

GR 12 MATHS – EXAM MEMOS

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NATIONAL NOV 2014 PAPER 1

► ALGEBRA AND EQUATIONS AND INEQUALITIES [21]

1.1.1 $(x-2)(4+x) = 0$

$$\begin{aligned} \therefore x-2 &= 0 & \text{or} & & 4+x &= 0 \\ \therefore x &= 2 & & & x &= -4 \end{aligned}$$

1.1.2 $3x^2 - 2x - 14 = 0$

$$\therefore x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(3)(-14)}}{2(3)}$$

$$\begin{aligned} \therefore x &= \frac{2 \pm \sqrt{172}}{6} \\ \therefore x &= 2,52 \text{ or } -1,85 \end{aligned}$$



1.1.3 $2^{x+2} + 2^x = 20$
 $\therefore 2^x \cdot 2^2 + 2^x = 20$
 $\therefore 2^x(4 + 1) = 20$
 $+5) \quad \therefore 2^x = 4$
 $\therefore x = 2 \checkmark$

1.2 $x = 2y + 3 \quad \dots \textcircled{1}$

$3x^2 - 5xy = 24 + 16y \quad \dots \textcircled{2}$

$$\begin{aligned} \textcircled{1} \text{ in } \textcircled{2}: & \therefore 3(2y+3)^2 - 5y(2y+3) = 24 + 16y \\ & \therefore 3(4y^2 + 12y + 9) - 10y^2 - 15y - 24 - 16y = 0 \\ & \therefore 12y^2 + 36y + 27 - 10y^2 - 15y - 24 - 16y = 0 \\ & \therefore 2y^2 + 5y + 3 = 0 \\ & \therefore (2y + 3)(y + 1) = 0 \\ & \therefore 2y + 3 = 0 \text{ or } y + 1 = 0 \\ & \therefore 2y = -3 \quad \therefore y = -1 \\ & \therefore y = \begin{cases} -3/2 \\ -1 \end{cases} \end{aligned}$$

$$\begin{aligned} \textcircled{1}: & \text{ For } y = -\frac{3}{2}: x = 2\left(-\frac{3}{2}\right) + 3 = -3 + 3 = 0 \\ & \text{ \& For } y = -1: x = 2(-1) + 3 = -2 + 3 = 1 \\ \therefore & \text{ The solution: } \left(-\frac{3}{2}, -\frac{3}{2}\right) \text{ or } (1, -1) \end{aligned}$$

1.3 $(x-1)(x-2) < 6$

$\therefore x^2 - 3x + 2 - 6 < 0$

$\therefore x^2 - 3x - 4 < 0$

$\therefore (x+1)(x-4) < 0$

The expression:

$$x: \quad \begin{array}{c} + & - & + \\ | & | & | \\ -1 & 0 & 4 \end{array}$$

$$\therefore -1 < x < 4 \checkmark$$

1.4 The roots are real when

$-b-4 \geq 0 \quad \dots \Delta \geq 0$

$\therefore -b \geq 4$

$\therefore b \leq -4 \checkmark$



► PATTERNS AND SEQUENCES [31]

2. $2 + 9 + 16 + \dots$ (to 251 terms)

2.1 $T_n = 2n \checkmark$

2.2 A.S.: $T_{251}?$: $a = 251$; $a = 2$; $d = 7$

$$T_n = a(n-1)d \quad \therefore T_{251} = 2 + (251-1)(7)$$

$$= 1752 \checkmark$$

(OR: It is a linear sequence: $T_n = an + b$)

where $a = 7$ and $b = T_1 = -5$

$\therefore T_n = 7n - 5$

$\therefore T_{251} = 7(251) - 5$

$$= 1752 \checkmark$$

2.3 $\sum_{n=1}^{251} (7n-5) \checkmark \quad \dots \text{if you found } T_n \text{ in 2.2}$

(OR: $\sum_{n=1}^{251} (7n-5) \checkmark$)



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(OR: Find T_n using the A.S. formula)

$T_n? : a = 2 ; d = 7$

$$T_n = a + (n-1)d \quad \therefore T_n = 2 + (n-1)(7)$$

$$= 2 + 7n - 7$$

$$= 7n - 5$$

Then, sigma notation, as above.

2.4 $S_n = \frac{n}{2}(a + T_n)$, where $n = 251$; $a = 2$; $T_n = 1752$

$$\therefore S_{251} = \frac{251}{2}(2 + 1752)$$

$$= 220\,127 \checkmark$$

(OR:

$$S_n = \frac{n}{2}[2a + (n-1)d]$$
, where $n = 251$; $a = 2$; $d = 7$

$$\therefore S_{251} = \frac{251}{2}[2(2) + (251-1)(7)]$$

$$= 220\,127 \checkmark$$

2.5 $2 + 9 + 16 + 25 + 36 + 49 + 64 + 81 + 100 + \dots$

Consider the series: $16 : 49 : 72 : \dots$

$a? : T_n = 1752$ (divisible by 4) ; $a = 16$; $d = 28$

$$a + (n-1)d = T_n \quad \therefore 16 + (n-1)(28) = 1752$$

$$\therefore (n-1)(28) = 1736$$

$$\therefore n-1 = 62$$

$$\therefore n = 63$$

$\therefore 63 \text{ terms } \checkmark$

(OR: By inspection, after 16 every 4th term is divisible by 4. So, imagining T_1 to be inserted at the start, determine the number of groups of 4 terms up to T_{251} .)

$$\text{The number of groups} = \frac{252}{4} \quad \dots 1 + 251$$

$$= 63$$

$\therefore 63 \text{ terms divisible by } 4 \checkmark$

EXAM MEMOS: PAPER 1

Grade 12 2014 Mid Year Exemplar

Lingjun Ying



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