SOUTH SYDNEY H.S.

Student Name: _____

Section 1	
Section II	
Question 11	
Question 12	
Question 13	
Question 14	

2015

YEAR 11

YEARLY EXAMINATION

Mathematics

General Instructions

- Working time - 2 hours
- Write using black or blue pen
- Board-approved calculators may be used
- A table of standard integrals is provided at the back of this paper
- Show relevant mathematical reasoning and/or calculations in Questions 11-14

Total marks - 70

Section I

10 marks

- Attempt Questions 1-10
- Allow about 15 minutes for this section

Section II

60 marks

- Attempt Questions 11-14
- Allow about 1 hour 45 minutes for this section

Section I

10 marks
Attempt Questions 1 - 10
Allow about 15 minutes for this section

Use the multiple-choice answer sheet for Questions 1-10

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1   What is the value of $\dfrac{\sqrt{3.84}}{3.65+6.7}$ correct to two decimal places?

   (A)   0.19
   (B)   0.61
   (C)   5.28
   (D)   8.44

2   What is the solution to the equation $6x^2 = x+2$?

   (A) $x=-\dfrac{2}{3}$ or $x=-\dfrac{1}{2}$

   (B) $x=\dfrac{2}{3}$ or $x=-\dfrac{1}{2}$

   (C) $x=-\dfrac{2}{3}$ or $x=\dfrac{1}{2}$

   (D) $x=\dfrac{2}{3}$ or $x=\dfrac{1}{2}$

3   What is the midpoint of $(-2,5)$ and $(2,-3)$?

   (A) $(0,1)$
   (B) $(0,4)$
   (C) $(2,1)$
   (D) $(2,4)$

4   What is the simultaneous solution to the equations $2x-y=-8$ and $3x+2y=-5$?

   (A) $x=-3$ and $y=-2$
   (B) $x=-3$ and $y=2$
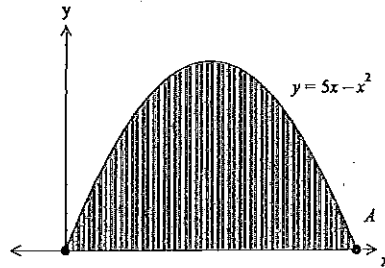   (C) $x=3$ and $y=-2$
   (D) $x=3$ and $y=2$

5   Which of the following is true for the function $f(x) = 8x^3 - 7x$?
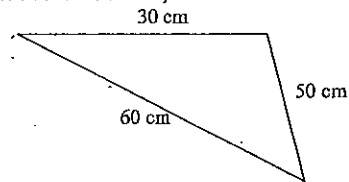
   (A)   Even function

   (B)   Odd function

   (C)   Neither odd or even

   (D)   Zero function

6   The diagram shows the graph of the function $y = 5x - x^2$.

   What pair of inequalities specify the shaded region?

   (A) $y \le 5x - x^2$ and $y \le 0$.

   (B) $y \le 5x - x^2$ and $y \ge 0$.

   (C) $y \ge 5x - x^2$ and $y \le 0$.

   (D) $y \ge 5x - x^2$ and $y \ge 0$.

7   The following triangle has sides 30 cm, 50 cm and 60 cm.

   Angle C is the largest angle. Which of the following expressions is correct for angle C?

   (A) $\text{Cos } C = \dfrac{30^2 + 60^2 - 50^2}{2 \times 30 \times 60}$

   (B) $\text{Cos } C = \dfrac{50^2 + 30^2 - 60^2}{2 \times 50 \times 30}$

   (C) $\text{Cos } C = \dfrac{50^2 + 60^2 - 30^2}{2 \times 50 \times 60}$

   (D) $\text{Cos } C = \dfrac{50^2 + 30^2 - 60^2}{2 \times 50 \times 60}$

8   What is the exact value of $\cos 135° + \operatorname{cosec} 60°$?

   (A) $\dfrac{2\sqrt{2} - \sqrt{3}}{\sqrt{6}}$

   (B) $\dfrac{2\sqrt{2} - 1}{\sqrt{2}}$

   (C) $\dfrac{2\sqrt{2} + \sqrt{3}}{\sqrt{6}}$

   (D) $\dfrac{2\sqrt{2} + 1}{\sqrt{2}}$

9   What values of k does the equation $x^2 + (k+3)x + 5 = 0$ have equal roots?

   (A) $k = -3 \pm \sqrt{5}$

   (B) $k = -3 \pm 2\sqrt{5}$

   (C) $k = 3 \pm \sqrt{5}$

   (D) $k = 3 \pm 2\sqrt{5}$

10 What is the solution to the equation $\cos\left(\dfrac{\theta}{2} + 30°\right) = \sin\theta$ for $0° \le \theta \le 90°$?

   (A) $\theta = 20°$

   (B) $\theta = 30°$

   (C) $\theta = 40°$

   (D) $\theta = 50°$

Section II

Question 12 (15 marks)   **Marks**

60 marks
Attempt Questions 11 – 14
Allow about 1 hours and 45 minutes for this section

Answer each question in the appropriate writing booklet.

Your responses should include relevant mathematical reasoning and/or calculations.

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Question 11 (15 marks)   **Marks**

(a) Find the value of a and b if $\dfrac{4}{3-\sqrt{7}} = a + b\sqrt{7}$.   **2**

(b) Factorise completely $3x^2 + 15x - 72$ **2**

(c) Solve $x^2 + 4x + 3 \geq 0$ **2**

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(d) Factorise completely $x^2y - y - z + x^2z$.   **2**

(e) Solve $|4 - 3x| = 7$ **2**

(f) Simplify $\dfrac{x^3 - 1}{x^2 - 1} \times \dfrac{x^2 - 4x - 5}{4x^2 + 4x + 4}$ **3**

(g) Solve for x if $4^x = 32$ **1**

(h) The line $6x - ky = 2$ passes through the point $(3, 2)$. Find the value of k.   **1**

Question 12   (15 marks)   **Marks**

(a)   The line $x + 2y - 4 = 0$ cuts the x-axis at B and the y-axis at A.

Not to scale
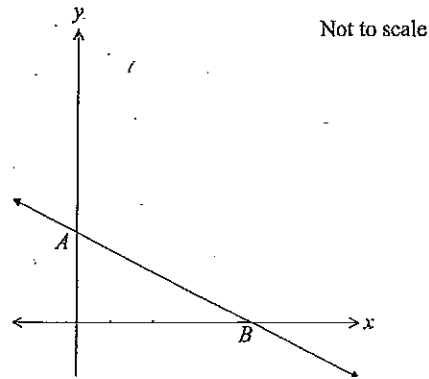
(i)	What are the coordinates of A and B?	2
(ii)	Find the perpendicular distance from $P(2,6)$ to $x + 2y - 4 = 0$.	1
(iii)	Find the gradient of AP.	1
(iv)	Hence or otherwise find the equation of AP.	1
(v)	What is the distance from A to B?	1
(vi)	Calculate the area of $\triangle APB$.	1

(b)   Prove $(\sec\theta - \cos\theta)^2 = \tan^2\theta - \sin^2\theta$ 2

(c)   Solve the equation $2\cos\beta = -\sqrt{3}$ for $0° \le \beta \le 360°$ 2

(d)   Draw neat one third page sketches of the following equations on a separate
      set of axes. Show clearly the essential features of each graph.

(i)	$(x-1)^2 + y^2 = 36$	1
(ii)	$y = |x + 3|$	1

(e)   For what values of m is $-4x^2 + 3x + m$ a positive definite.   2

Question 13 (15 marks)   **Marks**

(a)   A vertical tower AB with points B, C and D in a straight line on the ground is
      shown below. The distance CD is 100 metres. The angle of elevation to the
      top of the tower from point C is 35° and from point D is 60°.

Not to scale
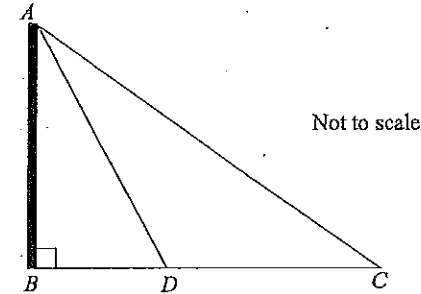
(i)	Show that $AD = \dfrac{100\sin 35°}{\sin 25°}$	2
(ii)	Calculate the height of the tower. Answer to the nearest metre.	2

(b)   A point A is 6 km south-west of a point O and a point B is 9 km on a bearing
      of 140° from O.

(i)	What is the size of $\angle AOB$?	1
(ii)	Find the distance AB correct to one decimal place.	2
(iii)	Find the size of $\angle BAO$ correct to the nearest degree.	2
(iv)	Find the true bearing of B from A.	1

(c)   Find the value of k if the sum of the roots of $x^2 - (k-1)x + 2k = 0$ is equal to
      the product of the roots.   2

(d)   Solve $4^x - 9(2^x) + 8 = 0$ 2

(e)   Evaluate $\displaystyle\sum_{r=1}^{3} 2^{1-r}$ 1

Question 14 (15 marks)   **Marks**

(a) If α and β are roots of the quadratic equation $2x^2 - 7x + 8 = 0$, find

   (i) $\alpha + \beta$ 1

   (ii) $\alpha\beta$ 1

   (iii) $\dfrac{1}{\alpha} + \dfrac{1}{\beta}$ 1

(b) The function $y = f(x)$ is defined as follows:

$$f(x) = \begin{cases} 2^x & \text{for } x < 0 \\ 1 & \text{for } x = 0 \\ x^{-1} & \text{for } x > 0 \end{cases}$$

   (i)   Draw a sketch of the graph of $y = f(x)$.   2

   (ii)   Evaluate $f(-3) + f(0) + f(3)$.   1
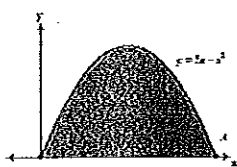
(c) For the arithmetic sequence 4, 9, 14, 19, ….
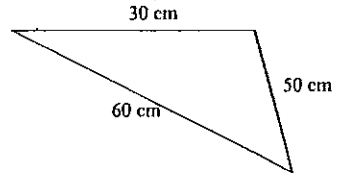
   (i)   Write the rule to describe the nth term.   1

   (ii)   What is the 25th term?   1
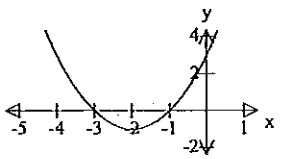
   (iii)   Find the sum of the first 100 terms.   1

(d) Given the parabola $x^2 - 4x - 12 = 8y$

   (i)   Write the equation in the form $(x-h)^2 = 4a(y-k)$ 1

   (ii)   Find the coordinates of the vertex and focus.   2

   (iii)   Find the equation of the axis of symmetry of the parabola.   1

   (iv)   Draw a neat sketch of the parabola showing the above information.   2
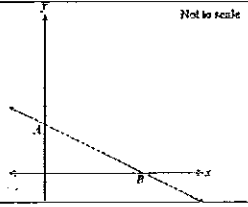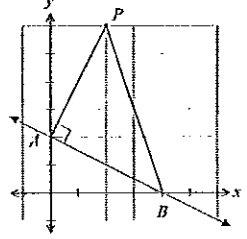
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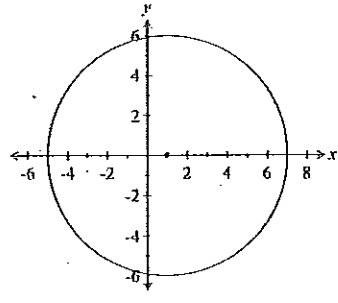
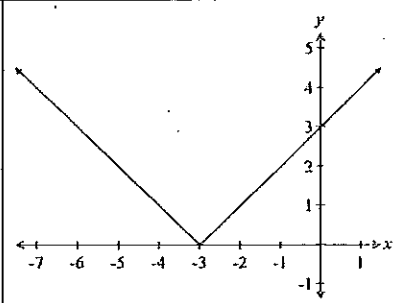|	
1 What is the value of $\dfrac{\sqrt{3.84}}{3.65+6.7}$ correct to two decimal places?	
$\dfrac{\sqrt{3.84}}{3.65+6.7} = 0.1893325405 \approx 0.19$	1 Mark: A
2 What is the solution to the equation $6x^2 = x+2$?	
$6x^2 - x - 2 = 0$ $(3x-2)(2x+1) = 0$ $(3x-2) = 0$ or $(2x+1) = 0$ $\therefore x = \dfrac{2}{3}$ or $x = -\dfrac{1}{2}$	1 Mark: B
3 What is the midpoint of $(-2,5)$ and $(2,-3)$?	
$\text{Midpoint} = \left(\dfrac{-2+2}{2}, \dfrac{5+-3}{2}\right) = (0,1)$	1 Mark: A
4 What is the simultaneous solution to the equations $2x - y = -8$ and $3x + 2y = -5$?	
$2x - y = -8$ (1) $3x + 2y = -5$ (2) Multiply equation (1) by 2 $4x - 2y = -16$ (3) Equation (2) + (3) $7x = -21$ or $x = -3$ Substitute $x = -3$ into equation (1) $-6 - y = -8$ or $y = 2$ Solution is $x = -3$ and $y = 2$.	1 Mark: B
5 Which of the following is true for the function $f(x) = 8x^3 - 7x$?	
$f(x) = 8x^3 - 7x$ Odd function $f(-x) = -f(x)$. $f(-x) = 8 \times (-x)^3 - 7 \times (-x)$ $\quad = -(8x^3 - 7x) = -f(x)$	1 Mark: B
6 The diagram shows the graph of the function $y = 5x - x^2$. What pair of inequalities specify the shaded region? Point A lies of the x axis ($y = 0$). To find x when $y = 0$ substitute into $y = 5x - x^2$. $0 = 5x - x^2$ $\quad = x(5-x)$ $\therefore x = 0$ or $x = 5$ Point A is $(5,0)$ Inequalities are $y \le 5x - x^2$ and $y \ge 0$. Test by substituting points into the inequalities. $\quad (2,1): 1 \le 5 \times 2 - 2^2$ and $1 \ge 0$ True.	1 Mark: B

7 The following triangle has sides 30 cm, 50 cm and 60 cm. Angle C is the largest angle. Which of the following expressions is correct for angle C?	
Largest angle is opposite the longest side (60 cm) Cosine rule $\text{Cos C} = \dfrac{50^2 + 30^2 - 60^2}{2 \times 50 \times 30}$	1 Mark: B
8 What is the exact value of $\cos 135° + \text{cosec} 60°$?	
$\cos 135° + \text{cosec} 60° = -\dfrac{1}{\sqrt{2}} + \dfrac{1}{\frac{\sqrt{3}}{2}} = -\dfrac{1}{\sqrt{2}} + \dfrac{2}{\sqrt{3}} = \dfrac{2\sqrt{2} - \sqrt{3}}{\sqrt{6}}$	1 Mark: A
9 What values of k does the equation $x^2 + (k+3)x + 5 = 0$ have equal roots?	
Equal roots $\Delta = 0$ $\Delta = b^2 - 4ac$ $\quad = (k+3)^2 - 4 \times 1 \times 5$ $\quad = k^2 + 6k + 9 - 20$ $\quad = k^2 + 6k - 11 = 0$ $\therefore k = -3 \pm 2\sqrt{5}$ $k = \dfrac{-6 \pm \sqrt{(6^2) - 4 \times 1 \times -11}}{2 \times 1}$ $\quad = \dfrac{-6 \pm \sqrt{80}}{2} = -3 \pm 2\sqrt{5}$	1 Mark: B
10 What is the solution to the equation $\cos\left(\dfrac{\theta}{2} + 30°\right) = \sin\theta$ for $0° \le \theta \le 90°$?	
Sine and cosine are complementary angles: $\sin\theta = \cos(90 - \theta)$ $\cos\left(\dfrac{\theta}{2} + 30°\right) = \cos(90° - \theta)$ $\dfrac{\theta}{2} + 30° = 90° - \theta$ $\theta + 60° = 180° - 2\theta$ $3\theta = 120°$ or $\theta = 40°$	1 Mark: C

2
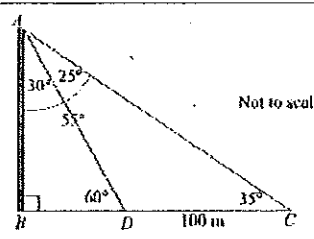
Question 11 (15 marks)		Marks
(a)	Find the value of a and b if $\dfrac{4}{3-\sqrt{7}} = a + b\sqrt{7}$.	
	$\dfrac{4}{3-\sqrt{7}} = \dfrac{4}{3-\sqrt{7}} \times \dfrac{3+\sqrt{7}}{3+\sqrt{7}} = \dfrac{4(3+\sqrt{7})}{9-7} = 6 + 2\sqrt{7}$ $\therefore a = 6$ and $b = 2$	2 Marks: Correct answer. 1 Mark: Uses the conjugate.
(b)	Factorise completely $3x^2 + 15x - 72$	
	$3x^2 + 15x - 72 = 3(x^2 + 5x - 24)$ $\qquad = 3(x+8)(x-3)$	2 Marks: Correct answer. 1 Mark: Finds one factor.
(c)	Solve $x^2 + 4x + 3 \geq 0$	
	$x^2 + 4x + 3 \geq 0$ $(x+3)(x+1) \geq 0$ Hence $x \geq -1$ or $x \leq -3$	2 Marks: Correct answer. 1 Mark: Finds one solution
(d)	Factorise completely $x^3 y - y - z + x^2 z$.	
	$x^3 y - y - z + x^2 z = x^3 y + x^2 z - y - z$ $\qquad = x^2(y+z) - 1(y+z)$ $\qquad = (x^2 - 1)(y+z)$ $\qquad = (x+1)(x-1)(y+z)$	2 Marks: Correct answer. 1 Mark: Groups terms and factorises.
(e)	Solve $|4 - 3x| = 7$	
	$4 - 3x < 7 \qquad$ and $\qquad 4 - 3x > -7$ $-3x < 3 \qquad\qquad\qquad -3x > -11$ $x > -1 \qquad\qquad\qquad x < \dfrac{11}{3}$ or $3\dfrac{2}{3}$ Solution is $-1 < x < \dfrac{11}{3}$	2 Marks: Correct answer. 1 Mark: Finds one solution or shows some understanding.
(f)	Simplify $\dfrac{x^3 - 1}{x^2 - 1} \times \dfrac{x^2 - 4x - 5}{4x^2 + 4x + 4}$	
	$\dfrac{x^3 - 1}{x^2 - 1} \times \dfrac{x^2 - 4x - 5}{4x^2 + 4x + 4} = \dfrac{(x-1)(x^2+x+1)}{(x-1)(x+1)} \times \dfrac{(x+1)(x-5)}{4(x^2+x+1)}$ $\qquad = \dfrac{(x-5)}{4}$	3 Marks: Correct answer. 2 Marks: Makes significant progress. 1 Mark: Correctly factorises one term

(g)	Solve for x if $4^x = 32$	
	$4^x = 32$ $(2^2)^x = 2^5$ $2x = 5$ $x = 2.5$	1 Mark: Correct answer.
(h)	The line $6x - ky = 2$ passes through the point $(3,2)$. Find the value of k.	1
	$(3,2)$ satisfies the equation $6x - ky = 2$ $6 \times 3 - k \times 2 = 2$ $18 - 2k = 2$ $-2k = -16$ $k = 8$	2 Marks: Correct answer. 1 Mark: Substitutes $(3,2)$ into the equation

Question 12		(15 marks)		Marks
(a)		The line $x+2y-4=0$ cuts the x-axis at B and the y-axis at A.		
		Not to scale		
	(i)	What are the coordinates of A and B?		
		Point A is the y-intercept or $x=0$ $0+2y-4=0$ $y=2$ $\therefore A(0,2)$ Point B is the x-intercept or $y=0$ $x+2\times0-4=0$ or $x=4$ $\therefore B(4,0)$		2 Marks: Correct answer. 1 Mark: Finds either A or B.
	(ii)	Find the perpendicular distance from $P(2,6)$ to $x+2y-4=0$.		
		$AP=\left|\dfrac{ax_1+by_1+c}{\sqrt{a^2+b^2}}\right|$ $=\left|\dfrac{2+2\times6-4}{\sqrt{1^2+2^2}}\right|$ $=\left|\dfrac{10}{\sqrt{5}}\right|=\dfrac{10\sqrt{5}}{5}$ $=2\sqrt{5}$ Alternatively Pythagoras theorem $AP^2=2^2+4^2$ $AP=\sqrt{20}=2\sqrt{5}$		
	(iii)	Find the gradient of AP.		
		Gradient $AP=\dfrac{y_2-y_1}{x_2-x_1}=\dfrac{6-2}{2-0}=\dfrac{4}{2}=2$		1 Mark: Correct answer.
	(iv)	Hence or otherwise find the equation of AP.		
		$y-y_1=m(x-x_1)$ $y-2=2(x-0)$ $2x-y+2=0$		1 Mark: Correct answer.
	(v)	What is the distance from A to B?		
		Distance $AB=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$ $=\sqrt{(4-0)^2+(0-2)^2}$ $=\sqrt{20}=2\sqrt{5}$		1 Mark: Correct answer.
	(vi)	Calculate the area of $\triangle APB$.		
		$A=\dfrac{1}{2}bh=\dfrac{1}{2}\times2\sqrt{5}\times2\sqrt{5}=10$ square units		1 Mark: Correct answer.
(b)		Prove $(\sec\theta-\cos\theta)^2=\tan^2\theta-\sin^2\theta$		
		$LHS=(\sec\theta-\cos\theta)^2$ $=\sec^2\theta-2\sec\theta\cos\theta+\cos^2\theta$ $=\sec^2\theta-2+\cos^2\theta$ $=\sec^2\theta-1-(1-\cos^2\theta)$ $=\tan^2\theta-\sin^2\theta=RHS$		2 Marks: Correct answer. 1 Mark: Uses relevant trig identity.
(c)		Solve the equation $2\cos\beta=-\sqrt{3}$ for $0°\le\beta\le360°$		
		$2\cos\beta=-\sqrt{3}$ $\cos\beta=-\dfrac{\sqrt{3}}{2}$ $\beta=150°$ or $210°$		2 Marks: Correct answer. 1 Mark: Calculates one answer or 30°
(d)		Draw neat one third page sketches of the following equations on a separate set of axes. Show clearly the essential features of each graph.		
	(i)	$(x-1)^2+y^2=36$		
		  Circle with centre $(1,0)$ and radius 6 units.		1 Mark: Correct answer.

	(ii)	$y = |x+3|$	
			1 Mark: Correct answer.
(e)		For what values of m is $-4x^2 + 3x + m$ a positive definite.	
		Positive definite $\Delta < 0$ or $b^2 - 4ac < 0$ $\quad 3^2 - 4 \times -4 \times m < 0$ $\quad 9 + 16m < 0$ $\quad 16m < -9$ $\quad m < -\dfrac{9}{16}$	2 Marks: Correct answer. 1 Mark: Substitute into discriminant correctly

Question 13 (15 marks)			Marks
(a)		A vertical tower AB with points B, C and D in a straight line on the ground is shown below. The distance CD is 100 metres. The angle of elevation to the top of the tower from point C is 35° and from point D is 60°.	
	(i)	Show that $AD = \dfrac{100\sin 35'}{\sin 25'}$	
		$\angle CAD = 55' - 30'$ $\qquad = 25'$ In $\triangle ADC$ use sine rule. $\dfrac{AD}{\sin 35'} = \dfrac{100}{\sin 25'}$ $AD = \dfrac{100 \sin 35'}{\sin 25'}$ 	2 Marks: Correct answer. 1 Mark: Calculates $\angle CAD$ or uses the sine rule with one correct value.
	(ii)	Calculate the height of the tower. Answer to the nearest metre.	
		$\sin 60' = \dfrac{AB}{AD}$ $AB = \dfrac{100 \sin 35' \sin 60'}{\sin 25'} = 117.5367488... \approx 118\,\text{m}$ The height of the tower is 118 metres.	2 Marks: Correct answer. 1 Mark: Shows some understanding of the problem.
(b)		A point A is 6 km south-west of a point O and a point B is 9 km on a bearing of 140° from O.	
	(i)	What is the size of $\angle AOB$?	
		$\angle BOS = 180 - 140$ (angle OB with NS) $\qquad = 40$ $\angle AOB = 45 + 40$ $\qquad = 85$	1 Mark: Correct answer.
	(ii)	Find the distance AB correct to one decimal place.	
		$AB^2 = 6^2 + 9^2 - 2 \times 6 \times 9 \times \cos 85'$ $AB^2 = 105.5871798...$ $AB = 10.37242401...$ $AB = 10.4$ The distance AB is about 10.4 km.	2 Marks: Correct answer. 1 Mark: Uses the cosine rule with some correct values
	(iii)	Find the size of $\angle BAO$ correct to the nearest degree.	
		$\cos\theta = \dfrac{(6^2 + 10.4^2 - 9^2)}{(2 \times 6 \times 10.4)}$ $\cos\theta = 0.50608.....$ $\theta = 59.59...$ $\qquad = 60'$	2 Marks: Correct answer. 1 Mark: Uses the cosine rule with some correct values
	(iv)	Find the true bearing of B from A.	
		True bearing of B from A is 105°T $(60 + 45)$	1 Mark: Correct answer.

(c)	Find the value of k if the sum of the roots of $x^2-(k-1)x+2k=0$ is equal to the product of the roots.	2
	$\alpha+\beta=-\dfrac{b}{a}=-\dfrac{-(k-1)}{1}=(k-1)$ $\alpha\beta=\dfrac{c}{a}=\dfrac{2k}{1}=2k$ Now $(k-1)=2k$ $\quad k=-1$	2 Marks: Correct answer. 1 Mark: Correctly calculates the sum or product
(d)	Solve $4^x-9(2^x)+8=0$	2
	$2^x\times4^{x+1}=0.5$ $2^x\times(2^2)^{x+1}=2^{-1}$ $2^{3x+2}=2^{-1}$ $3x+2=-1$ $3x=-3 \text{ or } x=-1$	2 Marks: Correct answer. 1 Mark: Writes the terms to the base 2.
(e)	Evaluate $\sum_{r=1}^{3}2^{1-r}$	1
	$\sum_{r=1}^{3}2^{1-r}=2^0+2^{-1}+2^{-2}$ $\quad=1+\dfrac{1}{2}+\dfrac{1}{4}=1\dfrac{3}{4}$	1 Mark: Correct answer.

Question 14 (15 marks)		Marks
(a)	If α and β are roots of the quadratic equation $2x^2-7x+8=0$, find	
(i)	$\alpha+\beta$	
	$\alpha+\beta=-\dfrac{b}{a}=-\dfrac{-7}{2}=\dfrac{7}{2}$	1 Mark: Correct answer.
(ii)	$\alpha\beta$	
	$\alpha\beta=\dfrac{c}{a}=\dfrac{8}{2}=4$	1 Mark: Correct answer.
(iii)	$\dfrac{1}{\alpha}+\dfrac{1}{\beta}$	
	$\dfrac{1}{\alpha}+\dfrac{1}{\beta}=\dfrac{\alpha+\beta}{\alpha\beta}=\dfrac{3.5}{4}=\dfrac{7}{8}$	1 Mark: Correct answer.
(b)	The function $y=f(x)$ is defined as follows:	
	$f(x)=\begin{cases}2^x & \text{for } x<0 \\ 1 & \text{for } x=0 \\ x^{-1} & \text{for } x>0\end{cases}$	
(i)	Draw a sketch of the graph of $y=f(x)$.	
		2 Marks: Correct answer. 1 Mark: Draws one of the functions correctly.
(ii)	Evaluate $f(-3)+f(0)+f(3)$.	
	$f(-3)+f(0)+f(3)=2^{-3}+1+3^{-1}$ $\quad=\dfrac{1}{8}+1+\dfrac{1}{3}=\dfrac{35}{24}$	1 Mark: Correct answer.
(c)	For the arithmetic sequence 4, 9, 14, 19, ….	
(i)	Write the rule to describe the nth term.	
	$a=4$ and $d=5$ for the sequence 4, 9, 14, 19, …. $T_n=a+(n-1)d$ $\quad=4+(n-1)\times5$ $\quad=5n-1$	1 Mark: Correct answer.
(ii)	What is the 25th term?	
	$T_{25}=5\times25-1$ $\quad=124$	1 Mark: Correct answer.
(iii)	Find the sum of the first 100 terms.	1

	$S_n = \dfrac{n}{2}[2a+(n-1)d]$ $S_{100} = \dfrac{100}{2}[2\times4+(100-1)\times5]$ $\qquad = 25{,}150$		1 Mark: Correct answer.
(d)	Given the parabola $x^2-4x-12=8y$		
	(i)	Write the equation in the form $(x-h)^2=4a(y-k)$	
	$x^2-4x-12=8y$ $(x-2)^2-4-12=8y$ $(x-2)^2=8y+16$ $(x-2)^2=4\times2\times(y+2)$		1 Mark: Correct answer.
	(ii)	Find the coordinates of the vertex and focus.	
	Vertex is (2, -2) Focus is (2, 0)		2 Marks: Correct answer. 1 Mark: Focus or vertex
	(iii)	Find the equation of the axis of symmetry of the parabola.	
	Axis of symmetry is $x=2$		1 Mark: Correct answer.
	(iv)	Draw a neat sketch of the parabola showing the above information.	
			2 Marks: Correct answer. 1 Mark: Basic shape of the curve