BAULKHAM HILLS HIGH SCHOOL
YEAR 11 P3 YEARLY EXAMINATION 2022
MATHEMATICS ADVANCED

MARKING COVER SHEET

FINAL MARK

Name:_____ **Teacher:**_____

		Outcomes						
Qn	**Parts**	**F1**	**T1**	**T2**	**C1**	**E1**	**S1**	**Total**
Multiple Choice		**1,2,5,9**	**4**	**10**	**7**	**6**	**3,8**	
		/4	**/1**	**/1**	**/1**	**/1**	**/2**	**/10**
11		**/2**						**/2**
12					**/2**			**/2**
13				**/2**				**/2**
14		**/2**						**/2**
15					**/3**			**/3**
16						**/3**		**/3**
17						**/3**		**/3**
18					**/3**			**/3**
19			**/3**					**/3**
20		**/2**						**/2**
21				**/3**				**/3**
22		**/2**						**/2**
23				**/3**				**/3**
24					**/3**			**/3**
25			**/3**					**/3**
26			**/4**					**/4**
27							**/4**	**/4**
28					**/3**			**/3**
29						**/4**		**/4**
30							**/6**	**/6**
	Total	**/12**	**/11**	**/9**	**/15**	**/11**	**/12**	**/70**

BLANK PAGE

2022 **PRELIMINARY YEARLY EXAMINATION**

Mathematics Advanced

General Instructions

- Reading time – 10 minutes
- Working time – 2 hours
- Write using black pen
- Calculators approved by NESA may be used
- A reference sheet is provided at the back of this paper
- In Questions 11 – 30, show relevant mathematical reasoning and/or calculations

Total marks: 70

Section I – 10 marks (pages 3 – 8)

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

Section II – 60 marks (pages 9 – 22)

- Attempt Questions 11 – 30
- Allow about 1 hour and 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 page at the end of this booklet for Questions 1 – 10.

---

1 What is the domain and the range of the function $f(x) = \sqrt{4 - x^2}$?

A. Domain: [-2,2], Range: [-2,2]

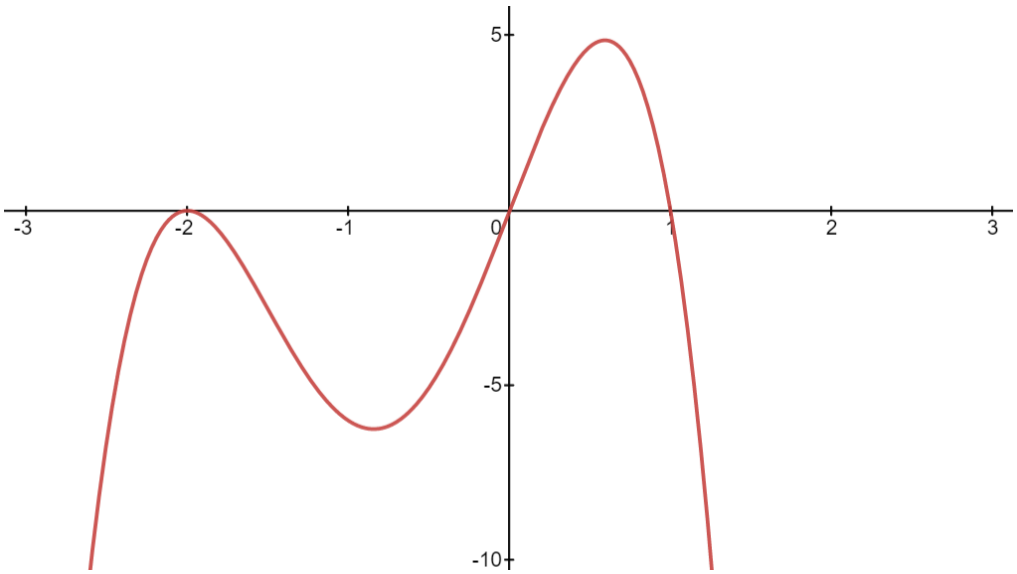
B. Domain: [-2,2], Range: [0,2]

C. Domain: [0,2], Range: [-4,4]

D. Domain: [0,2], Range: [0,4]

---

2 Which of the following is the correct equation for the given graph?



A. $y = -3x(x+1)(x-2)^2$

B. $y = 3x(x+1)(x-2)^2$

C. $y = 3x(1-x)(x+2)^2$

D. $y = 3x(x-1)(x+2)^2$

3 Fifty tickets are sold in a raffle in which there are two prizes. Emily buys 5 tickets. What is the probability that Emily does not win either prize?

A. $1-\frac{5}{50}\times\frac{4}{49}$

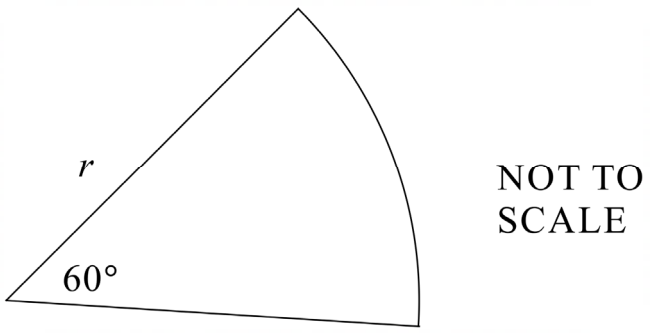
B. $1-\frac{5}{50}-\frac{4}{49}$

C. $\frac{45}{50}+\frac{44}{49}$

D. $\frac{45}{50}\times\frac{44}{49}$

---

4 The sector below has an area of 30π square units.



What is the value of r?

A. $6\sqrt{5}$

B. $\frac{6}{\sqrt{5}}$

C. $5\sqrt{6}$

D. $3\sqrt{2}$

5 Which of the following is the point of intersection of the two lines $3x-4y+6=0$ and $x-y-1=0$?

A. (0,0)

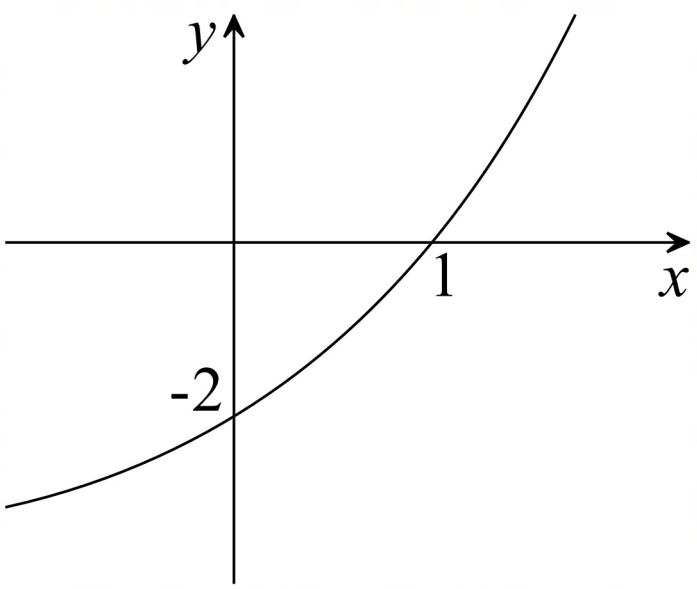
B. (-2,-3)

C. (10,9)

D. (11,10)

---

6 The graph of $y=2^{x+a}+b$ is shown.



What are the values of a and b?

A. $a = 0$ and $b = -2$

B. $a = 0$ and $b = -3$

C. $a = 1$ and $b = -2$

D. $a = 1$ and $b = -4$

---

7 What is the gradient of the normal to the curve $y = x^2 - 4x$ at the point $(-1, 5)$?

A. -6

B. $-\frac{1}{6}$

C. $\frac{1}{6}$

D. 6

---

8 In a class of 30 students, 8 play guitar, 12 play piano and 4 play both. What is the probability that a student selected at random either plays the guitar or plays the piano but not both?

A. $\frac{2}{15}$

B. $\frac{2}{5}$

C. $\frac{8}{15}$

D. $\frac{2}{3}$

---

9 The graph of the function $f(x) = 3x^2 - kx + 2$ is symmetrical about the line $x = \frac{1}{2}$.

What is the range of the function?

A. $y \geq \frac{1}{4}$

B. $y \geq \frac{1}{2}$

C. $y \geq \frac{3}{4}$

D. $y \geq \frac{5}{4}$

10 How many solution(s) does the equation $\cos x\left(\tan x - 1\right) = 0$ have for $-\frac{\pi}{2} \le x \le \frac{\pi}{2}$?

A. 1

B. 2

C. 3

D. 4

End of Section I

Section II

60 marks

Attempt Questions 11–30

Allow about 1 hour and 45 minutes for this section

Instructions

- Answer the questions in the spaces provided. These spaces provide guidance for the expected length of response.
- Your responses should include relevant mathematical reasoning and/or calculations.
- Extra writing paper is available. If you use extra paper, write your name, your teacher's name on the paper and clearly indicate which question you are answering.

Question 11 (2 marks)

Solve $\frac{x}{2} - (3x - 5) = 4$. **2**

……

……

……

……

……

Question 12 (2 marks)

Differentiate $(3x^2 + 1)^5$. **2**

……

……

……

Question 13 (2 marks)

Solve $\sqrt{3}\tan\theta = 1$ for $0 \le \theta \le 2\pi$. **2**

……

……

……

……

……

Question 14 (2 marks)

Solve $|x-3| = 4$. **2**

……

……

……

……

Question 15 (3 marks)

For what values of x is the function $y = x^3 + x^2 - x + 2$ stationary? **3**

……

……

……

……

……

……

……

Question 16 (3 marks)

If $\log_a x = 7.23$ and $\log_a y = 2.19$, find the value of:

(a) $\log_a \frac{x}{y}$ **1**

……

……

……

(b) $\log_a xy^2$ **2**

……

……

……

……

Question 17 (3 marks)

Differentiate $\frac{e^{3x}}{4x}$, expressing your answer in simplest form. **3**

……

……

……

……

……

……

……

……

……

……

Question 18 (3 marks)

Find the equation of the tangent to the curve $y = \sqrt{x}$ at the point where $x = 4$. **3**

……

……

……

……

……

……

……..

……

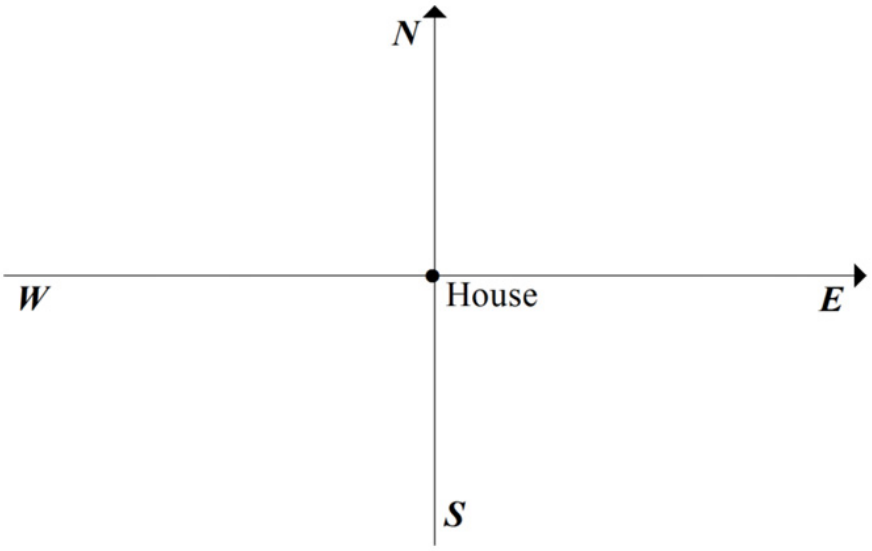
……

……

Question 19 (3 marks)

Asmita walks 270 metres from her house on a bearing of $330°$ to point *B*. She then walks in a straight line 290 metres to a point *C* which is due west of her house.

(a) Clearly indicate the information above on the following diagram. **1**



(b) Calculate the distance of *C* from her house. Give your answer in metres, correct to 1 decimal place. **2**

……

……

……

……

……

……

……

Question 20 (2 marks)

Write $\frac{6}{\sqrt{5}-\sqrt{3}}$ with a rational denominator and simplify. **2**

……

……

……

……

……

Question 21 (3 marks)

Prove $\frac{1+\cot\theta}{\operatorname{cosec}\theta} - \frac{\sec\theta}{\tan\theta+\cot\theta} = \cos\theta$. **3**

……

……

……

……

……

……

……

……

……

……

Question 22 (2 marks)

Solve for x, $3^{1-x} = \dfrac{1}{\sqrt{27}}$. **2**

……

……

……

……

……

Question 23 (3 marks)

Solve $10\sin^2\theta + \cos\theta - 7 = 0$, where $0 \le \theta \le 2\pi$. **3**

……

……

……

……

……

……

……

……

……

……

……

……

……

……

Question 24 (3 marks)

Differentiate, from first principles, $f(x) = 3x^2 - 5$. **3**

……

……

……

……

……

……

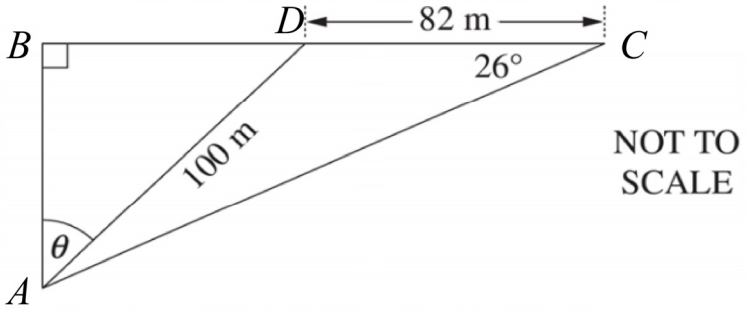
……

……

……

Question 25 (3 marks)

Calculate the value of θ to the nearest minute. **3**



……

……

……

……

……

……

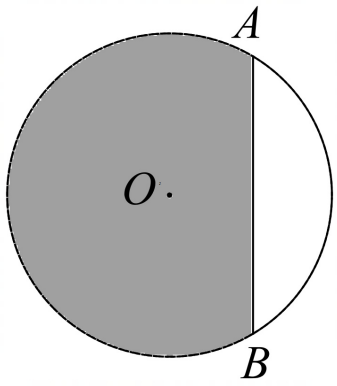
……

……

……

Question 26 (4 marks)

A garden bed is in the shape of a circle with a minor segment removed. The circle has centre, O, and a radius of 5 metres. The length of the straight edge AB is $5\sqrt{3}$ metres.



Find the area of the garden bed, leaving your answer as an exact value. **4**

……

……

……

……

……

……

……

……

……

……

……

……

Question 27 (4 marks)

James has three bags of lollies. In Bag 1, there are three mints and three toffees, in Bag 2 there are three mints and two toffees, and in Bag 3, there are two mints and one toffee.

James selects a bag at random, and then selects a lolly at random.

(a) Find the probability he chooses a mint from Bag 1. **1**

……

……

……

(b) Find the probability he chooses a mint. **2**

……

……

……

……

……

(c) Find the probability that James chose Bag 1, given that he selects a mint. **1**

……

……

……

……

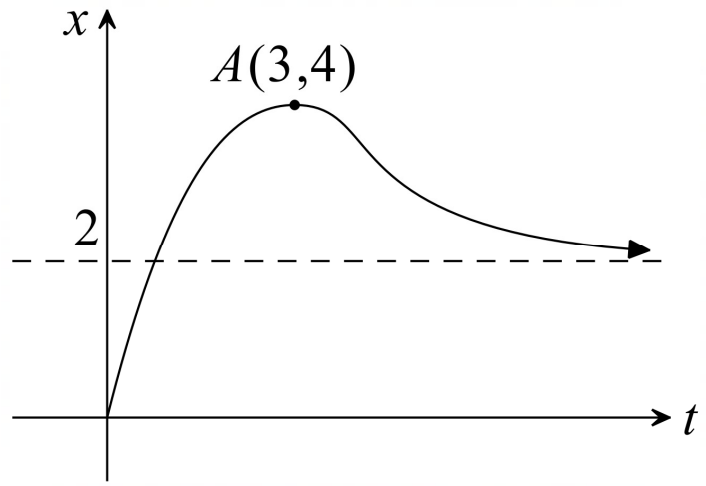
……

……

……

Question 28 (3 marks)

The graph below shows the displacement of a particle over time.



Sketch a possible graph of the particle's velocity, $\frac{dx}{dt}$, on the **axes above**. **3**

Question 29 (4 marks)

A bacteria culture of N bacteria after t minutes is increasing exponentially and can be modelled using such that $N = Ae^{kt}$. Initially, at 9 am, there was 100 bacteria and after 2 minutes there were 400 bacteria.

Calculate, to the nearest minute, the rate at which the bacteria are increasing at 9:10 am. **4**

……

……

……

……

……

……

……

……

……

……

……

……

……

Question 30 (6 marks)

A biased die with six faces is rolled. The discrete random variable X represents the score on the uppermost face. The probability distribution of X is shown in the table below.

x	1	2	3	4	5	6
$P(X = x)$	a	a	a	b	b	0.3

(a) Explain why $3a + 2b = 0.7$. **1**

……

……

(b) Given that $E(X) = 4.2$, find the values of a and b. **3**

……

……

……

……

……

……

……

……

……

……

……

Question 30 continues on page 21

Question 30 (continued)

(c) Find the variance of the distribution. **2**

……

……

……

……

……

……

……

……

……

End of Paper

ADDITIONAL WORKING OUT SPACE:

If you are continuing a question on this page, write "Continued on extra page" at the end of the allocated space for the question you are continuing. Write the question number clearly before continuing/starting a question on this page.

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……..

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

BAULKHAM HILLS HIGH SCHOOL

YEAR 11 P3 YEARLY EXAMINATION 2022

MATHEMATICS ADVANCED

NAME: _____

Teacher: _____

Mathematics
Section I – Multiple Choice

Select the alternative A, B, C or D that best answers the question. Fill in the response oval completely.

Sample: $2 + 4 =$ (A) 2 (B) 6 (C) 8 (D) 9

A ○ B ● C ○ D ○

If you think you have made a mistake, put a cross through the incorrect answer and fill in the new answer.

A ● B ⊗ C ○ D ○

If you change your mind and have crossed out what you consider to be the correct answer, then indicate the correct answer by writing the word *correct* and drawing an arrow as follows.

correct ↓

A ⊗ B ⊗ C ○ D ○

Start Here →

1.	A ○	B ○	C ○	D ○	**6.**	A ○	B ○	C ○	D ○
2.	A ○	B ○	C ○	D ○	**7.**	A ○	B ○	C ○	D ○
3.	A ○	B ○	C ○	D ○	**8.**	A ○	B ○	C ○	D ○
4.	A ○	B ○	C ○	D ○	**9.**	A ○	B ○	C ○	D ○
5.	A ○	B ○	C ○	D ○	**10.**	A ○	B ○	C ○	D ○

BLANK PAGE

YEAR 11 YEARLY EXAMINATION 2022
MATHEMATICS ADVANCED
MARKING GUIDELINES

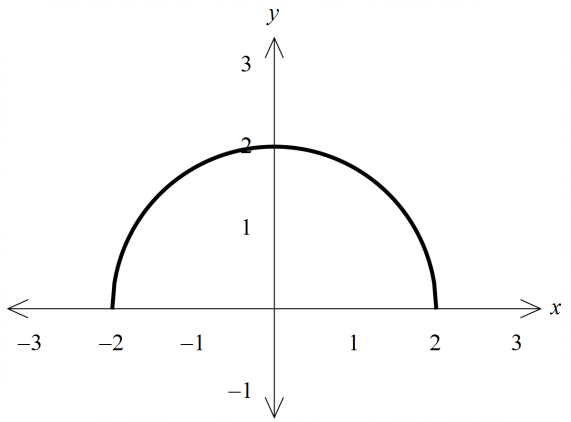
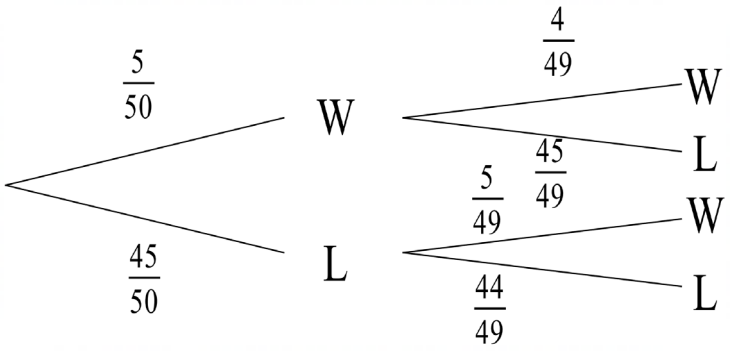
Section I

Multiple-choice Answer Key

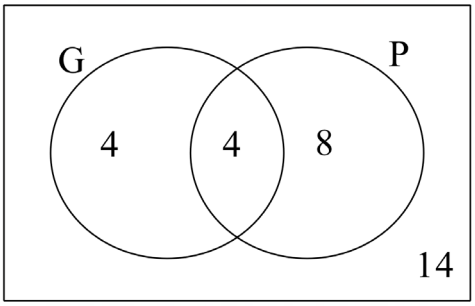
Question	Answer
1	B
2	C
3	D
4	A
5	C

Question	Answer
6	D
7	C
8	B
9	D
10	A

Questions 1 – 10

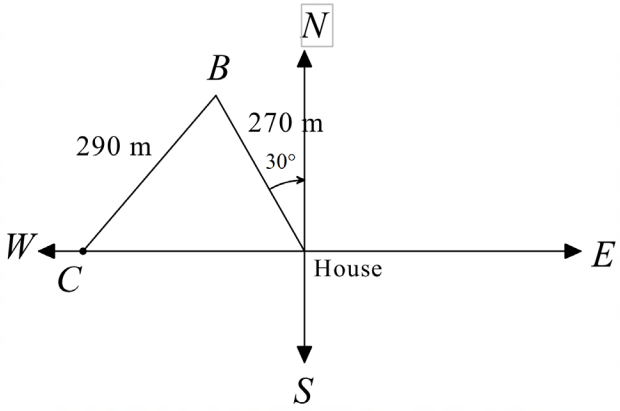
Sample solution	
1.	Semi-circle, radius 2 and $y \geq 0$. Therefore B. 
2.	Zeroes at -2, 0 and 1, therefore C or D. Leading coefficient is negative, as $x \to \infty, y \to -\infty$. Therefore C.
3.	 $P(LL) = \frac{45}{50} \times \frac{44}{49}$ Therefore D.

4.	$A = \frac{1}{2}r^2\theta$ $30\pi = \frac{1}{2}r^2\frac{\pi}{3}$ $180\pi = r^2\pi$ $r^2 = 180$ $r = \sqrt{180}$ $r = 6\sqrt{5}$ Therefore A.
5.	$3x - 4y + 6 = 0$ $3x - 3y - 3 = 0$ Subtracting gives: $-y + 9 = 0$ $y = 9$ Therefore C.
6.	Test A: $y = 2^x - 2$ When $x = 0$, $y = 2^0 - 2$ $y = -1$ (not A) Test B: $y = 2^x - 3$ When $x = 0,\ y = -2$ When $x = 1,\ y = -1$ (not B) Test C: $y = 2^{x+1} - 2$ When $x = 0,\ y = 2 - 2$ $y = 0$ (not C) Test D: $y = 2^{x+1} - 4$ When $x = 0,\ y = -2$ When $x = 1,\ y = 0$ (true) Therefore D.

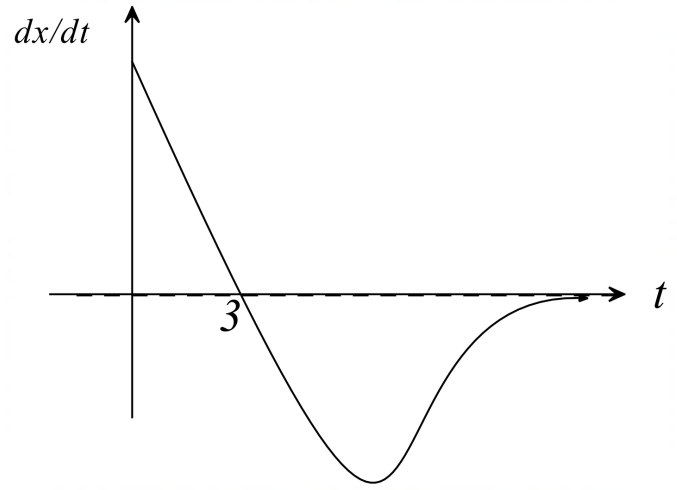
7.	$y' = 2x - 4$ When $x = -1, y' = -6$ $m_{\perp} = \frac{1}{6}$ Therefore C.
8.	 $\mathrm{P}(\text{G or P but not both}) = \frac{4+8}{30}$ $= \frac{2}{5}$ Therefore B.
9.	Axis of symmetry: $\frac{1}{2} = \frac{k}{6}$ $k = 3$ $f\left(\frac{1}{2}\right) = 3 \times \frac{1}{4} - \frac{3}{2} + 2$ $= \frac{5}{4}$ Since concave up, $y \geq \frac{5}{4}$. Therefore D.
10.	$\cos x = 0$ or $\tan x = 1$ $x = -\frac{\pi}{2}, \frac{\pi}{2}$ or $x = \frac{\pi}{4}$ But $\tan\left(-\frac{\pi}{2}\right)$ and $\tan\frac{\pi}{2}$ are undefined. Only 1 solution. Therefore A.

Section II

Sample solution		Suggested marking criteria
11.	$\frac{x}{2}-3x+5=4$ $x-6x+10=8$ $5x=2$ $x=\frac{2}{5}$	• 2 – correct answer • 1 – correctly multiplies by 2 or correctly expands
12.	$\frac{d}{dx}\left(3x^2+1\right)^5=5\left(3x^2+1\right)^4\times 6x$ $=30x\left(3x^2+1\right)^4$	• 2 – correct answer • 1 – obtains $5\left(3x^2+1\right)^4$ or $6x$
13.	$\tan\theta=\frac{1}{\sqrt{3}}$ $1^{st}, 3^{rd}$ quadrants $\theta=\frac{\pi}{6},\pi+\frac{\pi}{6}$ $\theta=\frac{\pi}{6},\frac{7\pi}{6}$	• 2 – correct solution • 1 – obtains $\frac{\pi}{6}$
14.	$x-3=4$ or $x-3=4$ $x=-1$ or $x=7$	• 2 – correct solution • 1 – one correct solution
15.	$\frac{dy}{dx}=3x^2+2x-1$ For function to be stationary, $\frac{dy}{dx}=0$ $3x^2+2x-1=0$ $(3x-1)(x+1)=0$ $x=-1$ or $x=\frac{1}{3}$	• 3 – correct solution • 2 – obtains $3x^2+2x-1=0$ • 1 – correct derivative
16.	a) $\log_a\frac{x}{y}=\log_a x-\log_a y$ $=7.23-2.19$ $=5.04$	• 1 – correct answer
	b) $\log_a xy^2=\log_a x+\log_a y^2$ $=\log_a x+2\log_a y$ $=7.23+2\times 2.19$ $=11.61$	• 2 – correct answer • 1 – expresses as $\log_a x+\log_a y^2$
17.	$\frac{d}{dx}\left(\frac{e^{3x}}{4x}\right)=\frac{4x\times 3e^{3x}-e^{3x}\times 4}{(4x)^2}$ $=\frac{4e^{3x}(3x-1)}{16x^2}$ $=\frac{e^{3x}(3x-1)}{4x^2}$	• 3 – correct solution • 2 – correct derivative • 1 – attempts to use the quotient rule

18.	$y = x^{\frac{1}{2}}$ $\frac{dy}{dx} = \frac{1}{2}x^{-\frac{1}{2}}$ When $x = 4$, $\frac{dy}{dx} = \frac{1}{2\sqrt{4}}$ and $y = \sqrt{4}$ $= \frac{1}{4}$ $= 2$ $y - 2 = \frac{1}{4}(x-4)$ $y = \frac{x}{4} + 1$ or $x - 4y + 4 = 0$	• 3 – correct solution • 2 – finds gradient and y value • 1 – correct derivative
19.	a)  	• 1 – correct solution
	b) $290^2 = x^2 + 270^2 - 2 \times 270 \times x \times \cos 60°$ $x^2 - 270x - 11200 = 0$ $x = \frac{270 \pm \sqrt{270^2 + 4 \times 11200}}{2}$ $x = 306.5, -36.5$ But $x > 0, \therefore$ The distance is 306.5m.	• 2 – correct solution • 1 – attempts to use the quadratic formula OR complete the square to solve the equation
20.	$\frac{6}{\sqrt{5}-\sqrt{3}} \times \frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}+\sqrt{3}} = \frac{6(\sqrt{5}+\sqrt{3})}{5-3}$ $= 3(\sqrt{5}+\sqrt{3})$	• 2 – correct solution • 1 – multiplies by conjugate
21.	$\frac{1+\cot\theta}{\operatorname{cosec}\theta} - \frac{\sec\theta}{\tan\theta+\cot\theta} = \sin\theta\left(1+\frac{\cos\theta}{\sin\theta}\right) - \frac{1}{\cos\theta\left(\frac{\sin\theta}{\cos\theta}+\frac{\cos\theta}{\sin\theta}\right)}$ $= \sin\theta + \cos\theta - \frac{1}{\sin\theta + \frac{\cos^2\theta}{\sin\theta}}$ $= \sin\theta + \cos\theta - \frac{\sin\theta}{\sin^2\theta + \cos^2\theta}$ $= \sin\theta + \cos\theta - \sin\theta$ (since $\sin^2\theta + \cos^2\theta = 1$) $= \cos\theta$	• 3 – correct proof • 2 – expresses either fraction with a denominator of 1 • 1 – makes some progress using $\tan\theta = \frac{\sin\theta}{\cos\theta}$ or $\tan^2\theta + 1 = \sec^2\theta$
22.	$3^{1-x} = (3^3)^{-\frac{1}{2}}$ $3^{1-x} = 3^{-\frac{3}{2}}$ $1 - x = -\frac{3}{2}$ $x = \frac{5}{2}$	• 2 – correct solution • 1 – expresses $\frac{1}{\sqrt{27}}$ as $3^{-\frac{3}{2}}$

23.	$10\sin^2\theta+\cos\theta-7=0$ $10\left(1-\cos^2\theta\right)+\cos\theta-7=0$ $10-10\cos^2\theta+\cos\theta-7=0$ $10\cos^2\theta-\cos\theta-3=0$ $\left(5\cos\theta-3\right)\left(2\cos\theta+1\right)=0$ $\cos\theta=\frac{3}{5}$ OR $\cos\theta=\frac{-1}{2}$ $\theta=0.927...,5.355...$ $\theta=\pi-\frac{\pi}{3},\pi+\frac{\pi}{3}$ $\theta=0.93,5.36$ $\theta=\frac{2\pi}{3},\frac{4\pi}{3}$ $\therefore\theta=0.93,2.09,4.19,5.36$	• 3 - correct solution • 2 – obtains $\cos\theta=\frac{3}{5}$ OR $\cos\theta=\frac{-1}{2}$ • 1 – uses $\sin^2\theta+\cos^2\theta=1$ to obtain a quadratic in $\cos\theta$
24.	$\frac{dy}{dx}=\lim_{h\to0}\frac{f(x+h)-f(x)}{h}$ $=\lim_{h\to0}\frac{3(x+h)^2-5-(3x^2-5)}{h}$ $=\lim_{h\to0}\frac{3x^2+6xh+3h^2-5-3x^2+5}{h}$ $=\lim_{h\to0}\frac{6xh+3h^2}{h}$ $=\lim_{h\to0}6x+3h$ $=6x+0$ $=6x$	• 3 – correct solution • 2 – correctly substitutes in to the formula and simplifies the numerator • 1 – correctly substitutes into the formula
25.	ΔADC, $\frac{\sin\angle DAC}{82}=\frac{\sin26°}{100}$ In $\sin\angle DAC=\frac{82\sin26°}{100}$ $=0.35946...$ $\angle DAC=21°4'$ (158°58'not possible) ΔABC, In $(\theta+\angle DAC)+90°+26°=180°$ (Angle sum of triangle) θ=42°56'	• 3 – correct solution • 2 – calculates $\angle DAC$ • 1 – writes down correct expression using the sine rule
26.	$\cos\angle AOB=\frac{5^2+5^2-(5\sqrt{3})^2}{2\times5\times5}$ $=\frac{-25}{50}$ $\angle AOB=\frac{2\pi}{3}$ $A=\pi\times5^2-\frac{1}{2}\times5^2\left(\frac{2\pi}{3}-\sin\frac{2\pi}{3}\right)$ OR $A=\frac{1}{2}\times5^2\left(\frac{4\pi}{3}-\sin\frac{4\pi}{3}\right)$ $=25\pi-\frac{25\pi}{3}+\frac{25}{2}\times\frac{\sqrt{3}}{2}$ $=\frac{25}{2}\left(\frac{4\pi}{3}+\frac{\sqrt{3}}{2}\right)$ $=\left(\frac{50\pi}{3}+\frac{25\sqrt{3}}{4}\right)\text{m}^2$	• 4 - correct solution • 3 – correct expression for a segment • 2 – obtains $\angle AOB=\frac{2\pi}{3}$ • 1 – correctly substitutes into cosine rule

27.	a) $\text{P(Bag 1 and mint)} = \frac{1}{3} \times \frac{1}{2}$ $= \frac{1}{6}$	• 1 – correct answer
	b) $\text{P(Mint)} = \text{P(Bag 1 and mint)} + \text{P(Bag 2 and mint)} + \text{P(Bag 3 and mint)}$ $= \frac{1}{6} + \frac{1}{3} \times \frac{3}{5} + \frac{1}{3} \times \frac{2}{3}$ $= \frac{53}{90}$	• 2 – correct solution • 1 – finds 2 correct cases and adds OR • 1 – finds all 3 cases correctly
	c) $\text{P(Bag 1}\mid\text{mint)} = \frac{\text{P(Bag 1} \cap \text{mint)}}{\text{P(mint)}}$ $= \frac{\frac{1}{6}}{\frac{53}{90}}$ $= \frac{15}{53}$	• 1 – correct answer
28.		• 3 – correct graph • 2 – two of the following features correct: - basic shape - x intercept at $x = 3$ (not tangent) - asymptote at $y = 0$ (approaching below) • 1 – one of the following features correct: - basic shape - x intercept at $x = 3$ (not tangent) - asymptote at $y = 0$ (approaching below)
29.	$N = Ae^{kt}$ When $t = 2, N = 400$; $400 = 100e^{2k}$ $e^{2k} = 4$ $2k = \ln 4$ $2k = \ln 2^2$ $2k = 2\ln 2$ $k = \ln 2$ $\frac{dN}{dt} = k \times 100e^{kt}$ When $t = 10$, $\frac{dN}{dt} = \ln 2 \times 100 \times e^{10\ln 2}$ = 71000 bacteria/minute (nearest 1000)	• 4 – Correct solution • 3 – Substitutes correct values of A, k and t into $\frac{dN}{dt}$ • 2 – Obtains $k = \ln 2$ • 1 – Obtains $e^{2k} = 4$

Sample solution		Suggested marking criteria
30.	a) Since the sum of the probability distribution must be 1, $3a + 2b + 0.3 = 1$ $3a + 2b = 0.7$	• 1 – correct explanation
	b) $E(X) = a + 2a + 3a + 4b + 5b + 6 \times 0.3$ $4.2 = 6a + 9b + 1.8$ $6a + 9b = 2.4 \quad (1)$ From (a), $3a + 2b = 0.7$ $6a + 4b = 1.4 \quad (2)$ (1) – (2) $5b = 1$ $b = 0.2$ Sub in (1) $3a + 0.4 = 0.7$ $3a = 0.3$ $a = 0.1$ $\therefore a = 0.1$ and $b = 0.2$	• 3 – correct solution • 2 – solves simultaneous equations and finds a or b • 1 – equates expected value to 4.2
	(c) $Var(X) = E(X^2) - \mu^2$ $= 1^2 \times 0.1 + 2^2 \times 0.1 + 3^2 \times 0.1 + 4^2 \times 0.2 + 5^2 \times 0.2 + 6^2 \times 0.3 - (4.2)^2$ $= 0.1 + 0.4 + 0.9 + 3.2 + 5 + 10.8 - (4.2)^2$ $= 20.4 - 17.64$ $= 2.76$	• 2 – correct solution • 1 – finds E $\left(X^2\right)$