St Leonard's College
Melbourne

Year 10A MATHEMATICS EXAMINATION 2017

Paper 1

Question and Answer Booklet

STUDENT NAME: _____

TIME ALLOWED: Reading time: 15 minutes
Writing time: 60 minutes

INSTRUCTIONS:

No Calculators or notes are permitted.
For questions worth more than 1 mark, appropriate working must be shown in order to gain full marks.
Work needs to be set out in a logical manner.
Answers must be given in simplest form where applicable.
Marks may be deducted for incorrect notation.

STRUCTURE OF BOOKLET / MARKINGSCHEME

Number of questions	Number of questions to be answered	Total marks
12	12	55

1. Six students complete a quiz which has a maximum score of 10. Their results are 2, 4, 4, 5, 5 and 7.

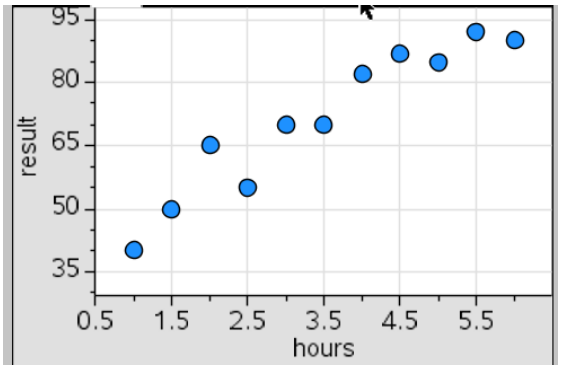
   A seventh student, Kelly, sits the quiz and the mean of all seven results is 5.

a) Determine what score Kelly achieved.

b) By how much, if at all did Kelly's result change the median result for this quiz. Explain your answer.

[2 + 2 = 4 marks]

2. A group of students recorded the number of hours preparation they performed in the last days before an exam and their exam results. The results are shown in the scatterplot below



a) Draw in a line of best fit for this data on the scatterplot above.

b) The gradient of this line should be positive. Explain what this means with regard to number of hours preparation and exam results.

[1 + 1 = 2 marks]

3. Simplify each of the following, writing answers with positive indices where appropriate.

(a) y^{-2}

[1 mark]

(b) $4x^2y^{-3}\times\left(2x^3y\right)^{-3}$

[3 marks]

(c) $\dfrac{(3a^{-\frac{1}{2}}b)^2}{a^{-3}b^3}\times\dfrac{\left(9a^4\right)^{\frac{1}{2}}}{27ab}$

[4 marks]

4. Evaluate the following:

(a) $-7p^0-(7p)^0-3^2$

[2 marks]

(b) $32^{-\frac{2}{5}}$

[2 marks]

(c) $(0.027)^{-\frac{2}{3}}$

[2 marks]

5. Write the following in exponential form, simplifying where possible.

(a) $\sqrt[3]{x^5}$

[1 mark]

(b) $\dfrac{\sqrt{a}}{a}$

[2 marks]

6. Solve for x.

(a) $3^x=\dfrac{1}{9}$

[2 marks]

(b) $6^{2x-6} = 1$

[2 marks]

7. A balloon with a volume (V) of 3000 cm^3 is leaking air at a rate of 18% per minute (t). Write the exponential rule in terms of *V* and *t* that could model this situation.

[1 mark]

8. A virulent strain of algae (N) grows according to the following equation,

$$N = 1000(3)^t$$

where *N* is the number of algae and *t* is the time in hours.

(a) How many algae were there initially?

[1 mark]

(b) After 2 hours, how many algae were there?

[1 mark]

(c) If the number of algae is 81 000, how many hours have the algae been reproducing?

[2 marks]

9. Given the values in the table below,

a	$\sin(a)$	$\cos(a)$	$\tan(a)$
30^0	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{3}}$
45^0	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	1
60^0	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\sqrt{3}$

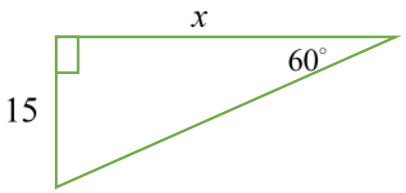
(a) Write down the values of

(i) $\sin(150°)$

(ii) $\cos(225°)$

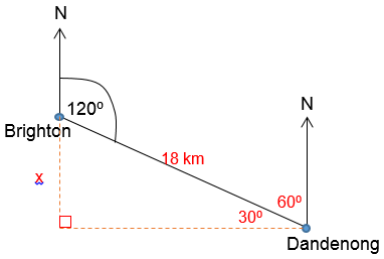
[2 marks]

(b) Find the value of x in this triangle, expressing your answer in simplest form with a rational denominator.



[2 marks]

(c) (i) Find the true bearing of Brighton from Dandenong.



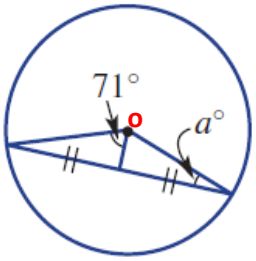
[1 mark]

(ii) If the direct distance from Brighton to Dandenong is 18 km, find how far Dandenong is south of Brighton.

[2 marks]

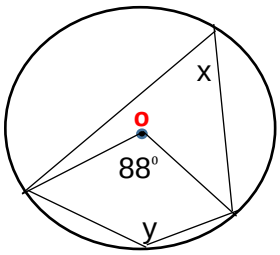
10. Find the value/s of the pronumerals in the diagrams below, where **o** is the centre of the circle.

(a)



[1 mark]

(b)



[2 marks]

11. Consider the parabola with the rule

$$y = x^2 - 2x - 15$$

(a) Write down the coordinates of the y intercept.

[1 mark]

(b) Find the x intercepts.

[2 marks]

(c)

(i) Use the method of completing the square to express in turning point form.

[2 marks]

(ii) Hence state the coordinates of the turning point.

[1 mark]

(d) Sketch the graph labelling all intercepts and turning point.

[2 marks]

12. During practice, a cricketer throws a ball whose height can be modelled by the equation:

$$h = -2t^2 + 4t + 1$$

where h is height in metres and t is time in seconds.

(a) How high off the ground is the ball when it is first thrown?

[1 mark]

(b) How long does it take for the ball to **first** reach a height of 2 metres? ***(give your answer exactly and in simplest form).***

[4 marks]

End of Exam Paper 1