



Class: Grade 10

Duration: 150 minutes

Name: \_\_\_\_\_

Mid-Year Exam

Mark: 30 points

Answer Key

Question I (4 points)		Mark
1)	$\left  \frac{4x}{x-5} - 4 \right  = \left  \frac{20}{x-5} \right $ and $x < 5$ then $E = \frac{20}{5-x}$	1
2)	$\frac{17\pi}{3} - 6\pi = -\frac{\pi}{3}$ ; the principal measure of $\frac{17\pi}{3}$ is $-\frac{\pi}{3}$	1
3)	$A \cap \bar{B} = [-2; 6] \cap ]-\infty; 0] = [-2; 0]$	1
4)	$\vec{U}$ and $\vec{V}$ then $\frac{2a}{1} = \frac{6}{3}$ , so $a = 1$	1

Question II (6 points)		Mark																																										
<b>Part A</b>																																												
1)	$A = -1$	1																																										
2)	$B = 4\sqrt{3}$	0.5																																										
3)	$C = 2\sqrt{3}$ (1.25 pts), then $\frac{B}{C} = 2$ (0.25 pt)	1.5																																										
<b>Part B</b>																																												
1)	$x^2 - 3 = x^2 + 1$ no solution and $x^2 - 3 = -x^2 - 1$ then $x = +1$ or $x = -1$	1																																										
2)	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>x</td> <td><math>-\infty</math></td> <td>-3</td> <td>1</td> <td>2</td> <td>3</td> <td><math>+\infty</math></td> </tr> <tr> <td>x-1</td> <td>-</td> <td>-</td> <td>0</td> <td>+</td> <td>+</td> <td>+</td> </tr> <tr> <td>4-2x</td> <td>+</td> <td>+</td> <td>+</td> <td>0</td> <td>-</td> <td>-</td> </tr> <tr> <td>2x-6</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>0</td> <td>+</td> </tr> <tr> <td>2x+6</td> <td>-</td> <td>0</td> <td>+</td> <td>+</td> <td>+</td> <td>+</td> </tr> <tr> <td>solution</td> <td>-</td> <td>   </td> <td>+</td> <td>-</td> <td>+</td> <td>  </td> </tr> </table> $x \in ]-3; 1] \cup [2; 3[$	x	$-\infty$	-3	1	2	3	$+\infty$	x-1	-	-	0	+	+	+	4-2x	+	+	+	0	-	-	2x-6	-	-	-	-	0	+	2x+6	-	0	+	+	+	+	solution	-		+	-	+		2
x	$-\infty$	-3	1	2	3	$+\infty$																																						
x-1	-	-	0	+	+	+																																						
4-2x	+	+	+	0	-	-																																						
2x-6	-	-	-	-	0	+																																						
2x+6	-	0	+	+	+	+																																						
solution	-		+	-	+																																							

Question III (4 points)		Mark
1)	$D(3; 2)$	0.75
2)	$x + y + 1 = 0$	0.75
3)	$x = 5$ and $y = -8$	0.75
4)	$G(2; -1)$	0.75
5)	$A(-2; 2)$	1

Question IV (5 points)		Mark																																							
1)	a) $P(2) = 0$ then $4a + 2b - 6 = 0$	0.5																																							
	b) $P(3) = 6$ then $9a + 3b - 6 = 6$	0.5																																							
	c) $a = 1$ and $b = 1$	0.5																																							
2)	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td><math>x-2</math></td> <td><math>\frac{x+3}{x^2+x-6}</math></td> <td rowspan="5" style="vertical-align: middle; text-align: center;"><b>1</b></td> <td rowspan="5" style="vertical-align: middle; text-align: center;"><b>3)</b></td> <td><math>\frac{x}{x+3}</math></td> <td><math>-\infty</math></td> <td>-3</td> <td>2</td> <td><math>+\infty</math></td> </tr> <tr> <td></td> <td><math>\frac{x^2-2x}{3x-6}</math></td> <td><math>\frac{x-2}{P(x)}</math></td> <td>-</td> <td>0</td> <td>+</td> <td>+</td> </tr> <tr> <td></td> <td><math>\frac{3x-6}{3x-6}</math></td> <td></td> <td>-</td> <td>-</td> <td>0</td> <td>+</td> </tr> <tr> <td></td> <td>0</td> <td></td> <td>+</td> <td>0</td> <td>-</td> <td>0</td> <td>+</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table> $x \in ]-\infty; -3[ \cup ]2; +\infty[$	$x-2$	$\frac{x+3}{x^2+x-6}$	<b>1</b>	<b>3)</b>	$\frac{x}{x+3}$	$-\infty$	-3	2	$+\infty$		$\frac{x^2-2x}{3x-6}$	$\frac{x-2}{P(x)}$	-	0	+	+		$\frac{3x-6}{3x-6}$		-	-	0	+		0		+	0	-	0	+									1
$x-2$	$\frac{x+3}{x^2+x-6}$	<b>1</b>	<b>3)</b>			$\frac{x}{x+3}$	$-\infty$	-3	2	$+\infty$																															
	$\frac{x^2-2x}{3x-6}$					$\frac{x-2}{P(x)}$	-	0	+	+																															
	$\frac{3x-6}{3x-6}$						-	-	0	+																															
	0						+	0	-	0	+																														
4)	a) 4) $S_1 = x^2 - 2x + 5$ ; $S_2 = 1 - x$ and $S_3 = 10 - 2x$ then $S_1 - (S_2 + S_3) = x^2 + x - 6 = P(x)$	1																																							
	b) 5) $S_1 > S_2 + S_3$ then $S_1 - (S_2 + S_3) > 0$ so $P(x) > 0$ therefore $x \in ]-\infty; -3[ \cup ]2; +\infty[$	0.5																																							

Question V (5 points)		Mark
<b>Part A</b>		
1)	$A = \tan x$	1
2)	a) $\cos \alpha = \frac{2\sqrt{5}}{5}$	1
	b) $E = \sin\left(\frac{5\pi}{2} - \alpha\right) \times \cos(-7\pi + \alpha) = \sin\left(\frac{\pi}{2} - \alpha\right) \times \cos(\pi + \alpha)$ $= \cos(\alpha) \times -\cos(\alpha) = -\frac{4}{5}$	1
<b>Part B</b>		
1)	$\frac{\cos \beta}{1 - \cos^2 \beta} - \frac{1}{1 - \cos \beta} = \frac{\cos \beta}{1 - \cos^2 \beta} - \frac{1 + \cos \beta}{1 - \cos^2 \beta} = \frac{-1}{1 - \cos^2 \beta} = \frac{-1}{\sin^2 \beta}$	1
2)	$u^2 + v^2 = (\cos \theta - \sin \theta)^2 + (\cos \theta + \sin \theta)^2$ $= \cos^2 \theta - 2\cos \theta \sin \theta + \sin^2 \theta + \cos^2 \theta + 2\cos \theta \sin \theta + \sin^2 \theta = 2$	1

Question VI (6 points)		Mark
<b>Part A</b>		
1)	$2\vec{DF} - \vec{FB} = \vec{0}$ , then $2\vec{DF} - \vec{FD} - \vec{DB} = \vec{0}$ , then $2\vec{DF} + \vec{DF} - \vec{DB} = \vec{0}$ , then $3\vec{DF} - \vec{DB} = \vec{0}$ , then $\vec{DF} = \frac{1}{3}\vec{DB}$	0.75
2)	$\vec{DF} = \frac{1}{3}\vec{DB}$ ; $\vec{DA} + \vec{AF} = \frac{1}{3}\vec{DA} + \frac{1}{3}\vec{AB}$ ; $\vec{AF} = \frac{2}{3}\vec{DA} + \frac{1}{3}\vec{AB}$ ; $\vec{AE} = \vec{AB} + \vec{BE}$ ; $\vec{AE} = \vec{AB} + 2\vec{BC}$ , then $\vec{AE} = \vec{AB} + 2\vec{AD}$	1.25
3)	$\vec{AF} = \frac{1}{3}\vec{AE}$ then $\vec{AF}$ and $\vec{AE}$ have same direction and A is common the A, F, and E are collinear.	0.5
<b>Part B</b>		
1)	$\vec{V} = \vec{MA} - 3\vec{MC} + \vec{MB} + \vec{MD} = \vec{MC} + \vec{CA} - 3\vec{MC} + \vec{MC} + \vec{CB} + \vec{MC} + \vec{CD} = 2\vec{CA}$	0.75
2)	$\ \vec{V}\  = 2CA = 2 \times 6\sqrt{2} = 12\sqrt{2}$	0.5
3)	$\vec{V} = \vec{MA} - 3\vec{MC} + \vec{MB} + \vec{MD} =$ $\vec{MG} + \vec{GA} - 3\vec{MG} - 3\vec{GC} + \vec{MG} + \vec{GB} + \vec{MG} + \vec{GD} = -3\vec{GC} = 3\vec{CG}$	0.75
<b>Part C</b>		
1)	A(0;0); E(1; 2) and F( $\frac{1}{3}$ ; $\frac{2}{3}$ )	0.75
2)	$\vec{AE}(1;2)$ and $\vec{AF}(\frac{1}{3}; \frac{2}{3})$ then $\vec{AE} = \frac{1}{3}\vec{AF}$	0.75