

GRADE 11.

JUNE 2018.

QUESTION 1:

1.1.1. $x(x-3) = 0$ ✓

$x = 0$ or $x = 3$ ✓

factors
answers

(2)

1.1.2. $3x^2 = 2x + 3$ ✓

$3x^2 - 2x - 3 = 0$ ✓

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

std form.

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

form & subs

$x = 1.39$ or $x = -0.72$ ✓

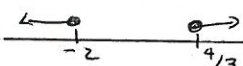
one for each ans

(4)

1.1.3. $-3x^2 \leq 2x - 8$ ✓

$3x^2 + 2x - 8 \geq 0$ ✓

$(3x - 4)(x + 2) \geq 0$ ✓



$x \leq -2$ or $x \geq \frac{4}{3}$ ✓

$x \in (-\infty; -2] \text{ or } x \in [\frac{4}{3}; \infty)$

one for each.
must have 'or'.

(4)

1.1.4. $(4x+1)(x-1) = (x+1)(x+1)$ ✓

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

$3x^2 - 5x - 2 = 0$ ✓

$(3x+1)(x-2) = 0$ ✓

$x = -\frac{1}{3}$ or $x = 2$ ✓

equating.

std form.

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 $x = 1$ ✓
(reject).

factors
answers

(4)

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

$3^x(3+1) = 36$

$3^x = 9$ ✓

$x = 2$ ✓

factors
simplify

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 $x^{3/2} = -1$ ✓

$x = (2)^{2/3}$

$x = 1.59$ ✓

no solution

factors

equations.

no solution

answer

(4)

1.2. $x = 2y + 3$ ✓

$3(2y+3)^2 - 5(2y+3)y = 16y + 24$

$3(4y^2 + 12y + 9) - 5y(2y+3) - 16y - 24 = 0$

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

$2y^2 + 5y + 3 = 0$ ✓

$(2y+3)(y+1) = 0$ ✓

$y = -\frac{3}{2}$ or $y = -1$ ✓

solve

subs.

std form.

factors.

y values.

(6)

$x = 0$ or $x = 1$ ✓

x values.

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

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

$= \frac{2^{8n-7}}{2^{8n-4}}$

$= 2^{-3}$ ✓

$= \frac{1}{8}$ ✓

prime factors.

remove brackets.

answer

(3)

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

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

$$x = 5.89$$

logs

answer
(2)

QUESTION 2:

$$\begin{aligned} 2.1. & (\sqrt{9 \times 2} + \sqrt{4 \times 2} - 2\sqrt{25 \times 2})^2 \\ &= (3\sqrt{2} + 2\sqrt{2} - 10\sqrt{2})^2 \\ &= (-5\sqrt{2})^2 \\ &= 50 \end{aligned}$$

factors.

adding
answer
(3)

$$2.2. \quad a^{1/2}, a^{2/3}, a^{-1/6}$$

$$= a$$

root

power
answer
(3)

$$\begin{aligned} 2.3. & 2x^{1/2}(3x^{1/2} - x^{-1/2}) \\ &= 6x - 2 \end{aligned}$$

6x and 2.
(2)

3.1...

$$20 - 4k < 0$$

$$-4k < -20$$

$$k > 5$$

$$\Delta < 0$$

answer
(2)

3.2.

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

$$\Delta = (5)^2 - 4(3)(-2)$$

$$\Delta = 49$$

$$\Delta = 7^2$$

∴ Roots are real, unequal
and rational

subs.

Answer

Conclusion
(3)

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

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

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

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

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

$$\Delta = -4p^2 + 8p + 12$$

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

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

$$(p-3)(p+1) = 0$$

$$p = 3 \text{ or } p = -1$$

subs.

simplify
 $\Delta = 0$

factors.
answers
(5)

QUESTION 4:

$$\begin{array}{cccc} -1 & -7 & -11 & -13 \\ & \swarrow & \swarrow & \swarrow \\ & -6 & -4 & -2 \\ & & \swarrow & \swarrow \\ & & 2 & 2 \end{array}$$

$$4.1. \quad 2a = 2$$

$$a = 1$$

$$3(1) + b = -6$$

$$b = -9$$

$$1 - 9 + c = -1$$

$$c = 7$$

$$T_n = n^2 - 9n + 7$$

a value
b value
c value
Equation
(4)

4.2. $-1; 10; -7; 17; -11; 24; -13...$

$-1; -7; -11; -13...$

and $10; 17; 24; 31...$

$\begin{matrix} \swarrow & \swarrow & \swarrow \\ 7 & 7 & 7 \end{matrix}$

$$T_n = 10 + (n-1)(7)$$

$$T_n = 7n + 3$$

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

$$T_{262} = 7(262) + 3$$

$$= 1837$$

+ 3

T_n

$n = 262$

answer

(4)

QUESTION 5.

$4, x, 2x+1, 28$

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

$$x-4, x+1, 27-2x$$

$$+5, -3x+26$$

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

$$5.1. +5 = -3x+26$$

$$3x = 21$$

$$x = 7$$

1st diff.

2nd diff

Equation

answer

(4)

Question 6:

6.1. -3

$$x+2 \overline{) -3x-14}$$

$$\underline{-3x-6}$$

$$-8$$

✓ correct + method

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

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

$$6.2. \begin{matrix} x = -2 \\ y = -3 \end{matrix}$$

equation
equation (2)

$$6.3. \begin{matrix} x = 0 \\ y = -7 \end{matrix}$$

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

$$3(x+2) = -8$$

$$3x = -8-6$$

$$x = \frac{-14}{3}$$

y value

equation

x value (3)

6.4. on answer sheet

$$6.5. y = x+k \quad (-2, -3)$$

$$-3 = -2+k$$

$$k = -1$$

answer (1)

6.6. $y = x - 1$

$A(-4; 6)$

$y = -4 - 1$

$6 = x - 1$

$y = -5$

$7 = x$

$A'(7; -5)$

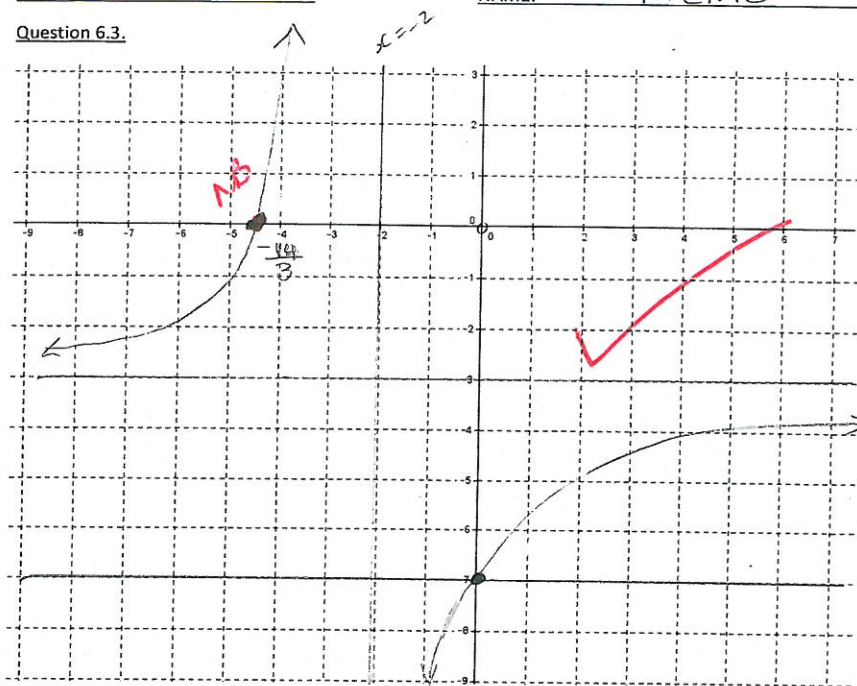
2

x value
y value.

GRADE 11 ANSWER SHEET PAPER 1.

NAME: MEMO.

Question 6.3.



$y = -3$

1

Question 7.1.



x int.
y int.
asym
shape

4

$y = -6$

4

4

QUESTION 7:

7.1. on answer sheet,

7.2. increasing ✓

(4)

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. $f(x) = a(x-p)^2 + q$
 $y = a(x-1)^2 + 9$
 $(-2; 0) \Rightarrow 0 = a(-2-1)^2 + 9$
 $-9 = a(-3)^2 \Rightarrow a = -1$
 $y = -1(x^2 - 2x + 1) + 9$
 $y = -x^2 + 2x + 8$ ✓

subs T.P.
subs $(-2; 0)$

$x^2 - 2x + 1$ 4
(4)

8.2. Simult. equation
 $-x^2 + 2x + 8 = \frac{1}{2}x + 1$ ✓
 $-x^2 + 2x + 8 - \frac{1}{2}x - 1 = 0$
 $-x^2 + \frac{3}{2}x + 7 = 0$
 $-2x^2 + 3x + 14 = 0$
 $2x^2 - 3x - 14 = 0$ ✓
 $(2x-7)(x+2) = 0$ ✓
 $x = \frac{7}{2}$ or $x = -2$
 $y =$
 $B(\frac{7}{2}; \frac{11}{4})$ ✓
3.5
2.75

equation

std form 5
factors
 x values
 y values

(5)

8.3. $f(x) \geq g(x)$
 $x \in [-2; \frac{1}{2}]$
or $-2 \leq x \leq \frac{1}{2}$ ✓

answer (1) 5

8.4. $x = -2$
 $x = 1$
 $y = 0$
 $y = 9$
grad = $\frac{0-9}{-2-1} = 3$ ✓

gradient (2) 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. $-1 < -k-3 < 0$
 $2 < -k < 3$
 $-2 > k > -3$ ✓

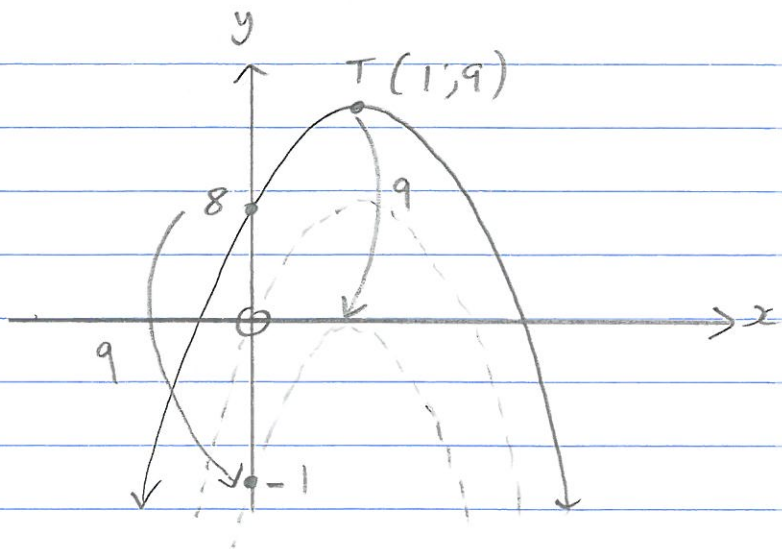
answer (2) 2

8.1. (5R) $\frac{x_c + (-2)}{2} = 1$ AOS $x = 1$
 $x_2: x_c - 2 = 2$
 $x_c = 4$
 $\therefore y = a(x+2)(x-4)$ ✓
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 $\rightarrow$

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

y-int: $y = 8$



$$\begin{array}{ll}
 -x^2 + 2x = k + 3 & 2 \neq + \mathbb{R} \text{ roots} \\
 -x^2 + 2x - k - 3 = 0 & 2 \neq + \mathbb{R} \text{ roots} \\
 -x^2 + 2x - \underbrace{k - 3}_{y\text{-int}} = y & 2 \neq + \mathbb{R} \text{ x-ints}
 \end{array}$$

$y\text{-int} \therefore \uparrow \downarrow$

$$-1 < y_{\text{int}} < 0$$

$$-1 < -k - 3 < 0$$

$$2 < -k < 3$$

$$-2 > k > -3$$