HURLSTONE AGRICULTURAL HIGH SCHOOL

MATHEMATICS

EXTENSION 1

2011

YEAR 11

YEARLY (TASK 3) EXAMINATION

EXAMINERS ~ S. FAULDS, J. DILLON, P. BICZO, D. CRANCHER, G. RAWSON, S. HACKETT

GENERAL INSTRUCTIONS

- Reading Time – 5 minutes.
- Working Time – 1 hour 30 minutes.
- Attempt **all** questions.
- Each question is worth 10 marks.
- **All** necessary working should be shown in every question.
- This paper contains eight (8) questions.
- Board approved calculators and MathAids may be used.
- **Each question is to be started in a new answer booklet**. Write the question number and your student number at the top of each answer booklet.
- You **must** hand in an answer booklet for **each question** even if a question has not been attempted.
- This examination must **NOT** be removed from the examination room

STUDENT NAME: ____________________

TEACHER: ____________________

QUESTION 1 **10 marks** Start a NEW answer booklet

Marks

(a) Evaluate $\log_2 5$ correct to four decimal places. **2**

(b) Find $3 \times 2^{2.5}$ correct to three significant figures. **1**

(c) Express with a rational denominator $\dfrac{1+\sqrt{3}}{2-\sqrt{3}}$. **2**

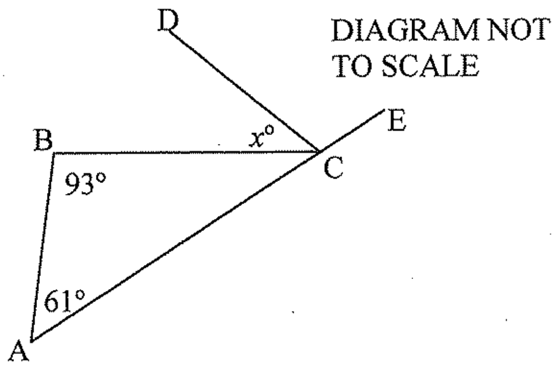
(d) Solve the inequality $\dfrac{3-2x}{x-3} < 4$. **3**

(e) Prove that $a + \dfrac{1}{a} \geq 2$ when $a > 0$. **2**

QUESTION 2 **10 marks** Start a NEW answer booklet

Marks

(a) 2



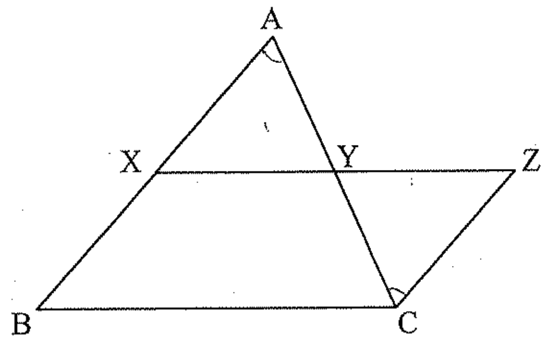
Find $\angle BCD$ in the diagram above, given DC bisects $\angle BCE$. Justify your answer by showing all reasoning.

(b) ABC is a triangle, right-angled at B. X is a point on BC such that AX=XC and $\angle BAX = 2\angle XAC$.

(i) Draw a neat sketch of ΔABC, showing all of the given information. 1

(ii) Find the size of $\angle ACB$, giving reasons. 2

(c) The diagram below shows parallelogram BXZC with BX produced to A. Y is the midpoint of AC.



(i) Prove $\Delta AXY \equiv \Delta CZY$. 3

(ii) Hence, show that X is the midpoint of AB. 2

QUESTION 3 **10 marks** Start a NEW answer booklet

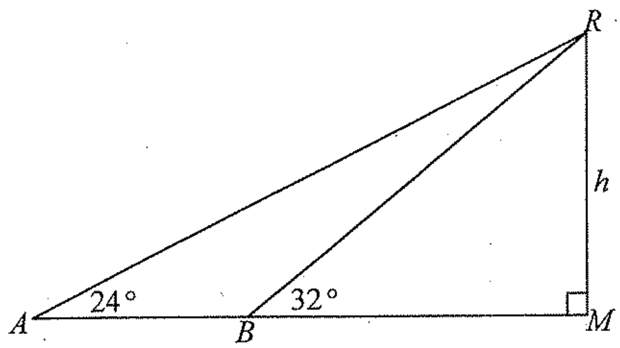
Marks

(a) Without using a calculator, show that: **2**

$$\frac{2\tan\frac{\pi}{6}}{1-\tan^2\frac{\pi}{6}} = \tan\frac{\pi}{3}$$

(b) Show that $\sin 75° = \frac{1+\sqrt{3}}{2\sqrt{2}}$. **2**

(c) A walker walks along the ground directly towards a distant high rocky cliff *R*. At a point *A* the angle of elevation of the cliff is $24°$. At point B, a kilometre closer to the cliff, the angle of elevation is $32°$.



(i) Find the horizontal distance from *B* to the cliff, to the nearest metre. **2**

(ii) Find the height of the cliff above ground level, to the nearest metre. **1**

(d) Prove that $\frac{1}{\sin^2\theta}+\frac{1}{\cos^2\theta} = \sec^2\theta\,\text{cosec}^2\theta$. **3**

QUESTION 4 **10 marks** Start a NEW answer booklet

Marks

(a) (i) State the definition of an odd function. **1**

(ii) Show that $f(x) = 2x^3$ is an odd function. **1**

(b) For the function $y = x^2 + 4x$:

(i) Find the equation of the axis of symmetry of the parabola. **1**

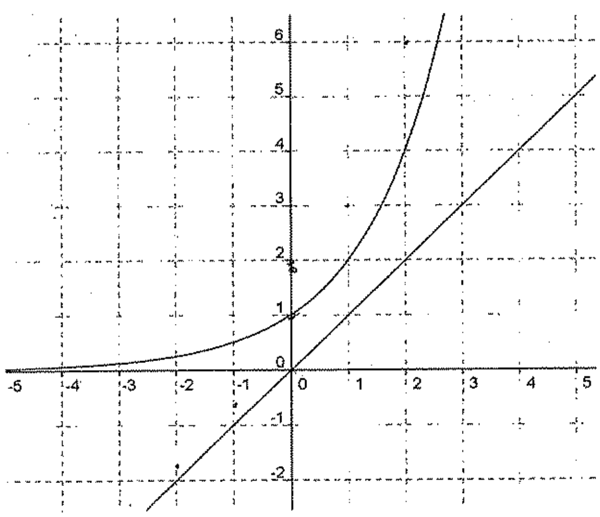
(ii) Find the co-ordinates of the vertex of the parabola and hence, state the range of the function. **2**

(c) (i) Sketch the graph of $y = |x+2|$, showing all important features. **2**

(ii) Hence, solve $|x+2| > 4 - |x|$. **2**

(d) Copy or trace the following curves onto your answer sheet. **1**

Using addition of ordinates, sketch the curve $y = 2^x + x$.

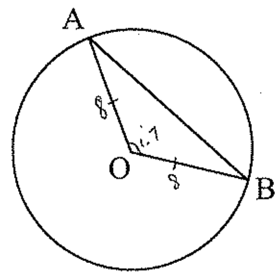


QUESTION 5 **10 marks** Start a NEW answer booklet

Marks

(a) (i) Convert $36°$ to radians, expressing your answer in terms of π. **1**

(ii) In the diagram below, the circle has a radius of 8cm and $\angle AOB = 1\cdot 7$ radians. **2**



Find the area of the minor segment enclosed by the chord AB.

(b) Differentiate the following with respect to x:

(i) $5x^4 - \dfrac{4}{x}$ **2**

(ii) $\sqrt{2x+7}$ **2**

(c) Prove, by the process of mathematical induction, that: **3**

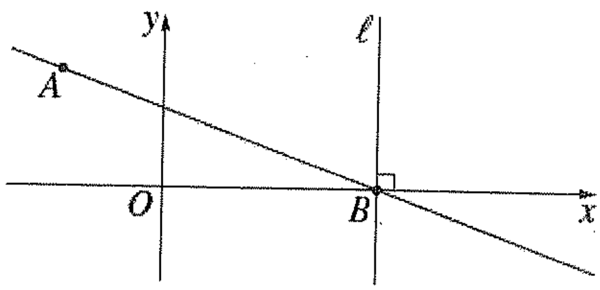
$$\frac{1}{1\times 4}+\frac{1}{4\times 7}+\frac{1}{7\times 10}+\ldots+\frac{1}{(3n-2)(3n+1)}=\frac{n}{3n+1}$$

for all positive integers, n.

QUESTION 6 **10 marks** Start a NEW answer booklet

Marks

a) The diagram shows the points $A(-1,3)$ and $B(2,0)$.
The line l is drawn perpendicular to the x-axis through the point B.



NOT TO SCALE

(i) Calculate the length of the interval AB. **1**

(ii) Find the gradient of the line AB. **1**

(iii) What is the size of the acute angle between the line AB and the line l? **1**

(iv) Show that the equation of the line AB is $x+y-2=0$. **1**

(v) Copy the diagram into your writing booklet and shade the region defined by $x+y-2<0$. **1**

(vi) Write down the equation of the line l. **1**

(vii) The point C is on the line l such that AC is perpendicular to AB. Find the coordinates of C. **2**

(b) Let A be the point $(3,-1)$ and B be the point $(9,2)$. **2**

Find the coordinates of the point P which divides the interval AB externally in the ratio $5:2$.

QUESTION 7 **10 marks** Start a NEW answer booklet

Marks

(a) Evaluate $\lim_{x \to 1} \dfrac{x^2 - 3x + 2}{x - 1}$. **2**

(b) Given that $\dfrac{d}{dx}(\sin x) = \cos x$, find the derivative of $y = (x^2 - 5)\sin x$. **2**

(c) Given that $f(x) = x^3 - 3x$ find the equation of the tangent to the curve $y = f(x)$ at the point on the curve where $x = -1$. **3**

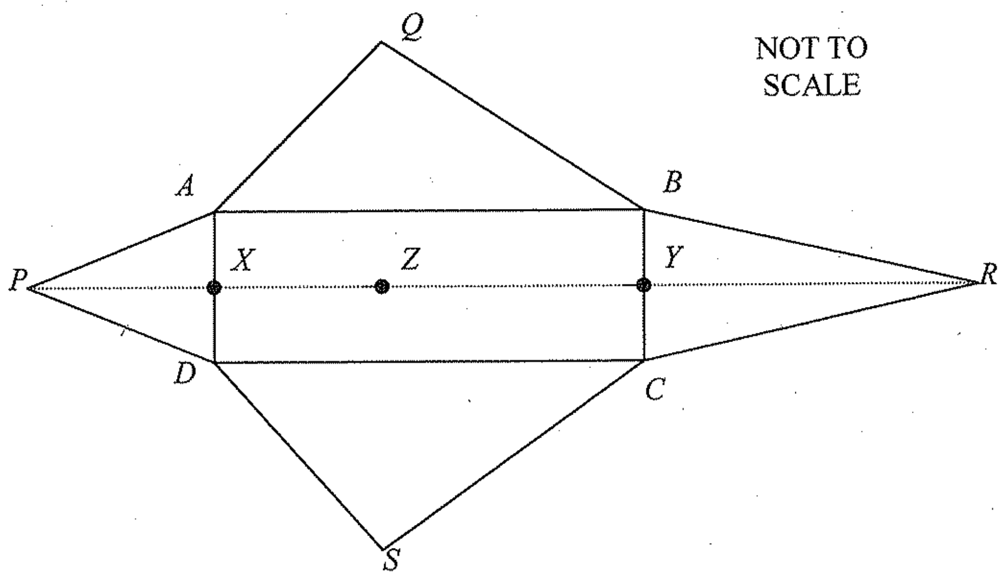
(d) Differentiate: **3**

$$y = \frac{x^2}{(2x+1)^3}, \; x \neq -\frac{1}{2}$$

QUESTION 8 **10 marks** Start a NEW answer booklet

Marks

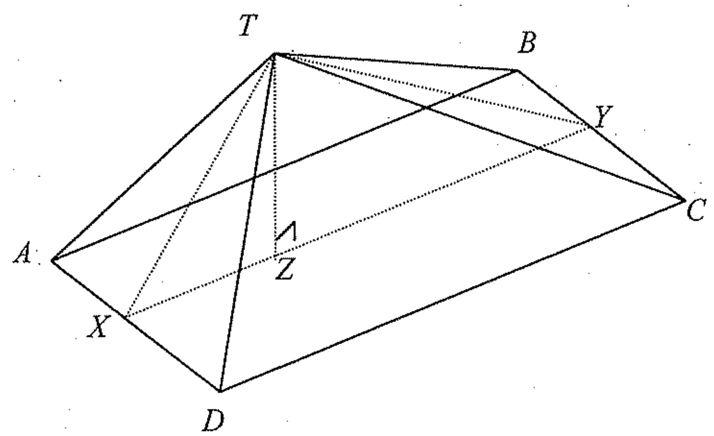
(a)



The figure above shows the net of an oblique pyramid with a rectangular base.

In this figure, $PXZYR$ is a straight line, $PX = 15$ cm, $RY = 20$ cm, $AB = 25$ cm and $BC = 10$ cm. Further, $AP = PD$ and $BR = RC$.

When the net is folded, points P, Q, R, and S all meet at the apex T, which lies vertically above the point Z in the horizontal base, as shown below.



(i) Show that ΔTXY is right-angled. **1**

(ii) Hence, show that T is 12 cm above the base. **2**

(iii) Hence, find the angle that the face DCT makes with the base. **2**

Question 8 continues on next page.

QUESTION 8 (continued)

Marks

(b) Prove the identity: **2**

$$\text{cosec}2A + \cot 2A = \cot A.$$

(c) Solve the equation below for $0° \leq \theta \leq 360°$: **3**

$$5\cos^2\theta + 2\sin\theta - 2 = 0$$

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Question No. 1 Solutions and Marking Guidelines

Outcomes Addressed in this Question

P3 **performs routine arithmetic and algebraic manipulation involving surds**, simple rational expressions and trigonometric identities

P4 **chooses and applies appropriate arithmetic**, algebraic, graphical, trigonometric and geometric **techniques**

PE3 **solves problems involving** permutations and combinations, **inequalities**, polynomials, circle geometry and parametric representations

Outcome	Solutions	Marking Guidelines
(a) P4	$\log_2 5 = \frac{\log 5}{\log 2}$ $= 2.321928095$ ≈ 2.3219	**Award 2** for correct answer **Award 1** attempts to use "change of base" and round to 4 d.p.
(b) P4	$3 \times 2^{2.5} = 16.97056275$ ≈ 17.0	**Award 1** for correct answer
(c) P3	$\frac{1+\sqrt{3}}{2-\sqrt{3}} = \frac{1+\sqrt{3}}{2-\sqrt{3}} \times \frac{2+\sqrt{3}}{2+\sqrt{3}}$ $= \frac{5+3\sqrt{3}}{4-3}$ $= 5+3\sqrt{3}$	**Award 2** for correct solution **Award 1** multiplies by the conjugate
(d) PE3	$\frac{3-2x}{x-3} < 4 \quad (x \neq 3)$ $(3-2x)(x-3) < 4(x-3)^2$ $4(x-3)^2 - (3-2x)(x-3) > 0$ $(x-3)(4(x-3)-(3-2x)) > 0$ $(x-3)(6x-15) > 0$ $\therefore x < 2\frac{1}{2}$ or $x > 3$	**Award 3** for correct solution **Award 2** multiplies both sides by $(x-3)^2$ and attempts to solve the resulting quadratic inequality. **Award 1** multiplies both sides by $(x-3)$ and attempts to solve the resulting linear inequality.
(e) PE3	Consider $a+\frac{1}{a}-2$ $a+\frac{1}{a}-2 = \frac{a^2+1-2a}{a}$ $= \frac{(a-1)^2}{a}$ If $a>0$, $(a-1)^2 \geq 0$ and $\frac{(a-1)^2}{a} \geq 0$ $\therefore a+\frac{1}{a}-2 \geq 0$ $\therefore a+\frac{1}{a} \geq 2$	**Award 2** for correct solution **Award 1** for attempting to prove the result by a valid means

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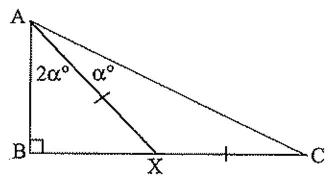
Question No. 2 Solutions and Marking Guidelines

Outcomes Addressed in this Question

P4 Chooses and applies appropriate geometric techniques.

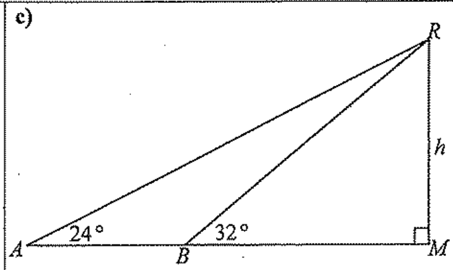
Outcome	Solutions	Marking Guidelines
P4	**(a)** $\angle BCE = 93° + 61°$ (Exterior angle of ΔABC equals the sum of the two interior opposite angles.) $\therefore \angle BCE = 154°$ $\angle BCD = \frac{154°}{2}$ (CD bisects $\angle BCE$) $\therefore \angle BCD = 77°$	**2 marks** Correct answer with full reasons. **1 mark** Correct answer with incomplete reasons OR incorrect answer with relevant and correct reasoning.
P4	**(b)(i)** 	**1 mark** Correctly drawn diagram showing all given information
P4	**(ii)** $AX = XC$ (given) $\therefore \Delta AXC$ is isosceles (two equal sides) Now, $\angle ACX = \alpha°$ (angles opposite equal sides in isosceles ΔAXC) In ΔABC, $2\alpha + \alpha + \alpha + 90° = 180°$ (angle sum of triangle) $4\alpha = 90°$ $\therefore \alpha = 22.5°$	**2 marks** Correct answer with full reasons. **1 mark** Correct answer with incomplete reasons OR incorrect answer with relevant and correct reasoning.
P4	**(c)(i)** $BX \parallel CZ$ ($BXZC$ is a parallelogram) $AX \parallel CZ$ (BX produced to A) In ΔAXY and ΔCZY $\angle AYX = \angle CYZ$ (vertically opposite angles are equal) $AY = CY$ (Y is the midpoint of AC) $\angle XAY = \angle ZCY$ (alternate angles equal $AX \parallel ZC$) $\therefore \Delta AXY \equiv \Delta CZY$ (AAS)	**3 marks** Correct solution **2 marks** Substantial progress towards correct solution **1 mark** Limited progress towards correct solution
P4	**ii)** $AX = CZ$ (matching sides of congruent triangles are equal) $BX = CZ$ (opposite sides are equal, $BXZC$ is a parallelogram) $\therefore AX = BX$ $\therefore X$ is the midpoint of AB.	**2 marks** Correct solution **1 mark** Substantial progress towards correct solution

Year 11	Extension 1 Mathematics Yearly	Examination 2011
Question No. 3	Solutions and Marking Guidelines	

Outcomes Addressed in this Question

PE2 - uses multi-step deductive reasoning in a variety of contexts
P3 - performs routine arithmetic and algebraic manipulation involving surds, simple rational expressions and trigonometric identities
P4 - chooses and applies appropriate arithmetic, algebraic, graphical, trigonometric and geometric techniques
P5 - understands the concept of a function and the relationship between a function and its graph
PE5 - determines derivatives which require the application of more than one rule of differentiation
P6 - relates the derivative of a function to the slope of its graph
PE6 - makes comprehensive use of mathematical language, diagrams and notation for communicating in a wide variety of situations
P8 - understands and uses the language and notation of calculus

	Sample Solution	Marking Guidelines
P4	**3.** **a)** $LHS = \dfrac{2\tan\frac{\pi}{6}}{1-\tan^2\frac{\pi}{6}}$ $= \tan 2\left(\frac{\pi}{6}\right)$ $= \tan\frac{\pi}{3}$ Since, double angle result for tan is: $\tan 2\theta = \dfrac{2\tan\theta}{1-\tan^2\theta}$ Therefore, $\dfrac{2\tan\frac{\pi}{6}}{1-\tan^2\frac{\pi}{6}} = \tan\frac{\pi}{3}$	**2 marks for complete correct solution** **1 marks for partially correct solution**
P4	**b)** $\sin 75°$ $= \sin(30° + 45°)$ $= \sin 30° \cos 45° + \cos 30° \sin 45°$ $= \frac{1}{2}\times\frac{1}{\sqrt{2}} + \frac{\sqrt{3}}{2}\times\frac{1}{\sqrt{2}}$ $= \dfrac{1+\sqrt{3}}{2\sqrt{2}}$	**2 marks for complete correct solution** **1 marks for partially correct solution**

	c) 	
P4	i) $\frac{BR}{\sin 24°} = \frac{1}{\sin 8°}$ $BR = \frac{\sin 24°}{\sin 8°}$ $\cos 32° = \frac{BM}{BR}$ $\therefore BM = BR\cos 32°$ $= \frac{\sin 24°}{\sin 8°}\cos 32°$ $= 2\cdot 478440398$ $= 2\cdot 478km \text{ or } 2478m$	**2marks for complete correct solution** **1 marks for partially correct solution**
P4	ii) $\frac{h}{BM} = \tan 32°$ $h = BM\tan 32°$ $h = \left(\frac{\sin 24°}{\sin 8°}\cos 32°\right)\tan 32°$ $= 1\cdot 548701446$ $= 1\cdot 549km \text{ or } 1549m$	**1 mark for correct solution**
P3	d) $LHS = \frac{1}{\sin^2\theta} + \frac{1}{\cos^2\theta}$ $= \frac{\cos^2\theta + \sin^2\theta}{\sin^2\theta\cos^2\theta}$ $= \frac{1}{\sin^2\theta\cos^2\theta}$ $= \frac{1}{\sin^2\theta} \times \frac{1}{\cos^2\theta}$ $= \cos ec^2\theta\sec^2\theta$ $= RHS$ $\therefore \frac{1}{\sin^2\theta} + \frac{1}{\cos^2\theta} = \sec^2\theta\cos ec^2\theta$	**3 marks for complete correct solution** **2 marks for partially correct solution no reasoning** **1 mark for any correct statement**

Year 11 Yearly Question No. 4	Extension 1 Mathematics Solutions and Marking Guidelines	Examination 2011

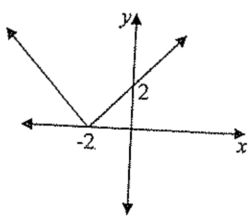
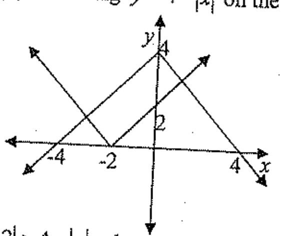
Outcomes Addressed in this Question

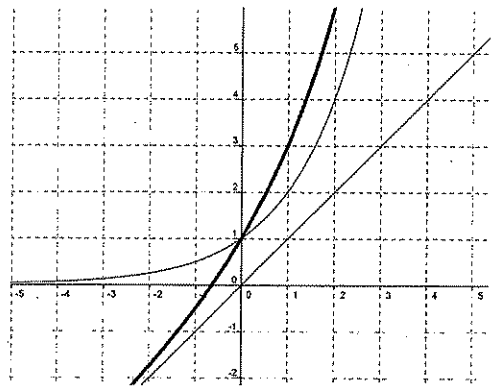
P4 Chooses and applies appropriate algebraic, trigonometric **and geometric techniques**

P5 Understands the concept of a function and the relationship between a function and its graph

PE3 Solves problems involving permutations and combinations, **inequalities,** polynomials, circle geometry and parametric representations.

PE6 Makes comprehensive use of mathematical language, diagrams and notation for communicating in a wide variety of situations.

Outcome	Solutions	Marking Guidelines
P4	(a)(i) A function is odd if $f(-x)=-f(x)$ $f(x)=2x^3$ $f(-x)=2(-x)^3$ $=-2x^3$ $=-(2x^3)$ $=-f(x)$	2 marks : correct definition and correct solution 1 mark : one of above
P5	(b)(i) Axis of symmetry of $y=ax^2+bx+c$ is given by $x=\frac{-b}{2a}$ $=\frac{-4}{2}$ $\therefore$ axis of symmetry is $x=-2$	1 mark : correct answer
	(ii) Vertex is on the axis of symmetry. Substituting $x=-2$ into $y=x^2+4x$, $y=4-8=-4$ $\therefore$ vertex is $(-2,-4)$ As this is a concave up parabola, range is $y\geq-4$.	2 marks : correct vertex & range 1 mark : one of above
P5	(c)(i)  	2 mark : correct graph 1 mark: incomplete graph
PE3	(ii) Sketching $y=4-\|x\|$ on the same diagram,  $\|x+2\|>4-\|x\|$ when the graph of $y=\|x+2\|$ is above the graph of $y=4-\|x\|$.	2 marks : correctly graphs $y=4-\|x\|$ and correct solution to inequality 1 mark : substantial progress towards correct solution, by using the given graph

PE6	The graphs meet when $y = x+2$ and $y = 4-x$ intersect and when $y = -(x+2)$ and $y = 4-(-x)$ intersect. Solving $x+2 = 4-x$, $2x = 2$, $\therefore x = 1$. Solving $-x-2 = 4+x$, $2x = -6$, $\therefore x = -3$. From the graph, it can be seen that the solution to the inequality is given by $x < -3$ and $x > 1$. (d) Add the y values at particular values of *x*. 	1 mark : correct solution

Year 11 Question No. 5	Mathematics Extension Solutions and Marking Guidelines	Task 3 2011

Outcomes Addressed in this Question

P4 chooses and applies appropriate arithmetic, algebraic, and trigonometric techniques
P7 determines the derivative of a function through routine application of the rules of differentiation
HE2 uses inductive reasoning in the construction of proofs

Outcome	Solutions	Marking Guidelines
P4	(a) (i) $36^\circ = \frac{36\pi^c}{180}$ $= \frac{\pi^c}{5}$	**1 mark:** correct answer
P4	(ii) $A = \frac{1}{2}r^2(\theta - \sin\theta)$ $= \frac{1}{2}\times 8^2(1\cdot 7 - \sin 1\cdot 7)$ $= 22\cdot 7 \text{ cm}^2$	**2 marks:** correct solution **1 mark:** substantially correct solution
P7	(b) (i) $\frac{d}{dx}\left(5x^4 - \frac{4}{x}\right) = 20x^3 + \frac{4}{x^2}$	**2 marks:** correct solution **1 mark:** substantially correct solution
P7	(ii) $\frac{d}{dx}\sqrt{2x+7} = \frac{d}{dx}(2x+7)^{\frac{1}{2}}$ $= \frac{1}{2}(2x+7)^{-\frac{1}{2}}\times 2$ $= \frac{1}{\sqrt{2x+7}}$	**2 marks:** correct solution **1 mark:** substantially correct solution
HE2	(c) Show true for $n = 1$ $\text{LHS} = \frac{1}{(3\times1-1)(3\times1+1)} = \frac{1}{4}$ $\quad \text{RHS} = \frac{1}{3(1)+1} = \frac{1}{4}$ Assume true for $n = k$. $\frac{1}{1\times4} + \frac{1}{4\times7} + \frac{1}{7\times10} + \ldots + \frac{1}{(3k-2)(3k+1)} = \frac{k}{3k+1}$ Prove true for $n = k+1$ $\frac{1}{1\times4} + \frac{1}{4\times7} + \frac{1}{7\times10} + \ldots + \frac{1}{(3k-2)(3k+1)} + \frac{1}{(3[k+1]-2)(3[k+1]+1)} = \frac{k+1}{3(k+1)+1}$ i.e. $\frac{k}{3k+1} + \frac{1}{(3k+1)(3k+4)} = \frac{k+1}{3k+4}$	**3 marks:** correct solution **2 mark:** substantially correct solution **1 mark:** partially correct solution

$$\text{LHS} = \frac{k}{3k+1} + \frac{1}{(3k+1)(3k+4)}$$

$$= \frac{k(3k+4)}{(3k+1)(3k+4)} + \frac{1}{(3k+1)(3k+4)}$$

$$= \frac{3k^2+4k+1}{(3k+1)(3k+4)}$$

$$= \frac{(3k+1)(k+1)}{(3k+1)(3k+4)}$$

$$= \frac{k+1}{3k+4}$$

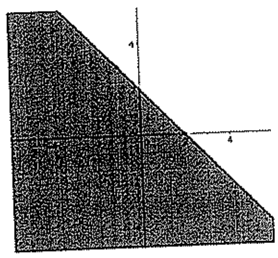
$$= \text{RHS}$$

$\therefore$ Proven by mathematical induction for $n > 0$.

Year 11 Yearly 2011 – Extension 1 Mathematics

Question No: 6 **Solutions and Marking Guidelines**

Outcome Addressed in this Question: Chooses and applies appropriate coordinate techniques to solve problems.

	Sample Solution	Marking Guidelines
a)	i) $\sqrt{18}$	**1 mark** – correct solution
	ii) -1	**1 mark** – correct solution
	iii) 45°	**1 mark** – correct solution
	iv) $y-0=-1(x-2)$ $y-0=-x+2$ $\therefore x+y-2=0$	**1 mark** – correct equation derived with all steps clearly shown
	v) 	**1 marks** – correct region shaded with dotted line clearly shown.
	vi) $x=2$	**1 mark** – correct solution
	vii) gradient of AC=1 $\therefore$ Equation of AC is $y-3=1(x+1)$ $y-3=x+1$ $y=x+4$ When $x=2$, $y=2+4=6$ $\therefore C(2,6)$	**2 marks** – correct solution **1 mark** – substantial progress towards correct solution
b)	$(3,-1)$ $(9,2)$ $5:-2$ $P\left(\frac{5\times9+-2\times3}{5+(-2)},\frac{5\times2+-2\times-1}{5+(-2)}\right)$ $P\left(\frac{45-6}{3},\frac{10+2}{3}\right)$ $P(13,4)$	**2 marks** – correct solution **1 mark** – substantial progress towards correct solution

Year 11 Yearly 2011 – Extension 1 Mathematics

Question No: 7

Solutions and Marking Guidelines

Outcome Addressed in this Question: Determines derivatives which require various rules of differentiation

	Sample Solution	Marking Guidelines
a)	$\lim_{x\to 1}\frac{x^2-3x+2}{x-1}$ $=\lim_{x\to 1}\frac{(x-1)(x-2)}{x-1}$ $=\lim_{x\to 1}(x-2)$ $=1-2$ $=-1$	**2 marks** – correct solution **1 mark** – substantial progress towards correct solution
b)	$y'=2x.\sin x+(x^2-5).\cos x$	**2 marks** – correct solution **1 mark** – substantial progress towards correct solution
c)	$f'(x)=3x^2-3$ at $x=-1$ $\quad f'(x)=0$ $f(x)=2$ $\therefore$ Equation of tangent is $y=2$	**3 marks** – correct solution **2 marks** – correctly calculates $f(x)$ and $f'(x)$ **1 mark** – correctly calculates $f(x)$ or $f'(x)$
d)	$y' = \frac{(2x+1)^3.2x-x^3.3(2x+1)^2.2}{((2x+1)^3)^2}$ $=\frac{2x.(2x+1)^3-6x^3.(2x+1)^2}{(2x+1)^6}$ $=\frac{2x.(2x+1)^2(2x+1-3x)}{(2x+1)^6}$ $=\frac{2x.(1-x)}{(2x+1)^4}$	**3 marks** – correct solution **2 mark** – correctly differentiates y, but does not simplify correctly **1 mark** – substantial progress towards correct derivative

Year 11 Question No. 8	Mathematics Extension Solutions and Marking Guidelines	Task 3 2011

Outcomes Addressed in this Question

P4 chooses and applies appropriate arithmetic, algebraic, and trigonometric techniques

Outcome	Solutions	Marking Guidelines
	(a) (i) $TX^2+TY^2=PX^2+RY^2$ $=15^2+20^2$ $=625$ $=XY^2$ $\therefore\ \Delta TXY$ is right angled.	**<u>1 mark:</u>** correct solution
	(ii) $A=\frac{1}{2}\times 15\times 20$ $=150$ $A=\frac{1}{2}\times XY\times TZ$ $150=\frac{1}{2}\times 25\times TZ$ $TZ=12$	**2 marks:** correct solution **1 mark:** substantially correct solution
	(iii) $\tan\theta=\frac{12}{5}$ $\theta=67°23'$	**2 marks:** correct solution **1 mark:** substantially correct solution
	(b) LHS $=\text{cosec}2A+\cot 2A$ $=\frac{1}{\sin 2A}+\frac{\cos 2A}{\sin 2A}$ $=\frac{1+\cos 2A}{\sin 2A}$ $=\frac{2\cos^2 A}{2\sin A\cos A}$ $=\frac{\cos A}{\sin A}=\cot A$ $=$RHS	**2 marks:** correct solution **1 mark:** substantially correct solution
	(c) $5\cos^2\theta+2\sin\theta-2=0$ $5\left(1-\sin^2\theta\right)+2\sin\theta-2=0$ $5\sin^2\theta-2\sin\theta-3=0$ $(5\sin\theta+3)(\sin\theta-1)=0$ $\sin\theta=-\frac{3}{5}$ or 1 $\theta=216°52',\ 323°8',\ 90°$	**3 marks:** correct solution **2 mark:** substantially correct solution **1 mark:** partially correct solution