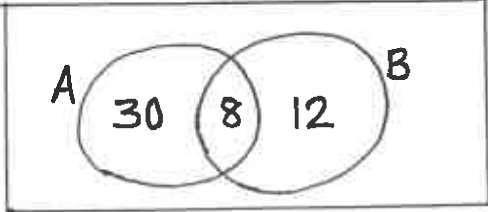




**FIRST YEAR HIGHER SECONDARY EXAMINATION MARCH 2019**
**SUBJECT : MATHEMATICS (COMMERCE)**
**CODE. NO: FY 51**


Qn No	Sub Qns	Answer Key/Value Points	Score	Total
1	(a)		2	3
	(b)	<p>Remark: For any Venn diagram give 1 score</p> $30 + 12 = 42$ <p>Remark: Alternate method give Full score</p>	1	
2	(a)	$x + 2 = 5, x = 3$ $y - 1 = 4, y = 5$	$\frac{1}{2}$	3
	(b)	$(f+g)(x) = f(x) + g(x)$ $= x^2 + x - 1$ $(f+g)(2) = 2^2 + 2 - 1 = 5$	$\frac{1}{2}$ $\frac{1}{2}$ 1	
3	(a)	$\bar{z} = 1 - \sqrt{3}i$	1	3
	(b)	Let $1 + \sqrt{3}i = r(\cos\theta + i\sin\theta)$ $r = \sqrt{1+3} = 2$ $\cos\theta = \frac{x}{r} = \frac{1}{2}, \sin\theta = \frac{y}{r} = \frac{\sqrt{3}}{2}$ $\therefore \theta = \frac{\pi}{3}$ Polar form is $2(\cos\frac{\pi}{3} + i\sin\frac{\pi}{3})$	1 $\frac{1}{2}$ $\frac{1}{2}$	
4	(a)	${}^nC_7 = {}^nC_{n-7} = {}^nC_3$ (given) $n-7=3,$ $n=10$	1	3
	(b)	(ii) 10 ${}^9P_4$ $= 3024$	2	

Remark: Formula for  ${}^nP_r$  give  $\frac{1}{2}$  score.

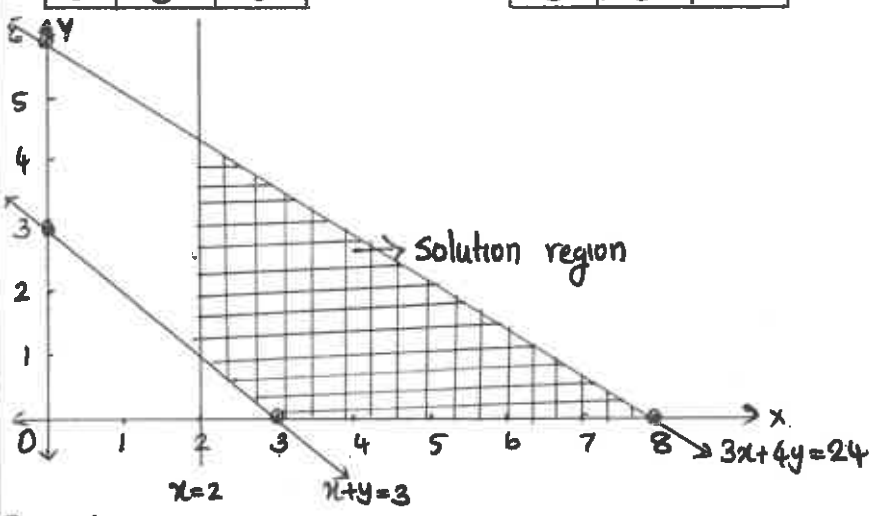
Qn No	Sub Qns	Answer Key/Value Points	Score	Total
5	(a) (b)	<p>(i) <math>a r^{n-1}</math></p> <p><math>ar = 12</math> — ①</p> <p><math>ar^4 = 768</math> — ②</p> <p><math>\frac{②}{①} \Rightarrow r^3 = 64, r = 4</math></p> <p><math>\therefore a = \frac{12}{4} = 3</math></p>	<p>1</p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p>	3
6	(a) (b) (c)	<p>Slope = <math>\frac{y_2 - y_1}{x_2 - x_1}</math></p> <p><math>= \frac{2 - 3}{4 - 2} = -\frac{1}{2}</math></p> <p><math>y - y_1 = m(x - x_1)</math></p> <p><math>y - 3 = -\frac{1}{2}(x - 2)</math> </p> <p>Since the lines are parallel Slopes are equal</p> <p><math>\therefore</math> slope = <math>-\frac{1}{2}</math></p>	<p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p>1</p>	3
7	(a) (b)	<p>0 or <math>\phi</math></p> <p><math>n(S) = 36</math></p> <p>Let A: event of getting a sum greater than 10</p> <p><math>A = \{(5, 6), (6, 5), (6, 6)\}</math></p> <p><math>\therefore P(A) = \frac{3}{36} = \frac{1}{12}</math></p> <p><u>Remark</u>: <math>P(A) = \frac{n(A)}{n(S)}</math> give <math>\frac{1}{2}</math> score</p>	<p>1</p> <p>1</p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p>	3
8	(a) (b) (c)	<p><math>A \times B = \{(2, 1), (2, 3), (4, 1), (4, 3), (6, 1), (6, 3)\}</math></p> <p><u>Remark</u>: for any 4 correct ordered pairs give 2 score</p> <p>number of relations = <math>\frac{n(A) \times n(B)}{2}</math></p> <p><math>= 2^6</math></p> <p><math>R = \{(2, 1), (4, 3)\}</math></p>	<p>2</p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p>1</p>	4


Qn No	Sub Qns	Answer Key/Value Points	Score	Total
9	(a)  (b)	<p>LHS = <math>\frac{1}{2}</math> and RHS = <math>1 - \frac{1}{2} = \frac{1}{2}</math>  <math>\therefore</math> LHS = RHS  <math>\therefore</math> P(1) is true</p> <p>Assume that P(k) is true </p> <p><math>P(k) \Rightarrow \frac{1}{2} + \frac{1}{4} + \dots + \frac{1}{2^k} = 1 - \frac{1}{2^k}</math></p> <p><math>P(k+1) \Rightarrow \frac{1}{2} + \frac{1}{4} + \dots + \frac{1}{2^{k+1}}</math>  <math>= 1 - \frac{1}{2^k} + \frac{1}{2^{k+1}}</math>  <math>= 1 - \left[ \frac{2-1}{2^{k+1}} \right] = 1 - \frac{1}{2^{k+1}}</math></p> <p>hence proved</p>	<p>1</p> <p>1</p> <p>1</p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p>	<p>4</p>
10		<p>Let <math>\sqrt{3+4i} = x+iy</math>            Squaring on both sides, <math>3+4i = x^2-y^2+i2xy</math>            Equating real and imaginary parts  <math>x^2-y^2=3</math> and <math>2xy=4</math>  <math>\therefore (x^2+y^2)^2 = (x^2-y^2)^2 + (2xy)^2</math>  <math>= 3^2 + 4^2 = 25</math>  <math>x^2+y^2=5</math>  <math>x^2-y^2=3</math>            Solving, <math>2x^2=8, x^2=4, x=\pm 2</math>  <math>2y^2=2, y^2=1, y=\pm 1</math>  <math>\therefore \sqrt{3+4i} = \pm 2 \pm i</math></p> <p><u>Remark</u> Alternate method give full score</p>	<p><math>\frac{1}{2}</math></p> <p>1</p> <p><math>\frac{1}{2} + \frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p>	<p>4</p>
11	(a)	<p><math>(1-3x)^5 = 1 - 5C_1(3x) + 5C_2(3x)^2 - 5C_3(3x)^3 + 5C_4(3x)^4 - (3x)^5</math>  <math>= 1 - 5(3x) + 10(9x^2) - 10(27x^3) + 5(81x^4) - 243x^5</math>  <math>= 1 - 15x + 90x^2 - 270x^3 + 405x^4 - 243x^5</math></p> <p><u>Remark</u>            Formula for <math>(a+b)^n</math> or <math>(a-b)^n</math> give 1 score</p>	<p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p>	

Qn No	Sub Qns	Answer Key/Value Points	Score	Total
	(b)	$T_{r+1} = {}^n C_r a^{n-r} b^r$ $= {}^{12} C_r x^{12-r} \left(\frac{1}{x}\right)^r$ $= {}^{12} C_r x^{12-2r}$ <p>term independent of <math>x \Rightarrow</math> term with <math>x^0</math></p> $\therefore 12 - 2r = 0 \Rightarrow r = 6$ $\therefore T_7 = {}^{12} C_6 \text{ is the required term}$	<p>1</p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p>	4
12	(a)	$d = \left  \frac{ax_1 + by_1 + c}{\sqrt{a^2 + b^2}} \right $ $= \left  \frac{1 - 2(-2) + 3}{\sqrt{1 + 4}} \right $ $= \frac{8}{\sqrt{5}}$	<p>1</p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p>	
	(b)	<p>Equation of a line perpendicular to <math>x - 2y + 3 = 0</math> is</p> $-2x - y + k = 0$ $2x + y - k = 0 \text{ --- (1)}$ <p>Since (1) passes through <math>(1, -2)</math> <math>2 - 2 - k = 0, k = 0</math></p> <p><math>\therefore</math> the required equation is <math>2x + y = 0</math></p> <p><u>Remark</u> Alternate method give full score</p>	<p>1</p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p>	4
13	(a) (ii)	$\frac{n(n+1)(2n+1)}{6}$	<p>1</p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p>	4
	(b)	<p>Let <math>S_n = 7 + 77 + 777 + \dots</math> to <math>n</math> terms</p> $= 7[1 + 11 + 111 + \dots \text{ to } n \text{ terms}]$ $= \frac{7}{9}[9 + 99 + 999 + \dots \text{ to } n \text{ terms}]$ $= \frac{7}{9}[(10-1) + (100-1) + (1000-1) + \dots \text{ to } n \text{ terms}]$ $= \frac{7}{9}[(10 + 100 + \dots \text{ to } n \text{ terms}) - (1 + 1 + \dots + n \text{ terms})]$ $= \frac{7}{9} \left[ \frac{10(10^n - 1)}{9} - n \right]$ <p><u>Remark</u> <math>S_n = \frac{a(r^n - 1)}{r - 1}</math> give <math>\frac{1}{2}</math> score</p>		

Qn No	Sub Qns	Answer Key/Value Points	Score	Total
14	(a)	<p>comparing with <math>y^2 = 4ax</math>, <math>4a = 8</math>, <math>a = 2</math>  <math>\therefore</math> focus = <math>(a, 0) = (2, 0)</math> </p> <p><u>Remark</u>: for the formula give <math>\frac{1}{2}</math> score</p>	$\frac{1}{2}$ $\frac{1}{2}$	4
	(b)	Length of latus rectum = $4a = 8$ units	$\frac{1}{2} + \frac{1}{2}$	
	(c)	$(x-h)^2 + (y-k)^2 = r^2$ $(x-2)^2 + (y-0)^2 = 5^2$ $x^2 + y^2 - 4x - 21 = 0$ , is the equation of the circle	1 1	
15	(a)	$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$ $= \sqrt{(2 - -2)^2 + (1 - 1)^2 + (-3 - 3)^2} = \sqrt{52} \text{ units}$	$\frac{1}{2}$ $\frac{1}{2}$	4
	(b)	<p>On YZ plane <math>x</math> coordinate = 0            Let the ratio be <math>k : 1</math>  <math>x = \frac{kx_2 + x_1}{k+1}</math>  <math>0 = \frac{3k + -2}{k+1}</math>  <math>3k - 2 = 0 \Rightarrow k = \frac{2}{3}</math>  <math>\therefore</math> ratio is 2:3</p> <p><u>Remark</u> Alternate method give full score</p>	1 $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	
16	(a)	(iii) $f'(x)$	1	
	(b)	$\frac{dy}{dx} = \frac{(x - \sin x) \frac{d}{dx}(x + \sin x) - (x + \sin x) \frac{d}{dx}(x - \sin x)}{(x - \sin x)^2}$ $= \frac{(x - \sin x)(1 + \cos x) - (x + \sin x)(1 - \cos x)}{(x - \sin x)^2}$ $= \frac{2(x \cos x - \sin x)}{(x - \sin x)^2}$ <p><u>Remark</u>: for Quotient rule give 1 score</p>	$\frac{1}{2}$ $\frac{1}{2}$	








Qn No	Sub Qns	Answer Key/Value Points	Score	Total
17	(a) (b)	<p>(ii) <math>\sim Q \Rightarrow \sim P</math></p> <p>Let <math>\sqrt{11}</math> be rational</p> <p><math>\sqrt{11} = \frac{a}{b}</math>, where a and b have no common factors</p> <p><math>a = \sqrt{11} b</math>, <math>a^2 = 11 b^2</math> — (1)</p> <p>11 divides <math>a^2</math> ie 11 divides a</p> <p>Let <math>a = 11 k</math>, substituting in (1), <math>(11k)^2 = 11 b^2</math></p> <p><math>121 k^2 = 11 b^2</math>, <math>11 k^2 = b^2</math></p> <p><math>\Rightarrow</math> 11 divides <math>b^2</math> ie, 11 divides b</p> <p><math>\Rightarrow</math> 11 is a common factor for a and b, which is a contradiction to our assumption</p> <p><math>\sqrt{11}</math> is an irrational number</p>	1 1 1 $\frac{1}{2}$ $\frac{1}{2}$	4
18	(a) (b) (c)	<p><math>P \cup Q = \{1, 2, 3, 4, 6, 7, 8\}</math></p> <p><math>P - Q = \{2, 4, 7\}</math></p> <p><math>P' = \{1, 5, 8\}</math></p> <p><math>Q' = \{2, 4, 5, 7\}</math></p> <p><math>(P \cup Q)' = \{5\}</math></p> <p><math>P' \cap Q' = \{5\}</math></p> <p><math>\therefore (P \cup Q)' = P' \cap Q'</math></p>	1 1 1 1 1	6
19	(a) (b) (c)	<p><math>120^\circ</math> or <math>2\frac{\pi}{3} \times \frac{180}{\pi}</math></p> <p><math>\frac{2 \sin 5x \cos 2x}{2 \cos 5x \cos 2x} = \tan 5x</math></p> <p><u>Remark</u>: for each formula give <math>\frac{1}{2}</math> score</p> <p><math>\tan 3x = \tan (2x+x)</math></p> <p><math>= \frac{\tan 2x + \tan x}{1 - \tan 2x \tan x}</math></p>	1 2 1 1	6

Qn No	Sub Qns	Answer Key/Value Points	Score	Total												
		$\tan 3x (1 - \tan 2x \tan x) = \tan 2x + \tan x$ $\tan 3x - \tan 2x - \tan x = \tan 3x \tan 2x \tan x$ <p>Remark: Formula for <math>\tan(x+y)</math> give <math>\frac{1}{2}</math> score</p>	$\frac{1}{2}$ $\frac{1}{2}$													
20	(a)	$\frac{x}{2} \geq \frac{25x - 10 - 21x + 9}{15}$ $\frac{x}{2} \geq \frac{4x - 1}{15}$ $15x \geq 8x - 2$ $7x \geq -2$ $x \geq \frac{-2}{7}$ <p>(b)</p> $3x + 4y = 24$ <table border="1" style="display: inline-table; margin-right: 20px;"> <tr><td>x</td><td>0</td><td>8</td></tr> <tr><td>y</td><td>6</td><td>0</td></tr> </table> $x + y = 3$ <table border="1" style="display: inline-table;"> <tr><td>x</td><td>0</td><td>3</td></tr> <tr><td>y</td><td>3</td><td>0</td></tr> </table> 	x	0	8	y	6	0	x	0	3	y	3	0	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 4	6
x	0	8														
y	6	0														
x	0	3														
y	3	0														
21	(a)	$\frac{{}^n C_3}{{}^n C_3} = \frac{11}{1}$ $\frac{n(n-1)(n-2)}{1 \cdot 2 \cdot 3} = 11$ $\frac{n(n-1)(n-2)}{1 \cdot 2 \cdot 3} = 11$	<p>1</p> <p>2</p>													

Qn No	Sub Qns	Answer Key/Value Points	Score	Total																
		$\frac{2n(2n-1)2(n-1)}{n(n-1)(n-2)} = 11$  $4(2n-1) = 11(n-2)$ $8n-4 = 11n-22$ $-3n = -18, n=6$ <p><u>Remark</u> Formula for <math>{}^n C_r</math> give <math>\frac{1}{2}</math> score</p> <p>(b) number of letters <math>n=8</math>, M's=2, I's=2</p> <p>number of words = <math>\frac{n!}{P_1! P_2! \dots P_k!}</math></p> $= \frac{8!}{2! 2!}$	<p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p>1</p>	6																
22	(a)	$\bar{x} = \frac{\sum x_i}{n}$ $= \frac{1+2+3+\dots+n}{n}$ $= \frac{\frac{n(n+1)}{2}}{n}$ $= \frac{n+1}{2}$ <p>(b) ascending order <math>\Rightarrow 3, 4, 5, \boxed{6}, 7, 8, 9</math></p> <p>Median = 6</p> <table border="1" data-bbox="367 1500 1173 1601"> <tr> <td><math>x</math></td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> <td>8</td> <td>9</td> </tr> <tr> <td><math> x-M </math></td> <td>3</td> <td>2</td> <td>1</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> </tr> </table> $\sum  x-M  = 12$ <p>Mean deviation about median = <math>\frac{\sum  x-M }{n}</math></p> $= \frac{12}{7}$	$x$	3	4	5	6	7	8	9	$ x-M $	3	2	1	0	1	2	3	<p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p>1</p> <p><math>\frac{1}{2}</math></p> <p>1</p> <p><math>\frac{1}{2}</math></p>	6
$x$	3	4	5	6	7	8	9													
$ x-M $	3	2	1	0	1	2	3													



Qn No	Sub Qns	Answer Key/Value Points	Score	Total																												
23		<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Mid x</th> <th>f</th> <th>fx</th> <th>fx<sup>2</sup></th> </tr> </thead> <tbody> <tr> <td>5</td> <td>5</td> <td>25</td> <td>125</td> </tr> <tr> <td>15</td> <td>9</td> <td>135</td> <td>2025</td> </tr> <tr> <td>25</td> <td>17</td> <td>425</td> <td>10625</td> </tr> <tr> <td>35</td> <td>14</td> <td>490</td> <td>17150</td> </tr> <tr> <td>45</td> <td>5</td> <td>225</td> <td>10125</td> </tr> <tr> <td></td> <td>50</td> <td>1300</td> <td>40050</td> </tr> </tbody> </table> <p>(a) Mean = <math>\frac{\sum fx}{N} = \frac{1300}{50} = 26</math> <math>\frac{1}{2} + \frac{1}{2}</math></p> <p>(b) Standard deviation = <math>\sqrt{\frac{\sum fx^2}{N} - \left(\frac{\sum fx}{N}\right)^2}</math>  <math>= \sqrt{\frac{40050}{50} - (26)^2}</math>  <math>= \sqrt{801 - 676} = \sqrt{125} = 11.18</math> <math>\frac{1}{2}</math></p> <p>(c) Coefficient of Variation (CV) = <math>\frac{sd}{Mean} \times 100</math>  <math>= \frac{11.18}{26} \times 100 = 43</math> <math>\frac{1}{2}</math></p>	Mid x	f	fx	fx <sup>2</sup>	5	5	25	125	15	9	135	2025	25	17	425	10625	35	14	490	17150	45	5	225	10125		50	1300	40050	3	6
Mid x	f	fx	fx <sup>2</sup>																													
5	5	25	125																													
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25	17	425	10625																													
35	14	490	17150																													
45	5	225	10125																													
	50	1300	40050																													
24		<p>(a) <math>P(A \text{ or } B) = P(A \cup B) = P(A) + P(B) - P(A \cap B)</math>  <math>= \frac{1}{2} + \frac{1}{3} - \frac{1}{4} = \frac{7}{12}</math></p> <p>(b) <math>P(\text{not } A) = P(A') = 1 - P(A)</math>  <math>= 1 - \frac{1}{2} = \frac{1}{2}</math></p> <p>(c) <math>P(\text{not } A \text{ and not } B) = P(A' \cap B') = 1 - P(A \cup B)</math>  <math>= 1 - \frac{7}{12} = \frac{5}{12}</math></p> <p>(d) <math>P(A) = \frac{n(A)}{n(S)}</math>  <math>n(S) = \frac{n(A)}{P(A)} = 10</math> <math>\frac{1}{2}</math></p>	1 1 $\frac{1}{2}$ $\frac{1}{2}$ 1 1 $\frac{1}{2}$ $\frac{1}{2}$	6																												

Qn No	Sub Qns	Answer Key/Value Points	Score	Total
1.		SISHA DIANATHOUS ST. PHILOMENAS H.S.S KONNAMAVU, ERNAKULAM 		
2.		JAYASREE.T.S ASMMHSS, Alathur, Palakkad 		
3.		HAREESH.S St.Mary's HSS Pariyapuram Malappuram 		
4.		Jose Mathew St.Mary's H.S.S, Vellarankunnu 		
5.		Deepamol Luke St. Dominic's H.S.S, Kariyappally 		
6.		Subhash. K.K 9496418185 SRKGMHSS Pumanattukara 		
7.		Shreeja.V R.G.M. H.S.S .Moketi, Kannur 		
8.		SINDHU.D TDHSS, Thuvayoch 