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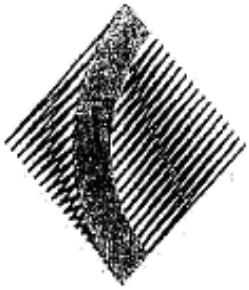
Name: _____

Class: _____

Teacher: _____

CHERRYBROOK TECHNOLOGY HIGH SCHOOL



2007

YEAR 11

AP2 EXAMINATION

MATHEMATICS

Time allowed - 2 HOURS
(Plus 5 minutes reading time)

DIRECTIONS TO CANDIDATES:

- Attempt all questions.
- Each question is to be commenced on a new page clearly marked Question 1, Question 2, etc on the top of the page. **
- If you do not attempt a question you must submit a blank page clearly indicating the question number, your name and class.
- All questions should be stapled together in order Question 1 to 7
- All necessary working should be shown in every question. Full marks may not be awarded for careless or badly arranged work.
- Approved calculators may be used.

Each page must show your name and your class. *

Question 1 12 Marks **Marks**

a) Evaluate $\frac{3.54 \times 11.3}{\sqrt{17}}$ expressing your answer to 3 significant figures. **1**

b) Fully factorise $7x^2 - 28$ **1**

c) Given that $\sqrt{80} - \sqrt{a} = 2\sqrt{5}$, find the value of a. **1**

d) Sketch $y = \cos x$ for $-180 \leq x \leq 180$. **1**

e) Express $\frac{\sqrt{2}+6}{\sqrt{2}-\sqrt{3}}$ with a rational denominator. **2**

f) Solve $0 = 2x^2 - 3x - 9$ **2**

g) Solve $-11t + 4 \geq -18$ and plot on a number line. **2**

h) If $\sin A = -\frac{1}{\sqrt{2}}$ and $\cos A$ is positive. What is the value of A? **2**

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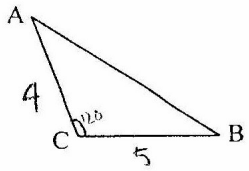
Question 2 12 Marks **Marks**

a) **2**



$AC = 4cm$, $CB = 5cm$ and $\angle ACB = 120^o$. Copy the diagram onto your worksheet and add the information. Determine the area of the triangle, giving an exact answer.

b) Express $\left(x^6 + 5\right)^{-2}$ with only positive indices. **1**

c) Evaluate $\log_7 9$ correct to 3 significant figures. **1**

d) If $\log_2 x = 3$, find the value of x **1**

e) Express $\sqrt[7]{5^x}$ with a fractional power. **1**

f) Simplify

i) $\log_3 36 - \log_3 4$ **2**

- ii) $\log_b 8 + \log_b 0.125$ **2**

g) If $\log_7 49\sqrt{7} = h$, find h. **2**

Start a new page

Question 3 12 Marks **Marks**

a) Find the gradient and y-intercept of $3x - 4y + 2 = 0$ **1**

b) The equation of a line is given by the formula $y = (\tan\theta)x + 8$. What is the value of θ if the gradient is $\sqrt{3}$? **1**

c)

i) Find the equation of the line that passes through the point (5,6) with a gradient of -2. Express your answer in the gradient intercept form. **2**

ii) What is the equation of the line that is perpendicular to the above line which also passes through (5,6)? **1**

d) $y = 12x - 5$ can be written in the general form as $12x - y - 5 = 0$. Find the perpendicular distance from the point (2, 15) to the line $y = 12x - 5$. **2**

e) Find the equation of the line that passes through (4, -3) and (-5, 15). Express in general form. **2**

f) Using the formula $L_1 + kL_2 = 0$ or otherwise, find the equation of the line that passes through the point of intersection of the lines $2x + 5y + 10 = 0$ and $3x + 2y - 2 = 0$ and also passes through (5, 6). **3**

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Question 4 12 Marks **Marks**

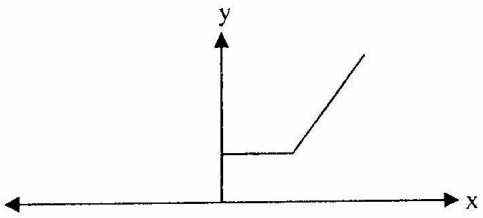
a) Sketch $y = |2x - 1|$ **2**

b) **1**

i) Evaluate $\lim_{x \to 5} \dfrac{x-5}{x^2 - x - 20}$

ii) Hence or otherwise, state the domain of $\dfrac{x-5}{x^2 - x - 20}$ **1**

c) Part of an even function is drawn below. **1**



Copy and complete the left side.

d) Evaluate $\lim_{x \to \infty} \dfrac{3x^2 - 4}{3 - 5x^2}$ **1**

e) For the function defined by:

$$f(x) = \begin{cases} 3 - x^2 & \text{for } -3 \le x \le -1 \\ 2x & \text{for } -1 < x < 1 \\ x^2 - 1 & \text{for } 1 \le x \le 3 \end{cases}$$

i) Evaluate:

A) $f(-2)$ **1**

B) $f(1)$ **1**

ii) Sketch the graph of the function for $-3 \le x \le 3$ **3**

iii) State the range of the function **1**

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Question 5 12 Marks **Marks**

a) Find the derivative of:

i) $y = 6x^2 - 2x + 9$ **1**

ii) $y = \dfrac{9x^3 + 4}{2x}$ **2**

iii) $y = x^2\sqrt{x-1}$ **2**

iv) $y = (2x^5 + 8x)^4$ **2**

b) Differentiate $f(x) = 3x^2 + 4$ by first principles. **2**

c)

i) Find the equation of the tangent to the curve $y = -4x^2 - 3x$ when $x = 5$ **2**

ii) At what point(s) on the curve $y = -4x^2 - 3x$ is the tangent to the curve parallel to the x-axis? **1**

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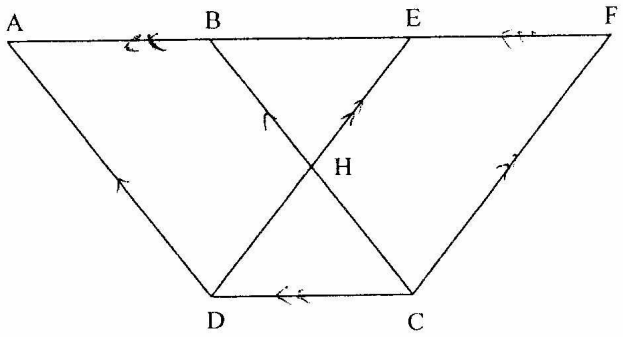
Question 6 12 Marks **Marks**

a) The interior angles of a regular polygon are each 120^o. How many sides does this polygon have? **2**

b)



A, B, E and F are collinear points. ABCD and EFCD are parallelograms. BC and ED intersect at H such that H is the mid-point of BC.

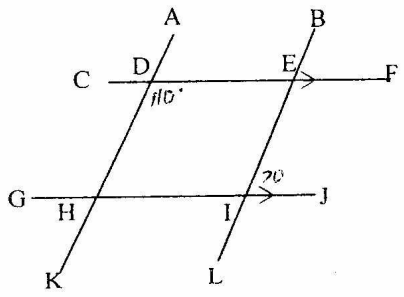
Copy or trace the diagram onto your worksheet.

i) Prove that $\Delta BHE \equiv \Delta CHD$. Give reason(s). **3**

ii) Show that $DC = BE$. Give reason(s). **1**

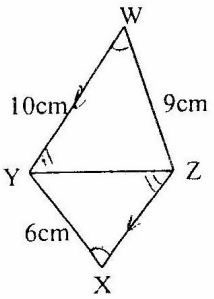
iii) Hence or otherwise, show that $AF = 3DC$. Give reason(s). **1**

c) **2**



In the diagram $CF \| GJ$, $\angle EDH = 110^o$ and $\angle EIJ = 70^o$. Prove $AK \| BL$.

d)



In the diagram above $YW \| XZ$ and $\angle W = \angle X$.

i) Show that ΔYWZ is similar to ΔZXY. 2

ii) Find the length of interval XZ. 1

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Question 7 12 Marks **Marks**

a) Find the centre and the radius of $(x-3)^2 + (y+2)^2 = 5$ 1

b) Show that the curve $y = 3x^2 + 3$ is parallel to $y = 12x - 5$ at the point (2,15). 3

c) Show that $\sin^2 x \cos^2 x + \cos^4 x = \cos^2 x$ 2

d) Sketch the region $xy > 4$. 2

e) $f(x)$ is an odd function, where $f(8) = 9$.

i) Find $f(-8)$ 1

ii) Given that $g(x) = 2x^3 - 120$ find the value of $f(g(4))$ 1

f) A (-1, 4), B (-5, 7) and C (6, 9) are 3 vertices of rhombus ABCD. Find the coordinates of D. 2

End of paper