For ✓ N For region B B1 M1 M1 A1
		10	
18.i) b ii) iii)	 (wp) = 6/11 x 3/5 = $^{18}/_{25}$ = $^{18}/_{25}$ P (wp1) ap(w1p) = $(^{6}/_{11}$ x $^{2}/_{5})$ + (5/11 x $^{2}/_{7})$ = 134 385	B1 B1 M1 A1 M1 A1	

iv)	P (w1p1) = $^{5}/_{11}$ x $^{5}/_{7}$ = $^{25}/_{77}$	M1 A1	
	Total	10	Marks
19a	Total rate of flow = 150 + 100 = 250 litres Time taken = 20 000 250 = 80 mins a 1 hr 20min	B1 M1 A1	
b	Water put in the tank by pond Q in 30 minutes (150 + 100) x 30 = 250 x 30 7, 500 litres Water to be put in the tank when the pipe R is opened = 20 000 – 7 500 _____ = 12 500 litres Rate = 150 + 100 – 20 = 230 litres Time taken to fill the tank from when R was opened 12 500 230 _____ 54.348 1hr 24.348 min	 M1 A1 M1 M1 M1 M1 A1	
	Total	10mks	
20			

X^0	0^0	30^0	60^0	90^0	120^0	150^0	180^0	210^0	240^0	270^0	300^0	330^0	360^0
Cos	1.00	0.87	0.50	0	-0.5	-0.87	-1	-0.87	-0.5	0	0.5	0.87	1
2 cos 1/2 x	2.00	1.93	1.73	1.41	1	0.52	0.00	-0.52	-1	-1.41	-1.73	-1.93	-2

		B1 B1 S1 P1 P1 C1 B1 B1	All values of cos x All values of cos ½ x Given scale used Plotting cos x Plotting 2 cos ½ x Curve smooth continuous
	(a) amplititude = 2 B1 period = 720^0 B1 (b) 2cos ½ x = cos x X = $222^0 \pm 6^0$	B1 B1	
22 a i	M.P = 25 600 Discount = 5% Cash price = $\frac{95}{100}$ x 25 600	M1	
	= 24 320	A1	
ii)	Down payment = Ksh 12, 640 Amount of installments = 16 x 1450 = sh 23, 200	M1	
	Hire purchase valie = 12 640 + 23 200 = 35, 840	M1 A1	
b)	Amount borrowed = 25, 600 – 12, 640 = 12, 960	B1	
	23, 200 = 12, 960 $(1 + \frac{r}{100})16$	M1	
	1.790 = $(1 + \frac{r}{100})16$	M1	
	0.037 = $\frac{r}{100}$		

	r = 3.7% Difference = 35, 840 – 24, 320 Sh. 11, 520	A1 B1	
	Total	10	Marks
23		B1 B1 B1 B1 B1	Midpoints Fx d = x – 4 d^2 Fd2

Mass	x	f	D = x - A	D^2	Fd^2	fx
30 – 34	32	4	-20.1	404.01	1616.04	128
35 – 39	37	6	-15.1	228.01	1368.06	222
40 – 44	42	10	-10.1	102.1	1020.1	420
45 – 49	47	14	-5.1	26.01	364.4	658
50 – 54	52	22	-0.1	0.01	0.22	1144
55 – 59	57	24	4.9	24.01	576.24	1368
60 – 64	62	14	9.9	98.01	1372.14	868
65 - 69	67	6	14.9	222.01	1332.6	402
					Fd2= 7649.54	Fx 5210

a) Mean = $\frac{5210}{100}$ M1

= 52.1kg A1

b) Variance = $\frac{7649.54}{100}$ M1

= 76.4954 A1

c) Standard deviation

$\sqrt{76.4954}$

8.7462 B1

	Total	10	Marks

24 a)	<BDG = <ABG = 40^0	B1	
	Angles in the altenate segment are equal	B1	
		B1	
B	<DGE = <DGE = 25^0	B1	
	Angles in the same segment are equal		
C	<GDE = $180^0 - (45^0 + 40^0) - 25 = 70^0$		
			For 130^0
	<EFG = $180^0 - 70 = 130^0$		
	Opposite angles of a cyclic	B1	
	Quadrilateral add up to 180^0		
		B1	
D	<CBD = <BGD = 45^0		
	Angles in the alternate	B1	
	Segment are equal		
E	<BDC = $180 - (70 + 40) = 60^0$		
	BCD = $180 - (45 + 60) = 75^0$	B1	For 75^0
	Angle sum of a triangle		
	Add up to 180^0	B1	
	Total	10	Marks

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