Presbyterian Ladies' College

MELBOURNE

VCE
Year 11

2016 Semester 1
Mathematical Methods Unit 1 Examination

PAPER 1

Teacher: **Bell,** **Lewis,** **Smith,** **I Taylor,** **J Taylor** (Please circle)

Full Name: _____ **Form:** _____

READING TIME: (15 minutes in total for Papers 1 + 2)
WRITING TIME: (40 minutes)

Section	Number of Questions	Number of Questions to be answered	Number of Marks
A	8	8	47

No. of Pages: 8

Instructions

1. No calculators are permitted.
2. No notes are permitted.
3. No white out is permitted.

SECTION A: Short Answer: All questions should be answered in the spaces provided.

Students are NOT permitted to bring mobile phones and/or any other unauthorised electronic devices into the examination room.

Inside Front Cover
Work Space

Section A: Short Answer: No calculator allowed.
Exact answers should be given unless instructed otherwise.

1. A line passes through the points A(2, –5) and B(–4, 4)

a Find the gradient of line AB.

(1 mark)

b Find the equation of the line AB and express your answer in the gradient-intercept form.

(2 marks)

c The point D had coordinates (5, 10)
Show that the line BD is perpendicular to AB.

(2 marks)

2. Find the value(s) of k for which the lines $kx + 2y = 3$ and $y = -\frac{7}{3} + \frac{4}{3}x$ have no points of intersection.

(3 marks)

3. When $P(x) = x^3 + 3x^2 + 7x - b$ is divided by $x - 2$ the remainder is 20.
What is the value of b?

(2 marks)

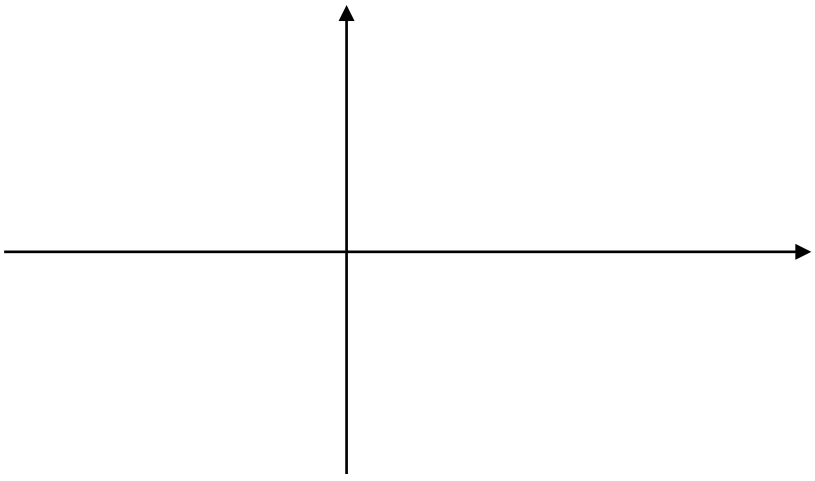
4. **a** Show that $x - 2$ is a factor of $P(x) = x^3 - 2x^2 - x + 2$.

(2 marks)

b Hence **fully** factorise $P(x) = x^3 - 2x^2 - x + 2$.

(2 marks)

c Sketch the graph of $y = x^3 - 2x^2 - x + 2$ showing the coordinates of the intercepts on the axes. You do not need to show the coordinates of the turning points.



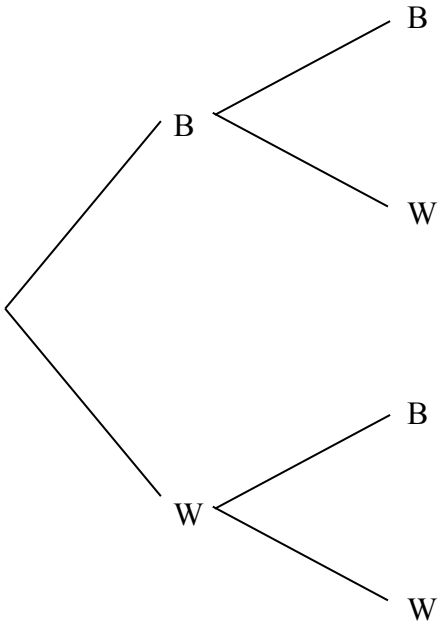
(2 marks)

d Hence find $x^3 - 2x^2 > x - 2$.

(2 marks)

5. There are 15 balls in a bag. Seven balls are blue and 8 balls are white.
Two balls are drawn out **without** replacement.
If B represents 'getting a blue ball' and W represents 'getting a white ball'

a Complete the tree diagram by showing the probability on each branch.
Express probabilities as fractions.



(3 marks)

b What is the probability in simplest form of getting

i two white balls

ii at least one white ball

iii two white balls given at least one ball is white.

(4 marks)

6. A circle has the rule $(x-2)^2 + (y+4)^2 = 16$.

a The rule of this circle can also be expressed in the form $x^2 + y^2 + ax + by + 4 = 0$
Find the values of *a* and *b*.

(2 marks)

b Write down

i the coordinates of the centre of the circle

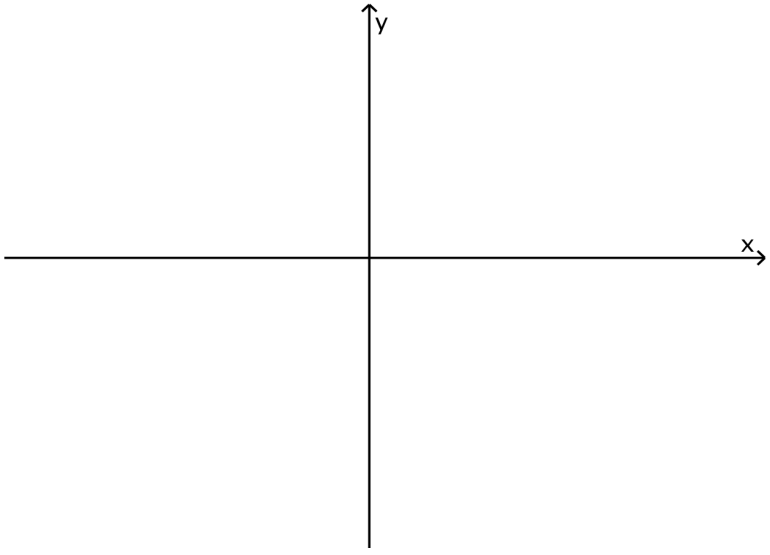
ii the radius of the circle.

(2 marks)

c Find all the axes intercepts for this circle.

(2 marks)

d Sketch the graph of $(x-2)^2 + (y+4)^2 = 16$, marking all key points with their coordinates.



(2 marks)

7. Two hundred and eighty children were asked to indicate their preference for ice-cream flavours. It was found that 160 of the children liked chocolate (**C**), 145 strawberry (**S**) and 50 like both flavours.

a Use this information to complete a probability table (Karnaugh map).

	C	**C'**	
S			
S'			
			280

(3 marks)

b Hence use this table to find the probability that a randomly selected child liked:

i Strawberry flavour **only**.

ii Strawberry **or** chocolate **or** both flavours.

(2 marks)

Examination Continues Next Page
PTO

8. Consider the quadratic equation $(-2p + 1)x^2 + (p - 2)x + 6p = 0$.

a Given that a quadratic equation is in the form $ax^2 + bx + c = 0$, state the values of a, b and c for this quadratic.

(1 mark)

b Find the discriminant in terms of p. Expand and simplify your answer.

(2 marks)

c Write the discriminant as a perfect square.

(1 mark)

d **i** For what values of p will the original quadratic equation have one solution?

(2 marks)

ii For what values of p will the original quadratic equation have two solutions? Hence state the nature (rational/irrational) of these solutions.

(3 marks)

End of Section A