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GRADE 10

MATHEMATICS PAPER 1

MID YEAR EXAMINATION 2019 MEMORANDUM

MARKS: 75

This memorandum consists of 6 pages

QUESTION 1[9]

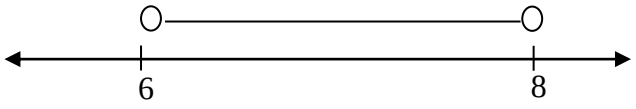
1.1.1	$v = \sqrt{\frac{2E}{m}}$ $= \sqrt{\frac{2\times 132}{12}}$ $= \sqrt{22}$	✓substitution ✓answer (2)
1.1.2	irrational	✓answer (1)
1.1.3	$\sqrt{16} < \sqrt{22} < \sqrt{25}$ $4 < \sqrt{22} < 5$ $\therefore$ it lies between integers 4 and 5	✓ $\sqrt{16} < \sqrt{22} < \sqrt{25}$ ✓answer (2)
1.2	$0,5\dot{2} = 0,5222222222.$ let $x = 0,5\dot{2}$ $\therefore 10x = 5,\dot{2}$ $-------(1)$ $\therefore 100x = 52,\dot{2}$ $-------(2)$ equation (2) - (1) $90x = 47$ $\therefore x = \frac{47}{92}$	✓equation 1 ✓equation 2 ✓ $90x = 47$ ✓answer (4)

QUESTION 2[18]

2.1.1	$a^2 - 2a - ax + 2x = a(a-2) - x(a-2)$ $= (a-2)(a-x)$	✓ $a(a-2)$ ✓ $-x(a-2)$ ✓answer (3)
2.1.2	$\frac{x^3-27}{x^2+3x+9} = \frac{(x-3)(x^2+3x+9)}{x^2+3x+9}$ $= x-3$	✓✓factors ✓answer (3)
2.2.1	$(2y-3)(6y^2+4y-8)$ $= 2y(6y^2+4y-8) - 3(6y^2+4y-8)$ $= 12y^3 + 8y^2 - 16y - 18y^2 - 12y + 24$ $= 12y^3 - 10y^2 - 28y + 24$	✓ $12y^3 + 8y^2 - 16y$ ✓ $-18y^2 - 12y + 24$ ✓answer (3)

2.2.2	$\frac{2^{2n}\times 4^n\times 2}{16^n}=\frac{2^{2n}2^{2n}.2}{2^{4n}}$ $=\frac{2^{4n}2}{2^{4n}}$ $=2$	✓changing 4^n to 2^{2n} ✓changing 16^n to 2^{4n} ✓answer (3)
2.2.3	$\frac{3x^3-7x^2-6x}{x^2-9}\div\frac{3x^2+2x}{3x+9}=\frac{x(3x^2-7x-6)}{(x-3)(x+3)}\div\frac{x(3x+2)}{3(x+3)}$ $=\frac{x(3x+2)(x-3)}{(x-3)(x+3)}\times\frac{3(x+3)}{x(3x+2)}$ $=3$	✓ $x(3x^2-7x-6)$ ✓ $(x-3)(x+3)$ ✓ $x(3x+2)$ ✓ $3(x+3)$ ✓ $(3x+2)(x-3)$ ✓answer (6)

QUESTION 3[17]

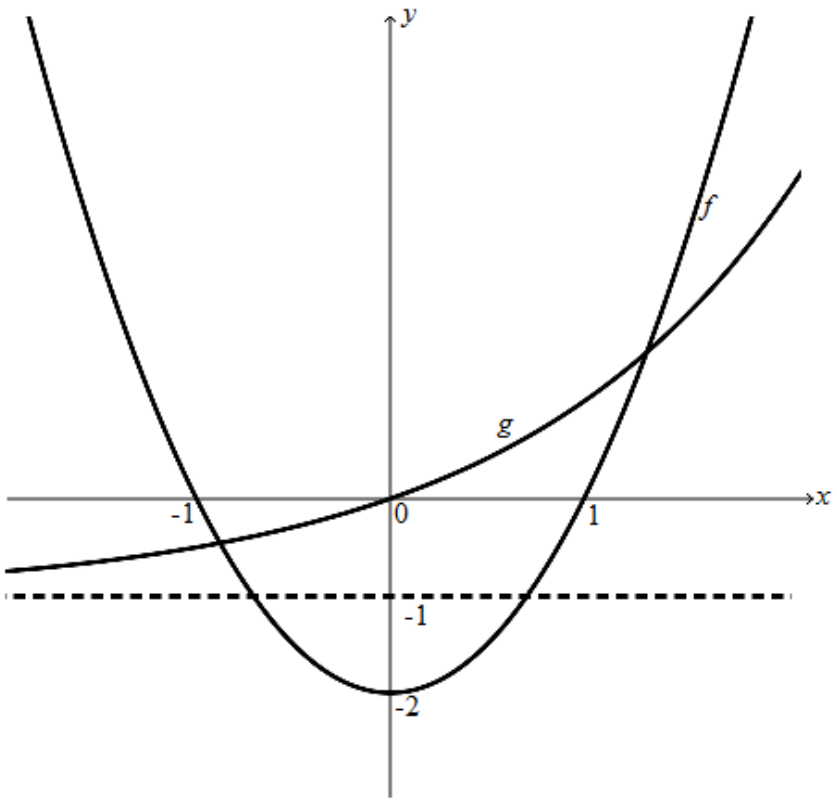
3.1.1	$9x=4-5(2x-3)$ $9x=4-10x+15$ $9x+10x=4+15$ $18x=18$ $\therefore x=1$	✓removing brackets ✓adding like terms ✓answer (3)
3.1.2	$4^x=\frac{1}{256}$ $2^{2x}=\frac{1}{2^8}$ $2^{2x}=2^{-8}$ $\therefore 2x=-8$ $\therefore x=-4$	✓expressing both 4 and 256 as the base of 2 ✓answer (2)
3.2	$10<x+4<12$ $10-4<x<12-4$ $6<x<8$  	✓transposing 4 ✓critical values ✓notation ✓graphical representation (4)

3.3	$A = \pi R^2 - \pi r^2$ $A - \pi R^2 = -\pi r^2$ $\frac{A - \pi R^2}{-\pi} = r^2$ $\therefore r = \sqrt{R^2 - \frac{A}{\pi}}$	✓ r^2 subj. of formula ✓ r subj. of formula NB: DO NOT PANELISE IF WRITE $\pm\sqrt{R^2 - \frac{A}{\pi}}$ (2)
3.4.1	$x^2 - 9y^2 = 99$ $(x-3y)(x+3y) = 99$ $\therefore x + 3y = \frac{99}{x-3y}$	✓factors ✓answer (2)
3.4.2	$x + 3y = \frac{99}{x-3y}$ $x + 3y = \frac{99}{3}$ $x + 3y = 33 ----equation1$ $x - 3y = 3 ----equation2$ $2x = 36$ $\therefore x = 18$ $\therefore 18 + 3y = 33$ $3y = 15$ $\therefore y = 5$	✓substituting 3 ✓ $2x = 36$ ✓ value of x ✓ value of y (4)

QUESTION 4[10]

4.1.1	$-11; -16$	✓✓each term (2)
4.1.2	Pattern is linear, $T_n = dn + c$ To solve for c, substitute $n = 1$ and $T_1 = 4$ $4 = -5(1) + c$ $\therefore c = 9$ $\therefore T_n = -5n + 9$	✓substitution ✓ value of c ✓answer (3)
4.1.3	$T_n = -5n + 9$ $T_{27} = -5(27) + 9$ $= -126$	✓substitution ✓answer (2)
4.1.3	$T_n = -5n + 9$ $-71 = -5n + 9$ $5n = 80$ $\therefore n = 16$	✓substitution ✓answer (2)
4.2	111111X111111	✓answer (1)

QUESTION 5[10]

5.1	$y = -1$	✓ answer (1)
5.2		Parabola ✓x – intercepts ✓Turning point ✓concave up Exponential ✓intercepts at (0;0) ✓asymptote ✓increasing function (6)
5.3	$y > -1$ OR $y \in (-1;\infty)$	✓answer (1)
5.4	reflection about the x axis	✓reflection ✓x axis (2)

QUESTION 6[11]

6.1	$m = \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{-1-4}{3+2}$ $= -1$ $y = mx + c$ $4 = -1(-2) + c$ $\therefore c = 2$ $\therefore y = -x + 2$ $\therefore a = -1 \quad q = 2$	✓formula ✓substitution ✓-1 ✓equation (4)
6.2	$h(x) = p(x)$ $-\frac{2}{x} + 1 = -x + 2$ $-\frac{2}{x} = -x + 1$ $-2 = -x^2 + x$ $x^2 - x - 2 = 0$ $(x-2)(x+1) = 0$ $\therefore x = 2 \text{ or } x = -1$	✓equating ✓standard form ✓factors ✓both values of x (4)
6.3	$-1 \le x < 0 \quad \text{or} \quad x \ge 2$	✓ end points ✓notation for $-1 \le x < 0$ ✓ $x \ge 2$ (3)