# REVISION 3

**Year 11 Examination**

**Question/Answer Booklet**

# MATHEMATICS METHODS UNITS 1 AND 2

**Section One:**
**Calculator-free**

## Time allowed for this section

Reading time before commencing work: five minutes
Working time for this section: fifty minutes

## Materials required/recommended for this section

***To be provided by the supervisor***

This Question/Answer Booklet
Formula Sheet

***To be provided by the candidate***

Standard items: pens (blue/black preferred), pencils (including coloured), sharpener, correction fluid/tape, eraser, ruler, highlighters

Special items: nil

## Important note to candidates

No other items may be taken into the examination room. It is **your** responsibility to ensure that you do not have any unauthorised notes or other items of a non-personal nature in the examination room. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further.

**Section One: Calculator-free** **35% (51 Marks)**

This section has **nine (9)** questions. Answer **all** questions. Write your answers in the spaces provided.

Working time for this section is 50 minutes.

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**Question 1** **(4 marks)**

A box contains a total of 500 marker and highlighter pens of various colours, as shown in the table. Some of the marker pens are permanent and the rest are non-permanent.

| | Colour | | | |
|---|---|---|---|---|
| Type of pen | Black | Yellow | Pink | Green |
| Permanent marker | 55 | 83 | 40 | 24 |
| Non-permanent marker | 45 | 67 | 24 | 12 |
| Highlighter | 0 | 50 | 46 | 54 |

A pen is selected at random from the box. Determine the probability that it is

(a) a yellow pen. (1 mark)

(b) a marker pen. (1 mark)

(c) a yellow pen or a marker pen. (1 mark)

(d) a green pen, given that it is a highlighter. (1 mark)

**Question 2** **(6 marks)**

(a) Evaluate $\frac{m^{0.5}}{n^2}$ when $m = 4 \times 10^6$ and $n = 5 \times 10^2$, writing your answer without the use of scientific notation. (3 marks)

(b) Determine the value of $x$ when $4^x = 32\sqrt{2}$. (3 marks)

**Question 3** **(7 marks)**

Solve each equation below for $x$.

(a) $\frac{3x}{x-5} = \frac{2}{3}$. (2 marks)

(b) $(x+3)(x-3) = 8x$. (3 marks)

(c) $\sqrt{2}\sin x + 1 = 0,\ 0° \leq x \leq 360°$. (2 marks)

**Question 4** **(6 marks)**

(a) $A$ and $B$ are independent events such that $P(A) = \frac{2}{3}$ and $P(B) = \frac{1}{4}$. Determine

(i) $P(A \cap B)$. (1 mark)

(ii) $P(B|A)$. (1 mark)

(iii) $P(A \cup B)$. (2 marks)

(b) A number is selected at random from the set of positive integers. Event $P$ occurs when the number is odd, event $Q$ occurs when the number is a multiple of five and event $R$ occurs when the number is a perfect square. Determine the smallest number that belongs to the following sets:

(i) $\bar{P} \cap (Q \cup R)$. (1 mark)

(ii) $\bar{P} \cap Q \cap R$. (1 mark)

**Question 5** **(4 marks)**

(a) Expand $(x+1)^4$. (2 marks)

(b) Determine the gradient of the curve $y=(x+1)^4$ at the point $(-2,1)$. (2 marks)

**Question 6** **(5 marks)**

Determine the gradient of the curve $y = x^2 + 4x - 45$ at the point(s) where it crosses the $x$-axis.

**Question 7** **(7 marks)**

(a) Determine the coefficient of the $n^3$ term in the expansion of $(3n-1)^5$. (3 marks)

(b) Consider the equation $x^3 - 7x^2 + 36 = 0$.

(i) Show that $x = 3$ is a solution of the equation. (1 mark)

(ii) Determine all other solutions. (3 marks)

**Question 8** **(4 marks)**

The line segment between the points $A(3, 2)$ and $B(3, -4)$ is the diameter of a circle.

Determine the equation of circle in the form $x^2 + ax + y^2 + by = c$, where $a, b$ and $c$ are constants.

**Question 9** **(8 marks)**

(a) Simplify $(2t - 5\sqrt{t})(2t + 5\sqrt{t})$. (2 marks)

(b) Solve the equation $9^{2x} = \frac{\sqrt{3}}{81}$ for $x$. (3 marks)

(c) Sketch the graph of $y = 2^{(2-x)}$ on the axes below. (3 marks)