<u>Topics Tested</u>: Algebra, Consumer Arithmetic, Geometry, Surds, Indices, Equations, Congruence and Quadrilaterals, Quadratic Equations, Graphing, Coordinate Geometry, Trigonometry (right angled), Measurement, Statistic and Probability, Similarity.

Directions

- Full working should be shown in every question.
  Marks may be deducted for careless or badly arranged work.
- Use black or blue pen only (not pencils) to write your solutions.
- No liquid paper/correction tape is to be used.
  If a correction is to be made, one line is to be ruled through the incorrect answer.
- The diagrams are not to scale.
- Calculators and Mathaids/templates are allowed

(For Teacher's use only)

Marking Grid

Section	**Basic Skills**		**Problem Solving**	
1	A Q1-6	**/9**	A Q7-9	**/6**
2	A Q11-13, BQ1, 3	**/13**	B Q2,4	**/4**
3	B Q5a, c- Q6	**/6**	B Q5b, Q7	**/4**
4	B Q8-10	**/9**	B Q11	**/2**
5			B Q12	**/3**
6			B Q13	**/6**
7			B Q14	**/7**
8	MCQ1-5	**/5**	MCQ6-10	**/5**
Sub-Total		**/42**		**/37**
Total	**/79**			

BAULKHAM HILLS HIGH SCHOOL

YEAR 9 YEARLY MATHEMATICS
November 2014
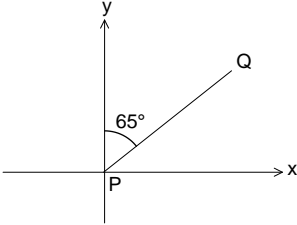
Time allowed: 70 minutes
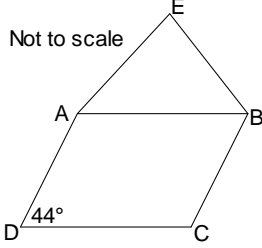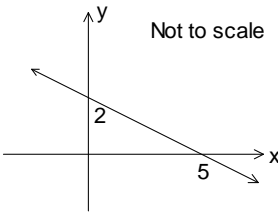
Students Name:_____

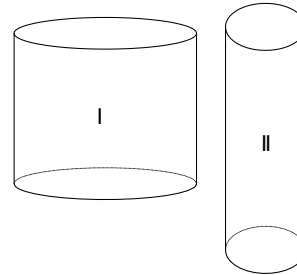## Teacher's Name:_____

DIRECTIONS TO CANDIDATES

- Attempt ALL questions.
- All relevant working must be shown.
- Diagrams are not to scale unless specified.
- NO liquid paper/tape is to be used in the exam
- Write your teacher's name and your name on the cover sheet provided.
- For the multiple choice answers, colour the appropriate answer on the box below.

Multiple Choice Answers									
1	Ⓐ	Ⓑ	Ⓒ	Ⓓ	6	Ⓐ	Ⓑ	Ⓒ	Ⓓ
2	Ⓐ	Ⓑ	Ⓒ	Ⓓ	7	Ⓐ	Ⓑ	Ⓒ	Ⓓ
3	Ⓐ	Ⓑ	Ⓒ	Ⓓ	8	Ⓐ	Ⓑ	Ⓒ	Ⓓ
4	Ⓐ	Ⓑ	Ⓒ	Ⓓ	9	Ⓐ	Ⓑ	Ⓒ	Ⓓ
5	Ⓐ	Ⓑ	Ⓒ	Ⓓ	10	Ⓐ	Ⓑ	Ⓒ	Ⓓ

Topics Tested: *Algebra, Consumer Arithmetic, Geometry, Surds, Indices, Equations, Congruence and Quadrilaterals, Quadratic Equations, Graphing, Coordinate Geometry, Trigonometry (right angled), Measurement, Statistic and Probability, Similarity.*

	Part A		7	The diameter of cylinder I is twice that of cylinder II. The height of cylinder II is twice that of cylinder I. The volume of cylinder I is V_1 The volume of cylinder II is V_2 Then $V_1 : V_2 = ?$	2

Part A

1 Solve $3x^2 - 9x = 0$. **2**

2 What is the true bearing of P from Q? **1**

7 The diameter of cylinder I is twice that of cylinder II. The height of cylinder II is twice that of cylinder I.
The volume of cylinder I is V_1
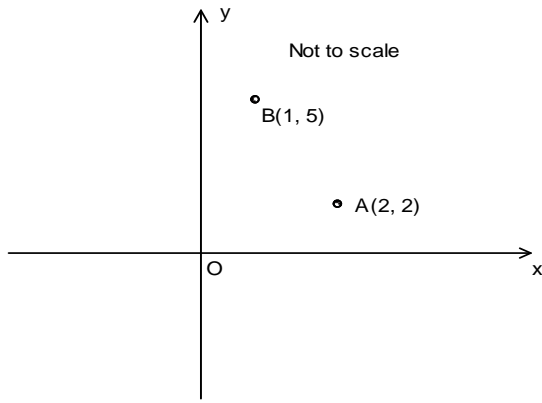The volume of cylinder II is V_2
Then $V_1 : V_2 = ?$ **2**

3 A shoe company offers a discount of 15% off the regular price to its employees. If an employee pays \$120 for a shoe, what is the regular price of the shoe? **1**

8 Simplify $\dfrac{25^{2x}}{125^x}$ **2**

4 $ABCD$ is a rhombus with $\angle ADC = 44°$. ΔABE is an equilateral Δ. Find the size of $\angle EAD$ (no reason required) **1**

Not to scale

9 If $(3x + P)^2 = 9x^2 - Mx + 16$, what are the values of M and P. **2**

5 Write the equation of the line below. **2**

Not to scale

6 Simplify $\dfrac{\sqrt{150} + 2\sqrt{54}}{\sqrt{24}}$ **2**

10	Tax is paid according to this table:	1

Taxable income	Tax payable
$0 to $5200	Nil
$5200 to $17 000	26c for each $1 over $5200
$17 000 to $32 000	$3068 plus 38c for each $1 over $17 000

Calculate the tax payable on a taxable income of $25 540.

11	Show that $\dfrac{1}{\sqrt{3}-2} - \dfrac{1}{\sqrt{3}+2}$ is a rational number.	2

12	For the scores represented in the frequency distribution table, the mean is 6 and the mode is 7.

Score	Frequency
x	11
y	5

(i) Find the values of x and y. | 1

(ii) Find the range of the scores. | 1

13	State whether each of the following is true or false:	4

a) There is only one set of co-interior angles inside any trapezium. _____

b) The diagonals of a parallelogram bisect the angles of the parallelogram at the corner. _____

c) A square is a rhombus but a rhombus is not necessarily a square. _____

d) The diagonals of a rhombus and a rectangle bisect each other at right angle. _____

Part B

1	Solve $3x - \dfrac{2x-5}{2} = 6$	2

2	If $\cos\theta = \dfrac{4}{7}$. What is the value of $\sin\theta$?	2

3	Solve $4x^2 - 6x + 1 = 0$. (leave the answer as the simplest exact form)	2

4	Given that $\left(\sqrt{x^m}\right)^n = x^{2m} \times x^n$	2

Find the expression for m in terms of n.

5	The diagram shows two points A(2,2) and B(1, 5) on the number plane.		6	Draw the graph of the following.(Showing all the important features.)	

5 The diagram shows two points A(2,2) and B(1, 5) on the number plane.

y

Not to scale

B(1, 5)

A(2, 2)

O   x

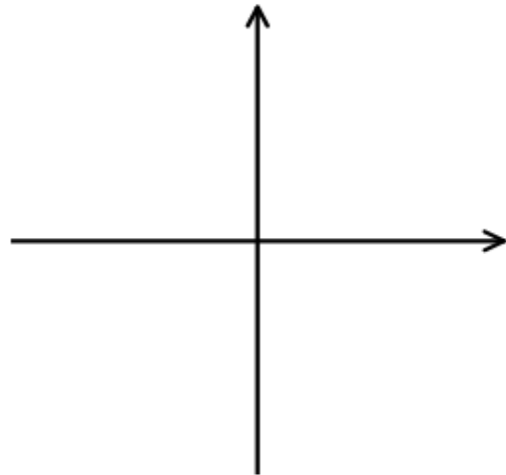a) Find the coordinates of M, the midpoint of AB.   **1**

b) Show that the equation of the perpendicular bisector of AB is $x - 3y + 9 = 0$ **2**
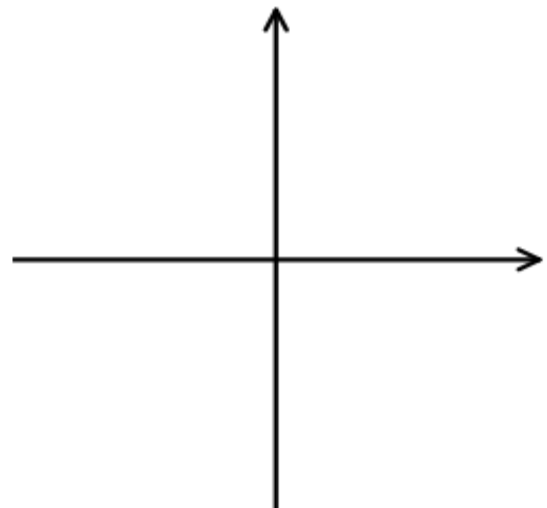
c) Find the coordinates of the point C that lies on the y axis and is equidistant from A and B.   **1**

6 Draw the graph of the following.(Showing all the important features.)
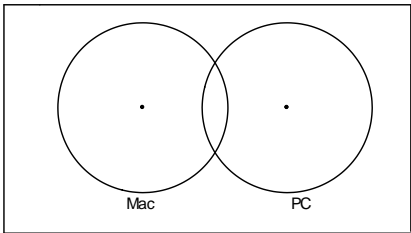
a) $y = -\frac{1}{x} + 2$ **2**


b) $y = 3 - x^2$ **2**

7 Kim's money was invested for one year to earn 12% per annum on half of it, 9% per annum on one third of it, and 6% per annum on the remainder. What is Kim's overall interest rate?   **2**

8 Lucy wants to buy a fridge for $1300, but she does not have enough money at the moment. She signs ' hire purchase' agreement to pay a deposit of $300, then $60 per month for 2 years.

a) How much will Lucy pay for this fridge?

1

b) How much would she have saved by paying the advertised price rather than purchasing on terms?

1

c)   What was the simple interest rate, expressed as a percentage per annum?

2

10 Karen is designing a new watering system for the shrubs in her garden. She knows that each shrub needs 1.2 litres of water per day. To minimise evaporations, Karen designs a system to drip water into a tube that takes the water to the roots.

a) What is the number of litres of water required daily for 13 shrubs?

1

b)   Karen pays 94.22c per kiloliter for water. Calculate the total cost of watering 13 shrubs for one week.

1

c) Karen knows that 1 ml= 15 drops. Find the number of drops that one shrub needs daily.

1

9 a) Complete the following two- table.

1

	Mac	No Mac	Total
PC		16	
No PC	8		20
Total	17		

b) transfer this information into the Venn diagram.

1

Mac   PC

11 Let x be the numerator and y be the denominator of a fraction. The denominator is 5 more than the numerator.
If 2 is subtracted from both numerator and denominator, the denominator is then twice the numerator.
By forming two simultaneous equations find the fraction

2

12	A man is walking in a straight line towards the base of a tower, observes that the angle of elevation to the top of the tower is 30°. After walking 50m, he then observes the angle of elevation is 60°. Find the height h of the tower to the nearest metres.	3
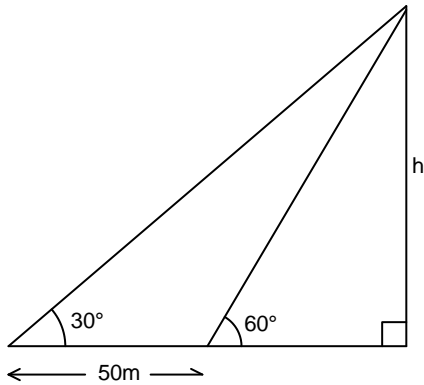
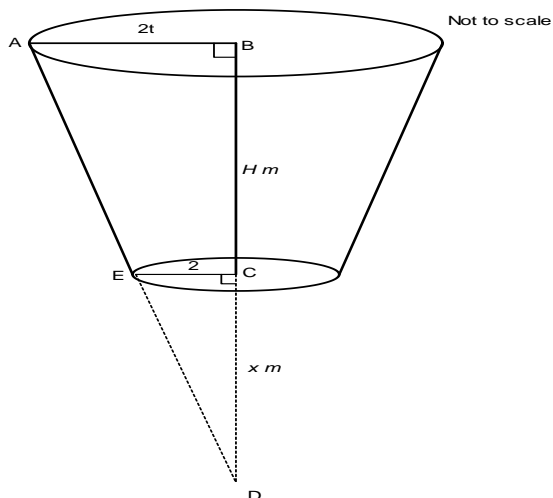| 13	In the diagram $AD \parallel BC$, $\angle BAE = 30^{\circ}$, $\angle ACB = 83^{\circ}$, $\angle ACD = 34^{\circ}$ and $\angle EBC = 138^{\circ}$	

Not to scale
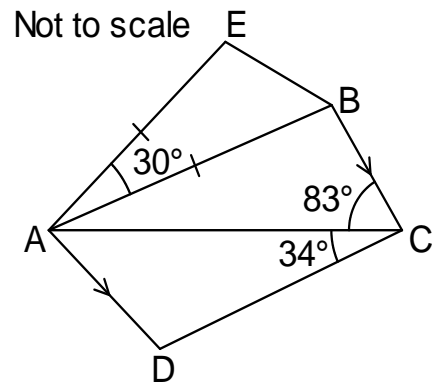
a) Prove that $AB \parallel DC$.   3

b) Prove that $\Delta ABC \equiv \Delta ACD$ 3

| 14 | A truncated cone is to be used as a part of a hopper for a grain harvester. It has a height of H metres. The radius AB is to be t times greater than the bottom radius EC which is 2 metres. | | (ii) Find the volume of the truncated cone in terms of H and t. ($V_{cone} = \pi r^2 h$) | 3 |

Not to scale

(i) If x is the height of the removed section of the original cone. Proving similar triangles show that $x = \dfrac{H}{t-1}$
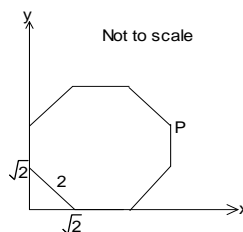
4

<div align="center">

Part C – Multiple Choice
Circle the correct answer.

</div>

| 1 | The gradient of the interval joining (-6, 2) to $(2, y)$ is -1. What is the value of y? |
| | (A) -6 (B) 6   (C) $\frac{-2}{3}$ (D) -8 |

| 2 | The diagram shows a regular octagon of side 2 units. What are the coordinates of P? |

Not to scale

(A) $(3\sqrt{2},\ 2\sqrt{2})$ (B) $(3\sqrt{2}, 2 + \sqrt{2})$
(C) $(2+2\sqrt{2}, 2\sqrt{2})$ (D) $(2 + 2\sqrt{2}, 2 + \sqrt{2})$

| 3 | A series of concentric circles is shown where the length of the radius of the smallest circle is r cm. The radius of each circle increases in length by 3 cm. What is the length of the radius of the nth concentric circle from the common centre? |
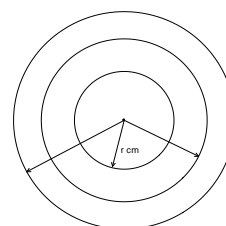
(A) $n(r + 3)$ (B) $3n - r + 1$
(C) $3n + r - 1$ (D) $3n + r - 3$

| 4 | In a rectangle ABCD, arc of a circle are drawn from A, B and C. The arc with centre A has a radius x.
Find an expression for the length of FG.
Not to scale

A x E ... D
8
B F 18 G C

(A) $2 - x$ (B) $2 + x$
(C) $10 - x$ (D) $18 + x$ |

4	In a rectangle ABCD, arc of a circle are drawn from A, B and C. The arc with centre A has a radius x. Find an expression for the length of FG.

4 In a rectangle ABCD, arc of a circle are drawn from A, B and C. The arc with centre A has a radius x.

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Not to scale
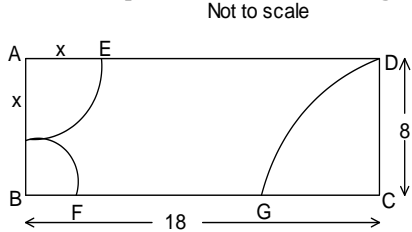
(A) $2 - x$ (B) $2 + x$

(C) $10 - x$ (D) $18 + x$

5 The vertices of the square touch the circumference of the circle which has a radius of 4 cm, as shown in the diagram.
What is the area of the square(in cm^2)

not to scale

4 cm   O
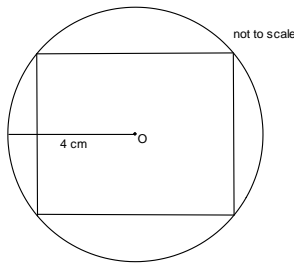
(A) 16   (B) 32   (C) 48   (D) 64

6 Two groups of people were surveyed about their weekly wages. The results are shown in the box and whisker plots.

People under 21 years

People 21 years and older

200   250   300   350   400   450
Weekly wages ($)
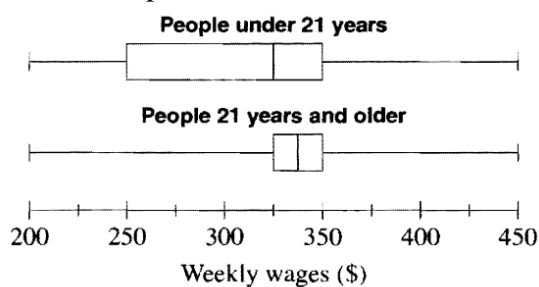
Which of the following statements is true for the people surveyed?

(A) The same percentage of people in each group earned more than $325 per week.

(B) Approximately 75% of people under 21 years earned less than $350 per week.

(C) Approximately 75% of people 21 years and older earned more than $350 per week.

(D) Approximately 50% of people in each group earned between $325 and $350 per week.

7 In a bag there are 8 discs numbered from 2 to 9. A disc is chosen at random. What is the probability that the number on the disc is a perfect square or an even number.

(A) $\frac{1}{2}$ (B) $\frac{1}{8}$ (C) $\frac{5}{8}$ (D) $\frac{3}{4}$

8 The shaded region shown in the figure below is represented by which of the following inequalities?
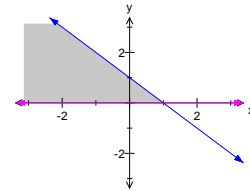
(A) $y + x \geq 1, x \geq 0$ (B) $y + x \leq 1, y \geq 0$

(C) $y + x \leq 1, x \geq 0$ (D) $y + x \leq 1, y \leq 0$

9 The following stem and leaf plot represent the results of the class project.
What is the difference between the median for boys and girls?

Boys			Girls
0 0	5		0
9 8 6 4	4		2 4
8 7 5	3		3 4 7
6	2		6 7
8	1		2 4
	0		7

(A) 3   (B) 13   (C) 11   (D) 10

10 A 1 cm wide border is removed from a rectangular sheet of paper resulting in a rectangle whose area is half that of the original rectangle. If its original perimeter was 28cm, then its original area, square centimetre is

(A) 26   (B) 40   (C) 48   (D) 35

Spare working space

End of Exam