Model Answers for Mathematic Sec A

<table>
<tr><th>No</th><th>Work</th><th>marks</th><th>comment</th></tr>
<tr><td>1</td><td><table><tr><td>2</td><td>12</td><td>24</td><td>28</td></tr><tr><td>2</td><td>6</td><td>12</td><td>14</td></tr><tr><td>2</td><td>3</td><td>6</td><td>7</td></tr><tr><td>3</td><td>3</td><td>3</td><td>7</td></tr><tr><td>7</td><td>1</td><td>1</td><td>7</td></tr></table>2 x 2 x 2 x 3 x 7 = 8 x 3 x 7 = 168</td><td>2
2 4
total</td><td>Calculation
Answer</td></tr>
<tr><td>2</td><td>3x + 2y = --------(i)
2x – y = 5 -------(2)
3x = 4 – 2y => x = $\frac{4-2y}{3}$
2($\frac{4-2y}{3}$) – y = 5=> 8 – 4y – 3y = 15
-7y = 15 – 8 => y = $\frac{7}{-7}$ = -1, y = -1
3x + 2 (-1) = 4 => 3x = 4 + 2
$\frac{3x}{3}$ = $\frac{6}{3}$ x = 2</td><td>1
1
1
1
Total +
4</td><td>Putting x as a subject
Substituting x in the equation 2
Answer
answer</td></tr>
<tr><td>3</td><td>(a). $\begin{pmatrix} 2 & 0 \\ 3 & 4 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix}$ = $\begin{pmatrix} 4 \\ 18 \end{pmatrix}$
$\begin{pmatrix} 2\ x\ X+0\ x\ y \\ 3\ x\ X+4\ x\ y \end{pmatrix}$ = $\begin{pmatrix} 4 \\ 18 \end{pmatrix}$
2x = 4 ----------------(i)
3x + 4y = 18 ------------ (ii)
From Equation (i) x = 2
3(2) + 4y = 18 => 4y = 18 – 6
Y = 3</td><td>1</td><td>Multiplying the matrices
Getting equations from matrices</td></tr>
<tr><td></td><td>(b). A = $\begin{pmatrix} 2 \\ 1 \end{pmatrix}$, B = (3, -5)
AB = $\begin{pmatrix} 2 \\ 1 \end{pmatrix}$(3 – 5) = $\begin{pmatrix} 6 & -10 \\ 3 & -5 \end{pmatrix}$
AB = $\begin{pmatrix} 6 & -10 \\ 3 & -5 \end{pmatrix}$</td><td></td><td></td></tr>
<tr><td>4</td><td>$(\sqrt{5})^2$ + 2(2.23b1)
5 + 4.4722 = 9.4722</td><td></td><td></td></tr>
<tr><td>5</td><td>Area of rectangle = L x W
Area = 6 x 5 = $30cm^2$
Linear scale factor =
$\frac{270cm^2}{30cm^2}$ = $\sqrt{9 = 3}$</td><td></td><td></td></tr>
<tr><td></td><td>$X^2 - 8x + y^2 = 0$
$X^2 + y^2 - 8x = 0$
Center of circle
$\frac{2gx}{2x}$ = $\frac{8x}{2x}$ = 14
(-g, -f) = (4,0)
Radius = $\sqrt{g^2 + f^2 - c}$</td><td></td><td></td></tr>
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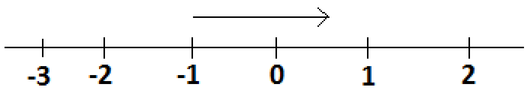
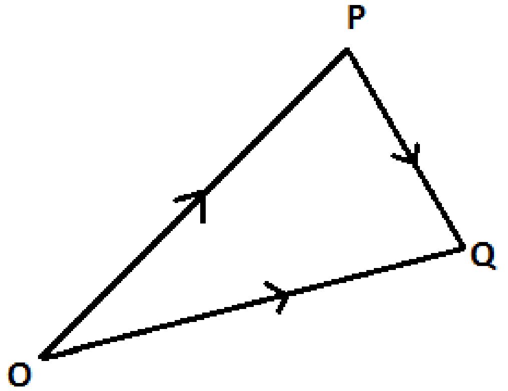
	Radius = $\sqrt{4^2 + 0 - 0} = \sqrt{1b}$ Radius = 4 units		
	$\tan\theta = \frac{4}{3}$, $\text{Sin}\theta = \frac{4}{5}$, $\text{Cos}\theta\ \frac{3}{5}$, $\text{Sin}\theta - \text{Cos}\theta = \frac{4}{5} - \frac{3}{5} = \frac{4-3}{5} = \frac{1}{5}$ $\text{Sin}\theta - \text{Cos}\theta = \frac{1}{5}$		
	$5 \geq 1 - 2x$ $5 - 1 \geq 1 - 1 - 2x$ $4 \geq -2x$ $\frac{4}{2} \geq -\frac{-2x}{2} \Rightarrow 2 \geq -x$ $\therefore x \geq -2$  		
Q9	$\text{Log}_{10}^{40} + \text{Log}_{10}^{5} - \text{Log}_{10}^{2}$ $\text{Log}_{10}^{(40 \times 5 \div 2)} = \text{Log}_{10}^{(200 \div 2}$ $= \text{Log}_{10}^{100} = 2\text{Log}_{10}^{10} = 2$		
Q10	(i). $Z_1 + Z_2 = 3 - 2i - 2 + 4i$ $Z_1 + Z_2 = 1 + 2i$		
	$Z_1 - Z_2, = 3 - 2i - (-2 + 4i)$ $= 3 - 2i + 2 - 4i = 5 - 6i$ $= Z_1 - Z_2 = 5 - 6i$		
Q11.	**Section B** (a). 5_{C_2} x $4_{C_3} = \frac{5!}{2!3!}$ x $\frac{4!}{3!1!} = \frac{5\ x\ 4\ x\ 3!}{2\ x\ 1\ x\ 3!}$ X $\frac{4\ X\ 3!}{3!\ x\ 1} = \frac{20}{2}$ x 4 Possible ways is 40		
	$n_{p_2} = 6$ $N(n - 1) = 6 \Rightarrow n^2 - n = 0$ $(n - 3)(n + 2) = 0$ Either, $n - 3 = 0$ where $n = 3$ Or $n = -2$ is rejected because it is –ve)		
12	(a). $\frac{dy}{dx} = 3x^2 - 14x + 3$ At point (1,2), x = 1 Gradient = $3(1)^2 - 14(1) + 3$ Gradient = $3 - 14 + 3 = -8$ Equation of tangent = $\frac{y-2}{x-1} = 8$ $Y - 2 = -8(x - 1)$ $Y - 2 = -8x + 8$ $Y = -8x + 10$		

	If m is the gradient of the tangent and n is the gradient of the normal m x n = -1 -8 x n = -1 => n = $\frac{1}{8}$ Equation of normal $\frac{y-2}{x-1} = \frac{1}{8}$ 8(y – 2) = x – 1 8y – 16 = x – 1 8y = x + 15 y = $\frac{x}{8} + \frac{15}{x}$		
	(b). $\int (3x^2 - 2x)\, dx$ $\frac{3x^3}{3} - \frac{2x^2}{2} + c$ $x^2 - x^2 + c$ Hence: $\int_2^3 3x^2 - 2x)\, d$ $(3x^2 - 2x)^3_2 = [(3)^3 - (3)^2] - [(2)^3 - (2)^2]$ $[27 - 9] - [8 - 4]$ = 18 – 4, = 14		
13	 (a). $\overrightarrow{OP} = -42^0 + j - 4k$ $\overrightarrow{OQ} = 62^0 + 3j - 6k$ $\overrightarrow{PQ} = \overrightarrow{OQ} - \overrightarrow{OP}$ $\overrightarrow{PQ} = 62^0 + 3j - 6k - (-42^0 + j - 4k)$ $= 62^0 + 3j - 6k + 42^0 + j - 4k$ PQ = 10j + 2j – 2k		
	(b). $Z_1 - Z_2 = 2 + 3j - (4 + 7j)$ $= 2 + 3j - 4 - 7j$ $Z_1 - Z_2 = -2 - 5j$ $\lvert Z_{1-} Z_2 \rvert \sqrt{(-2)^2 + (-4)^2}$ $= \sqrt{4 + 16} = \sqrt{20}$ $\lvert Z_{1-} Z_2 \rvert 2\sqrt{5}$		

14	(a). Mean = $\frac{Ex}{n}$ 20 = $\frac{25+20+30+x+10+15}{6}$ 20 = $\frac{100+\ x}{6}$ 120 = 100 + x x = 20 Mode = 20		
	(b). Number of the students is Ef Ef = 20 + 10 + 3 + 10 + 5 = 30 Number of the is 30		
	(ii). Mean = $\frac{Efx}{Ef}$ $\frac{15\ x\ 2 + 20\ x\ 10 + 30\ x\ 3 + 35\ x\ 10 + 40\ x\ 5}{30}$ $\frac{30 + 200 + 90 + 350 + 200}{30}$ = $\frac{870}{30}$ = 29 Mean = 29		
15	(i). a = 3 r = $\frac{9}{3}$ n^{th} term = ar^{n-1} 4^{th} term = $3(3)^{4-1}$ = 3 x 27 = 81 5^{th} term = $3(3)^{5-1}$ = 3 x 81 = 243 The next two digits are 81 and 243		
	(ii). n^{th} term = a + (n – 1)d Where a = 1 and d = 4 4^{th} term = 1 + (4 – 1)4 = 1 + 12 = 13 5^{th} term = 1 + (5 – 1)4 = 1 + 16 = 17 The next two digits are 13 and 17		
16	(a). Loss % = $\frac{c.p-s.p}{c.p}$x 100 20 = $\frac{c.p-2000}{c.p}\ x\ 100$ 20c.p = 100c.p – 200000 -80c.p = -200000 c.p = $\frac{-200000}{-80}$ c.p = 2500 SSP Jackson bought the laptop at 2,500 SSP		
	(b). Principle P = SSP 5000 Rate R = 5% Period T = 3 years Simple interest I = $\frac{PRT}{100}$		

	$I = \frac{5000 \; x \; 5 \; x \; 3}{100} = 750$ Amount = principle + Interest = 5000 + 750 = 5750 SSP Amount at the end of 3 years is 5,750 SSP		
17	(a). $y = (x^2 – 3)(x + 1)^2$ $y = (x^2 – 3)(x^2 + 2x + 1)$ $y = x^4 + 2x^3 + x^2 + 3x^2 – 6x – 3$ $y = x^4 + 2x^3 – 2x^2 – 6x – 3$ $\frac{dy}{dx} = 4x^3 + 6x – 4x - 6$		
	(b). Given $\frac{dv}{dt} = 3t^2 + 6t + 2$ $\int dv = \int(3t^2 + 6t^2 + 2)dt$ $= \frac{3t^3}{3} + \frac{6t^2}{2} + 2t + c$ $V = t^3 + 3t^2 + 2t + C$ When V= 4, and t = 2 $4 = (2)^3 + 3(2)^2 + 2(2) + c$ 4 = 8 + 12 + 4 + C C = -20 $V = t^3 – 3t^2 + 2t – 20$		