PERTH MODERN SCHOOL
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Independent Public School

Course Methods Year 11 Test 2

Student name: ________________ Teacher name: ________________

Task type: **Response**

Time allowed for this task: 40 mins

Number of questions: 5

Materials required: Formula Sheet and 1 page both sides of notes permitted.
No Calculators allowed.

Standard items: Pens (blue/black preferred), pencils (including coloured), sharpener, correction fluid/tape, eraser, ruler, highlighters

Special items: Drawing instruments.

Marks available: 35 **marks**

Task weighting: **10 %**

Formula sheet provided: Yes

Note: All part questions worth more than 2 marks require working to obtain full marks.

Question 1 **(1.1.8)** **(4 marks)**

A parabola that has its vertex at the point with coordinates (–1, 6) passes through the point (2, 10).

Find the equation of the parabola.

$\therefore \quad y = a(x+1)^2 + 6$

i.e. $\quad 10 = a(2+1)^2 + 6$

$4 = 9a$

$a = \frac{4}{9}$

$\therefore$ The equation is

$y = \frac{4}{9}(x+1)^2 + 6$

Question 2 **(1.1.10)** **(4 marks)**

Find the exact y-coordinate of the points of intersection of the curve with equation

$y = x^2$ and the circle $x^2 + y^2 = 1$

Answer $y = \frac{\sqrt{5}-1}{2}$ recognises that we have only 1 solution (-1)

$\therefore \quad y + y^2 = 1$

$y^2 + y - 1 = 0$

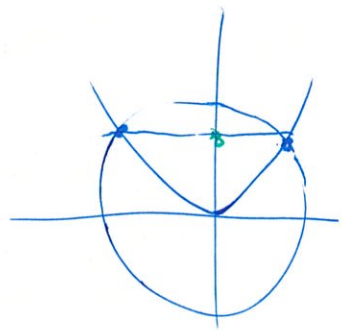
i.e. $\quad y = \frac{-1 \pm \sqrt{1^2 - 4(1)(-1)}}{2(1)}$

$= \frac{-1 \pm \sqrt{1+4}}{2}$

$= \frac{-1+\sqrt{5}}{2}$

-1 if given

$\boxed{\neq \frac{-1-\sqrt{5}}{2}}$



Question 3 **(1.1.11)** **(3, 2, = 5 marks)**

Consider the quadratic equation $(-2p+1)x^2 + (p-2)x + 6p = 0$.

(a) Find the discriminant.

$\Delta = (p-2)^2 - 4(-2p+1)(6p)$ ✓.

$= p^2 - 4p + 4 + 48p^2 - 24p$ ✓.

$= \underline{49p^2 - 28p - 4}$ ✓

(b) Re write the discriminant in perfect square form.

By inspection $(7p-2)^2$ ✓. ✓.

Question 4 **(1.1.24)** **(2, 2 = 4 marks)**

Given function f with rule $f(x) = \sqrt{3x-11}$

(a) State the domain of $f(x)$

$3x - 11 \geq 0$

$\therefore 3x \geq 11$ ✓.

$x \geq \frac{11}{3} \Rightarrow D_x : \{x \geq \frac{11}{3}\}$ ✓.

(b) Find $f(2a+3)$

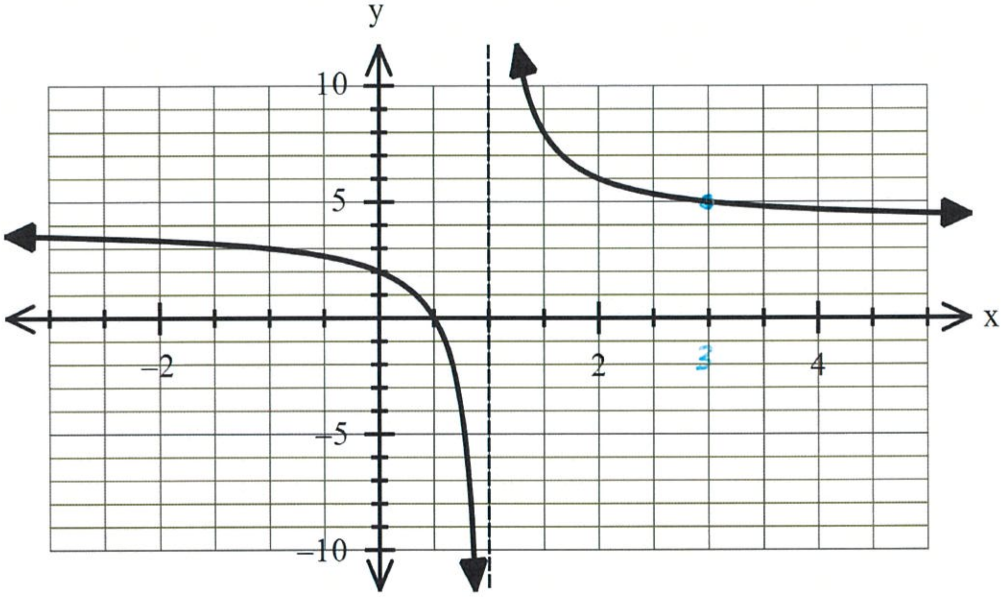
$f(2a+3) = \sqrt{3(2a+3) - 11}$ ✓.

$= \sqrt{6a+9-11}$

$= \underline{\sqrt{6a-2}}$ ✓

Question 5 (1.1.14) **(4 marks)**

Given that the graph below is in the form $y = \frac{a}{x-b} + c$
Determine the values of $a, b, and\ c$



$y = \frac{a}{x-1} + 4$, thru $(3,5)$

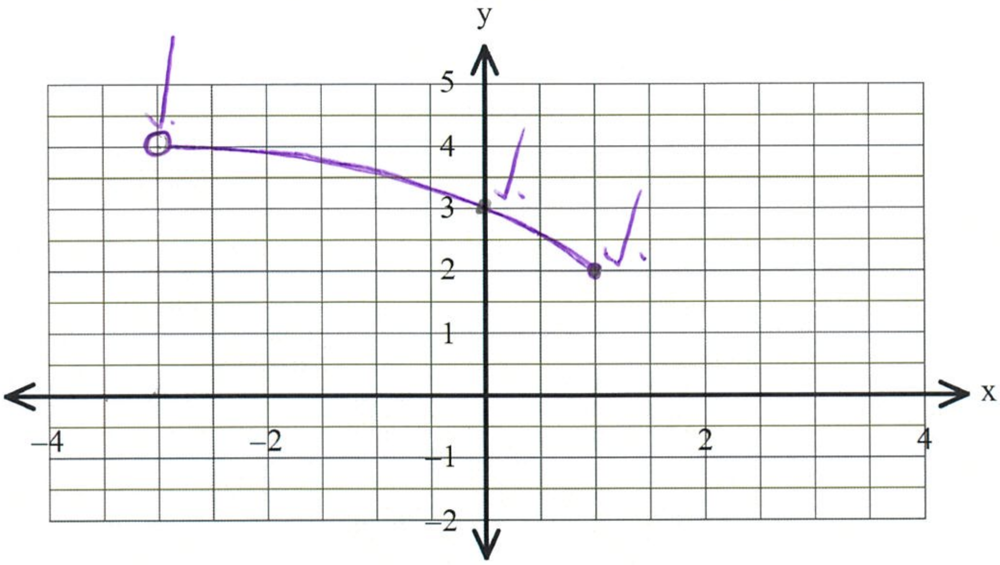
$\therefore 5 = \frac{a}{3-1} + 4$

$\underline{a = 2}$

$a = 2$
$b = 1$
$c = 4$

Question 6 (1.1.15) **(3 marks)**

Sketch $y = \sqrt{-x+1} + 2$ within the domain $-3 < x \leq 3$



Question 7 (1.1.21, 1.1.22) **(2, 4 = 6 marks)**

Consider the Polynomial $G(m) = m^3 - 3m^2 - 6m + 8$

(a) Find $G(4)$

$= 4^3 - 3(4)^2 - 6\times4 + 8$ ✓.

$= 0$ ✓. $\therefore m-4$ is a factor.

(b) Hence or otherwise fully factorise $G(m)$

can use any method
eg trial $\pm 1, 2, 3$ / long division
etc

$\therefore (m-4)(m^2+m-2) = G(m)$

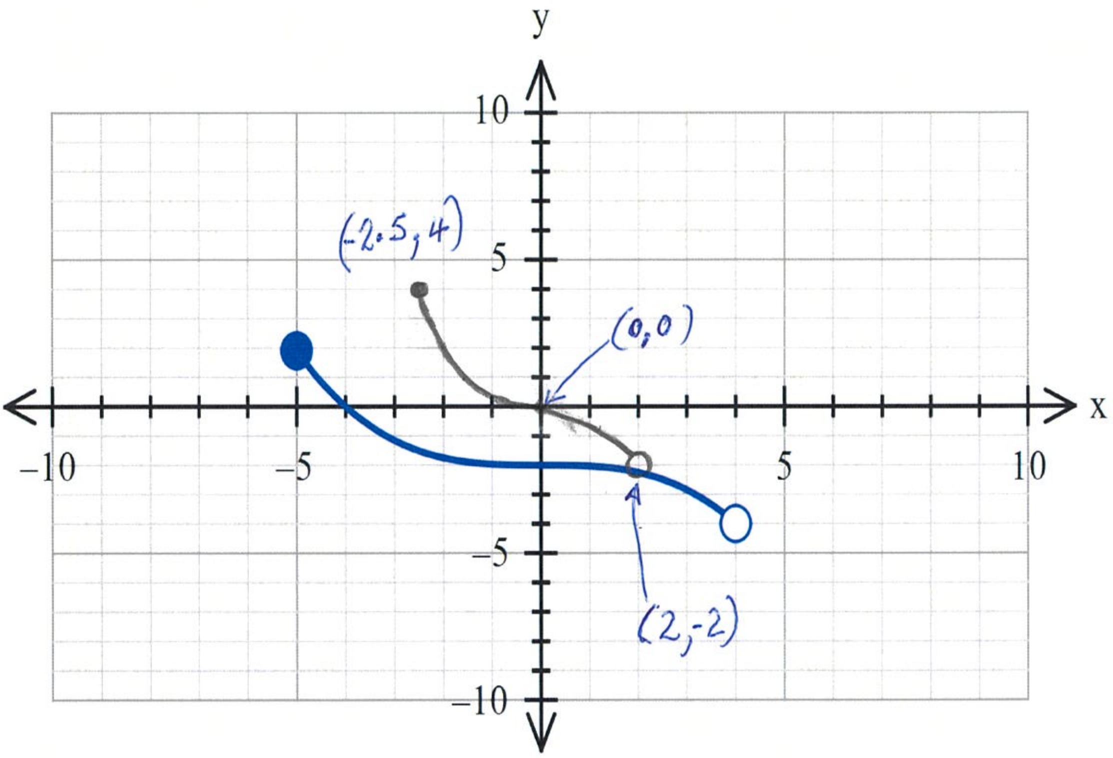
$(m-4)(m+2)(m-1) = G(m)$ ✓ ✓ ✓

$$
\begin{array}{r|l}
 & m^2 + m - 2 \\
m-4 & m^3 - 3m^2 - 6m + 8 \\
 & -\ m^3 - 4m^2 \\
 & \qquad m^2 - 6m + 8 \\
 & -\quad m^2 - 4m \\
 & \qquad\quad -2m + 8 \\
 & -\quad -2m + 8 \\
 & \qquad\qquad 0
\end{array}
$$

✓.

Question 8 **(1, 2, 2 = 5 marks)**

The function $y = f(x)$ is shown below.



(a) State the range of $f(x)$. (1 mark)

$R(y) : \{-4 < y \leq 2\}$ ✓.

(b) Another function is given by $g(x) = 2f(x-3)$.

Describe the transformation required to produce $g(x)$ from $f(x)$. ✓ (2 marks)

Translation f(x), 3 units to the Right, then

Dilate by scale factor ×2 // to y-axis ✓.

(c) On the same axes above, sketch the graph of $y = f(2x) + 2$. (2 marks)

✓ sketch goes thru 2 critical pts

✓ " " " 3 " "