GRADE 11. JUNE 2018. MEMO

QUESTION 1:

1.1.1. $x(x-3) = 0$ ✓

$x = 0$ or $x = 3$ ✓

factors answers 2 (2)

1.1.2. $3x^2 = 2x + 3$.

$3x^2 - 2x - 3 = 0$ ✓

std form.

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$\frac{2 \pm \sqrt{40}}{6}$

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

form & subs 4

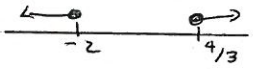
$x = 1,39$ ✓ or $x = -0,72$ ✓

one for each ans (4)

1.1.3. $-3x^2 \leq 2x - 8$

$3x^2 + 2x - 8 \geq 0$ ✓

$(3x - 4)(x + 2) \geq 0$. ✓



std form factors. 4

$x \leq -2$ or $x \geq 4/3$ ✓ ✓

-1 • no or • and ;

$x \in (-\infty; -2]$ or $x \in [4/3; \infty)$

one for each. must have 'or'. (4)

1.1.4. $(4x+1)(x-1) = (x+1)(x+1)$ ✓

$4x^2 - 3x - 1 = x^2 + 2x + 1$

$3x^2 - 5x - 2 = 0$ ✓

$(3x + 1)(x - 2) = 0$ ✓

$x = -1/3$ or $x = 2$ ✓

equating.

std form. 4

factors

answers (4)

1.1.5. $(2\sqrt{2x-1})^2 = (2x-4)^2$

$\Rightarrow 8x - 4 = 4x^2 - 16x + 16$ ✓

$\Rightarrow 4x^2 - 24x + 20 = 0$

$\Rightarrow x^2 - 6x + 5 = 0$ ✓

multiplying.

equation

$(x-5)(x-1) = 0$ ✓

$x = 5$ or $x \neq 1$. ✓ (reject).

factors answers 4 (4)

1.1.6. $3^x \cdot 3^1 + 3^x = 36$

$3^x(3+1) = 36$ ✓

$3^x = 9$ ✓

$x = 2$. ✓

factors simplify 3 answers (3)

1.1.7. $x^3 - x^{3/2} - 2 = 0$

$(x^{3/2} - 2)(x^{3/2} + 1) = 0$ ✓

$x^{3/2} = 2$ or $x^{3/2} = -1$ ✓

$x = (2)^{2/3}$ no solution

$x = 1,59$. ✓

factors equations. no solution answer 4 (4)

1.2. $x = 2y + 3$ ✓

$3(2y+3)^2 - 5(2y+3)y = 16y + 24$ ✓

$3(4y^2 + 12y + 9) - 5y(2y+3) - 16y - 24$

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

$2y^2 + 5y + 3 = 0$ ✓

$(2y+3)(y+1) = 0$ ✓

$y = -3/2$ or $y = -1$ ✓

solve subs.

std form. factors. y values. 6

$x = 0$ or $x = 1$ ✓

x values. (6)

1.3.1. $\frac{(2^2)^{n+1} \cdot (2^3)^{2n-3}}{(2^4)^{2n-1}}$ ✓

$= \frac{2^{2n+2} \cdot 2^{6n-9}}{2^{8n-4}}$ ✓

$= 2^{-3}$ ✓

$= \frac{1}{8}$

prime factors.

remove brackets.

answer 3 (3)

1.3.2. $\frac{1}{8} = 3^{-x+4}$.

$-x+4 = \frac{\log \frac{1}{8}}{\log 3}$ ✓ — logs

$x = 5{,}89$. ✓ — answer (2) — 2

QUESTION 2:

2.1. $(\sqrt{9\times2} + \sqrt{4\times2} - 2\sqrt{25\times2})^2$ ✓ — factors.

$= (3\sqrt{2} + 2\sqrt{2} - 10\sqrt{2})^2$

$= (-5\sqrt{2})^2$ ✓ — adding

$= 50$. ✓ — answer (3) — 3

2.2. $a^{1/2} \cdot a^{2/3} \cdot a^{-1/6}$ ✓ ✓ — root, power

$= a$ ✓ ✓ — answer (3) — 3

2.3. $2x^{1/2}(3x^{1/2} - x^{-1/2})$

$= 6x - 2$. ✓ ✓ — 6x and 2. (2) — 2

3.1... $20 - 4k < 0$ ✓ — $\Delta < 0$.

$-4k < -20$

$k > 5$. ✓ ✓ — answer (2) — 2

3.2. $\Delta = b^2 - 4ac$

$\Delta = (5)^2 - 4(3)(-2)$ ✓ — subs.

$\Delta = 49$.

$\Delta = 7^2$ ✓ — answer — 3

$\therefore$ Roots are real, unequal and rational ✓ ✓ — conclusion (3)

3.3. $(p-1)x^2 + 4x + (p-1) = 0$

$\Delta = b^2 - 4ac$

$\Delta = (4)^2 - 4(p-1)(p-1)$ ✓ — subs

$\Delta = 16 - 4(p^2 - p - p + 1)$

$\Delta = 16 - 4p^2 + 8p - 4$

$\Delta = -4p^2 + 8p + 12$ ✓ — simplify.

$\Delta = 0 \quad -4p^2 + 8p + 12 = 0$ ✓ — $\Delta = 0$

$\therefore p^2 - 2p - 3 = 0$

$\therefore (p-3)(p+1) = 0$ ✓ — factors.

$\therefore p = 3$ or $p = -1$ ✓ ✓ — answers (5) — 5

QUESTION 4:

$-1 \quad -7 \quad -11 \quad -13$

$-6 \quad -4 \quad -2$

$2 \quad 2$

4.1... $2a = 2$ $\quad a = 1$. ✓ — a value

$3(1) + b = -6$ $\quad b = -9$. ✓ — b value

$1 - 9 + c = -1$ $\quad c = 7$ ✓ — c value

$T_n = n^2 - 9n + 7$. ✓ — Equation (4) — 4

4.2. $-1 : 10 : -7 : 17 : -11 : 24 : -13 \ldots$

$-1 : -7 : -11 : -13 \ldots$

and $10 : 17 : 24 : 31 \ldots$

$7 \quad 7 \quad 7$

$T_n = 10 + (n-1)(7)$ ✓

$T_n = 7n + 3$. ✓ ✓

+3

7n

4

$T_{524} \div 2 = T_{262}$.

$T_{262} = 7(262) + 3$ ✓

$= 1837$ ✓

n = 262

answer.

(4)

3

QUESTION 5.

4 , x , 2x+1 , 28

$28 - (2x+1) = 28 - 2x - 1$

x−4 ✓ , x+1 , 27−2x

1st differ.

2nd diff

+5 ✓ , −3x + 26.

$27 - 2x - (x+1) = 27 - 2x - x - 1$

5.1. $+5 = -3x + 26$ ✓

$3x = 21$

$x = 7$ ✓

Equation 4

answer

(4)

Question 6:

6.1.

$$x+2 \overline{)\ -3x - 14} \quad -3$$
$$\underline{+3x \pm 6}$$
$$-8$$

✓ correct + method

$f(x) = \frac{-8}{x+2} - 3$.

−3

−8

(1)

NB.. No mark for $\frac{-8-3(x+2)}{x+2}$

6.2. $x = -2$ ✓

$y = -3$ ✓

equation

equation 2

(2)

6.3. $x = 0$ $y = -7$. ✓

y value.

$y = 0$: $0 = \frac{-8}{x+2} - 3$

$3(x+2) = -8$ ✓

$3x = -8 - 6$

$x = \frac{-14}{3}$. ✓

equation 3

x value. (3)

6.4. on answer sheet. (1)

6.5. $y = x + k$ $(-2; -3)$

$-3 = -2 + k$ $k = -1$ ✓

1

answer (1)

6.6. $y = x - 1$.

$A(-4;6)$.

$y = -4 - 1$ $\quad 6 = x - 1$

$y = -5$ $\quad 7 = x$

$A'(7;-5)$.

2

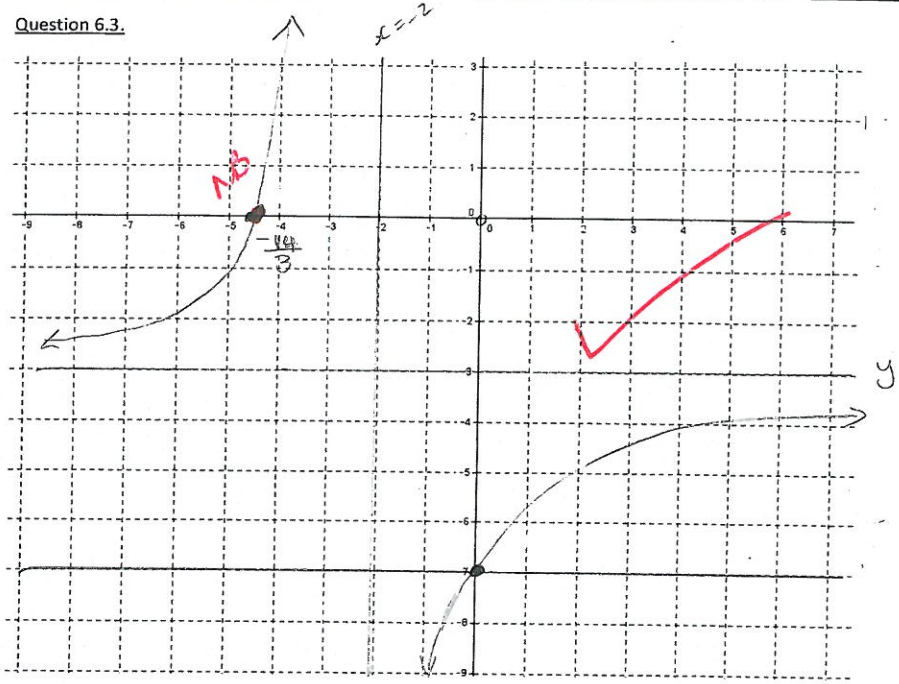
x value

y value.

4

GRADE 11 ANSWER SHEET PAPER 1. NAME: MEMO.

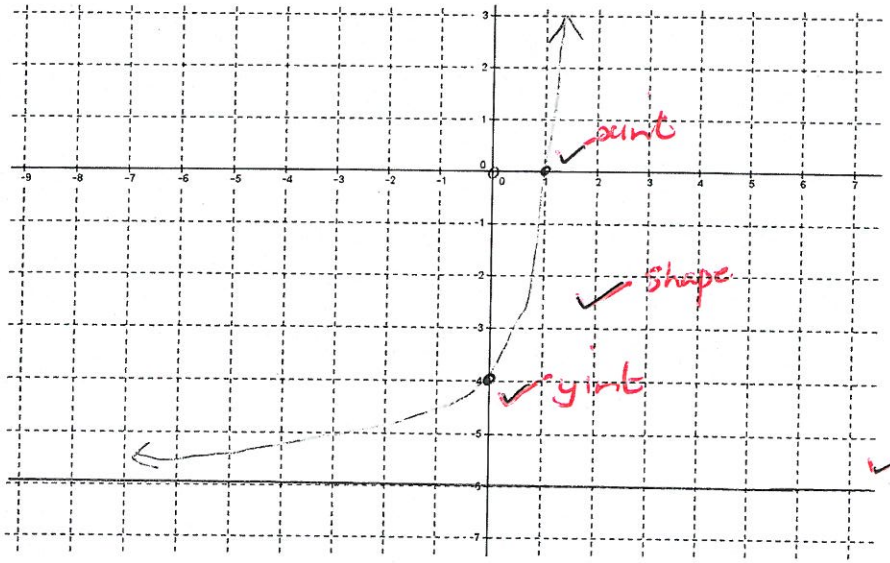
Question 6.3.



1

1

Question 7.1.



[x int
y int
asym
shape]

4

4

QUESTION 7:

7.1. on answer sheet. (4)

7.2. increasing ✓ — answer (1) 1

7.3. $y \in (-6; \infty)$ or $y > -6$. ✓ — answer (1) 1

7.4. $y = 2 \cdot 3^{x-4} - 11$ ✓ ✓ — $x-4$, -11 (2) 2

QUESTION 8:

8.1. $f(x) = a(x-p)^2 + q$.

$y = a(x-1)^2 + 9$ ✓

$(-2;0)$ $0 = a(-2-1)^2 + 9$ ✓

$-9 = a(-3)^2 \Rightarrow a = -1$ ✓

$y = -1(x^2 - 2x + 1) + 9$ ✓

$y = -x^2 + 2x + 8$ ✓

sub s T.P.

sub s $(-2;0)$

$x^2 - 2x + 1$ 4

(4)

8.2. simult. equation.

$-x^2 + 2x + 8 = \frac{1}{2}x + 1$ ✓

$-x^2 + 2x + 8 - \frac{1}{2}x - 1 = 0$

$-x^2 + \frac{3}{2}x + 7 = 0$

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

$2x^2 - 3x - 14 = 0$ ✓

$(2x - 7)(x + 2) = 0$ ✓

$x = 7/2$ or $x \neq -2$

$y =$

$B(\frac{7}{2}; \frac{11}{4})$ ✓ ✓ 3,5 2,75

equation.

std form 5

factors

x values.

y values

(5)

8.3. $f(x) \geq g(x)$

$x \in [-2; 7/2]$

or $-2 \leq x \leq 7/2$ ✓

answer (1) 1

5

8.4. $x = -2 \quad y = 0$

$x = 1 \quad y = 9$

grad $= \frac{0 - 9}{-2 - 1} = 3$ ✓

2

gradient (2)

8.5. $y = 0$ is x axis.

$-y = -x^2 + 2x + 8$ ✓

$\Rightarrow y = x^2 - 2x - 8$ ✓

changing y

answer 2

(2)

8.6. $-1 < -k - 3 < 0$

$2 < -k < 3$

$-2 > k > -3$ ✓ ✓

answer 2

(2)

8.1. (S2) $\frac{x_c + (-2)}{2} = 1$ AOS $x = 1$

$\times 2$: $x_c - 2 = 2$

$x_c = 4$

$\therefore y = a(x+2)(x-4)$ ✓

Sub $T(1;9)$

$9 = a(1+2)(1-4)$ ✓

$9 = -9a$

$-1 = a$ ✓

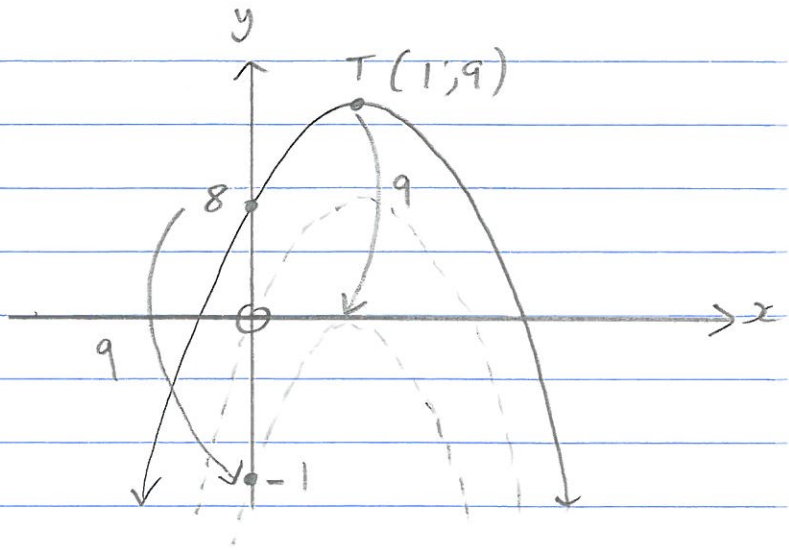
$\therefore y = -1(x+2)(x-4)$

$= -(x^2 - 2x - 8)$ ✓

$= -x^2 + 2x + 8$

8.6. explanation →

8.6. $y = -x^2 + 2x + 8$



y int: $y = 8$

$-x^2 + 2x = k + 3$ $\quad 2 \neq + \quad \mathbb{R}$ roots

$-x^2 + 2x - k - 3 = 0$ $\quad 2 \neq + \quad \mathbb{R}$ roots

$-x^2 + 2x \underbrace{- k - 3}_{\text{y int}} = y$ $\quad 2 \neq + \quad \mathbb{R}$ x ints

$\therefore \uparrow\downarrow$

$$-1 < \text{y int} < 0$$
$$-1 < -k-3 < 0$$
$$2 < -k < 3$$
$$-2 > k > -3$$