



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.

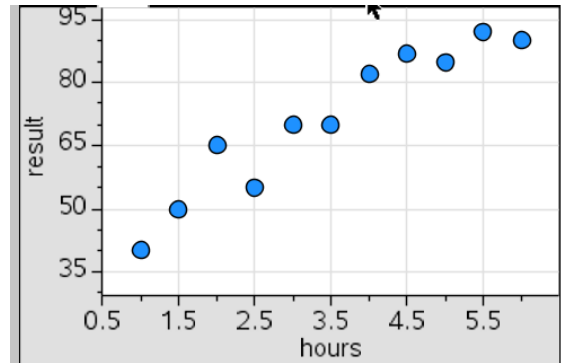
A seventh student, Kelly, sits the quiz and the mean of all seven results is 5.

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

[3 marks]

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

[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) $\frac{\sqrt{a}}{a}$

[2 marks]

6. Solve for x .

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

[2 marks]

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

[2 marks]

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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.

[2 marks]

[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?

9. Given the values in the table below,

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

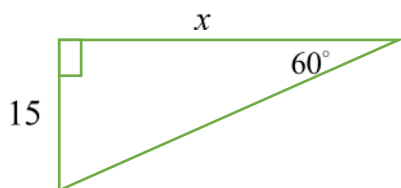
- (a) Write down the values of

(i) $\sin(150^\circ)$

(ii) $\cos(225^\circ)$

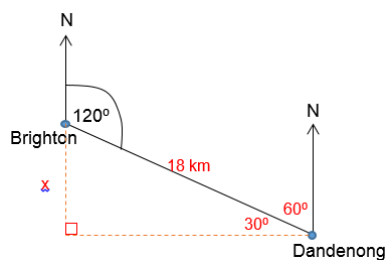
[2 marks]

- (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.



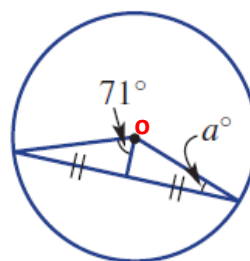
[1 mark]

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

[2 marks]

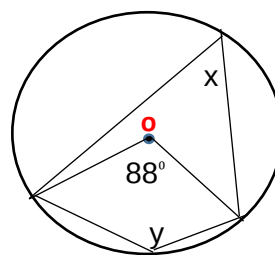
10. Find the value/s of the pronumerals in the diagrams below, where O is the centre of the circle.

- (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]

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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
