

GR 12 MATHS – EXAM MEMOS

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NATIONAL NOV 2014 PAPER 1

► ALGEBRA AND EQUATIONS AND INEQUALITIES [21]

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

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

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

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

$$\therefore x = \frac{2 \pm \sqrt{172}}{6}$$

$$\therefore x = 2,52 \text{ or } -1,85 <$$



1.1.3 $2^{x+2} + 2^x = 20$

$$\therefore 2^x \cdot 2^2 + 2^x = 20$$

$$\therefore 2^x(4 + 1) = 20$$

$$+5) \quad \therefore 2^x = 14$$

$$\therefore x = 2 <$$

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

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

$$\textcircled{1} \text{ in } \textcircled{2}: \therefore 3(2y+3)^2 - 5y(2y+3) = 24 + 16y$$

$$\therefore 3(4y^2 + 12y + 9) - 10y^2 - 15y - 24 - 16y = 0$$

$$\therefore 12y^2 + 36y + 27 - 10y^2 - 15y - 24 - 16y = 0$$

$$\therefore 2y^2 + 5y + 3 = 0$$

$$\therefore (2y + 3)(y + 1) = 0$$

$$\therefore 2y + 3 = 0 \text{ or } y + 1 = 0$$

$$\therefore 2y = -3 \quad \therefore y = -1$$

$$\therefore y = -1$$

$$\textcircled{1}: \text{ For } y = -\frac{3}{2}: x = 2\left(-\frac{3}{2}\right) + 3 = -3 + 3 = 0$$

$$\& \text{ For } y = -1: x = 2(-1) + 3 = -2 + 3 = 1$$

$$\therefore \text{The solution: } \left(0, -\frac{3}{2}\right) \text{ or } (1, -1) <$$

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

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

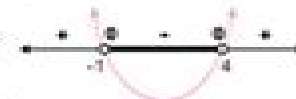
$$\therefore x^2 - 3x - 4 < 0$$

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

The expression:

$x:$

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



1.4 The roots are real when

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

$$\therefore -b \geq 4$$

$$+(-1) \quad \therefore b \leq -4 <$$



► PATTERNS AND SEQUENCES [31]

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

2.1 $T_n = 2n - 1$

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

$$T_n = a(n-1)d \quad \therefore T_{251} = 2 + (251-1)(7) = 1752 <$$

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

$$\text{where } a = 7 \text{ and } b = T_1 = -5$$

$$\therefore T_n = 7n - 5$$

$$\therefore T_{251} = 7(251) - 5 = 1752 <$$

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

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



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 $n = 251$: $a = 2$: $T_n = 1752$

$$\therefore S_{251} = \frac{251}{2}(2 + 1752) = 220\,127 <$$

OR:

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

$$\therefore S_{251} = \frac{251}{2}[2(2) + (251-1)(7)] = 220\,127 <$$

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

Consider the series: $16 : 49 : 100 : \dots$

$$a? : T_n = 1752 \text{ (divisible by 4)} : a = 16 : d = 28$$

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

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

$$\therefore n-1 = 62$$

$$\therefore n = 63$$

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

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} .

$$\text{The number of groups} = \frac{252}{4} \dots 1 + 251 = 63$$

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

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