Grade 11 June Exam P1

Question 1

a) $(x+2)^2 = 1$

$x+2 = \pm 1$

$x = -1 \quad x = -3$

- method
- $x = -1$
- $x = -3$ (3)

2) $2x^2 - 11x - 4 = 0$

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

$= \frac{11 \pm \sqrt{11^2 - 4(2)(-4)}}{2(2)}$

$= \frac{11 \pm \sqrt{153}}{4}$

$= 5,84 \quad = -0,34$

- method
- $\frac{11 \pm \sqrt{153}}{4}$
- $x = 5,84$
- $x = -0,34$

(4)

* If learners give $x =$ or $x =$ 2/4

3) $x^2 > \frac{1}{4}$

CV $x = -\frac{1}{2}$; $\frac{1}{2}$

$x < -\frac{1}{2} \quad x > \frac{1}{2}$

- CV
- method
- $x < -\frac{1}{2}$
- $x > \frac{1}{2}$

(4)

4) $x + 5 = \sqrt{3 - 3x}$

$x^2 + 10x + 25 = 3 - 3x$

$x^2 + 13x + 22 = 0$

$x = -11 \quad x = -2$

Test

$\therefore x = -2$

- $(\ )^2$ both sides
- Std form
- factors
- Conclusion (4)

b1) $y^2 - 9x^2$

$(y-3x)(y+3x)$

- Answer (1)

2) $y + 3x = 2$

$y = -3x + 2$ ——— ①

$y^2 - 9x^2 = 16$ ——— ②

- change (1)
- Subst (1)
- method
- x
- y

(5)

$(y-3x)(y+3x) = 16$

$(-3x+2-3x)(-3x+2+3x) = 16$

$2(-6x+2) = 16$

$-6x + 2 = 8$

$-6x = 6$

$x = -1$

$y = 5$

Question 2

a1) $\left(\frac{a^3}{2}\right)^2$

$= \frac{a^6}{4}$

- answer (1)

2) $\frac{2^{x-3} - 3 \cdot 2^{x-1}}{2^{x-2}}$

$= \frac{2^x(2^{-3} - 3 \cdot 2^{-1})}{2^x \cdot 2^{-2}}$

$= -\frac{11}{2}$

- each exp own base
- HCF
- Simplify
- Answer

(4)

b) $2^{2x} = 0{,}125$

$2^{2x} = 2^{-3}$

$x = -3$

- Prime base
- answer

(2)

c) $2x(x+1) + m = x$

$2x^2 + 2x - x + m = 0$

$2x^2 + x + m = 0$

$\Delta = b^2 - 4ac$

$= 1 - 4(2)(m)$

for non real $\Delta < 0$

$1 - 8m < 0$

$m > \frac{1}{8}$

- Std form
- Δ subst
- $1 - 8m$
- < 0
- answer

(5)

4) $f(x) = \frac{\sqrt{x+2}}{5-x^2}$

$x + 2 < 0$ or $5 - x^2 \geq 0$

$x < -2$ $\quad x = \pm\sqrt{5}$

- $5 - x^2 = 0$
- $x + 2 < 0$
- $x < -2$
- $x = \sqrt{5}$
- $x = -\sqrt{5}$

(5)

Question 3

a 1) 22, 27

- 22
- 27

(2)

2) $T_n = 5n + 2$

- $5n$
- 2

(2)

3) $5n+2 = 12^5$

$n = 49766$

$\therefore 12^5$ is a term

- $= 12^5$
- n
- conclusion

(3)

4) Multiple of 5 plus 2 Numbers will always end in a 2 or 7

- Multiple of 5 plus 2
- end with 2 or 7

(2)

b1) 39

- answer (1)

2) $2a = 2$

$a = 1$

$3a+b = 6$

$b = 3$

$a+b+c = 3$

$c = -1$

$T_n = n^2+3n-1$

- a
- b
- c
- Answer 2 marks

(5)

3) $n^2+3n-1 = 269$

$n^2+3n-270 = 0$

$n = 15 \quad n = -18$

NA

$\therefore$ The 16^{th} term is bigger than 269

- $= 269$
- Factors
- $n = 15$
- conclusion

(4)

Grade 11

June Examination

Name: _____

Question 4

Given: $f(x) = \frac{8}{x-8} + 4$

a. Write down the equations of the asymptotes of f. (2)

$x = 8$ • x (2)

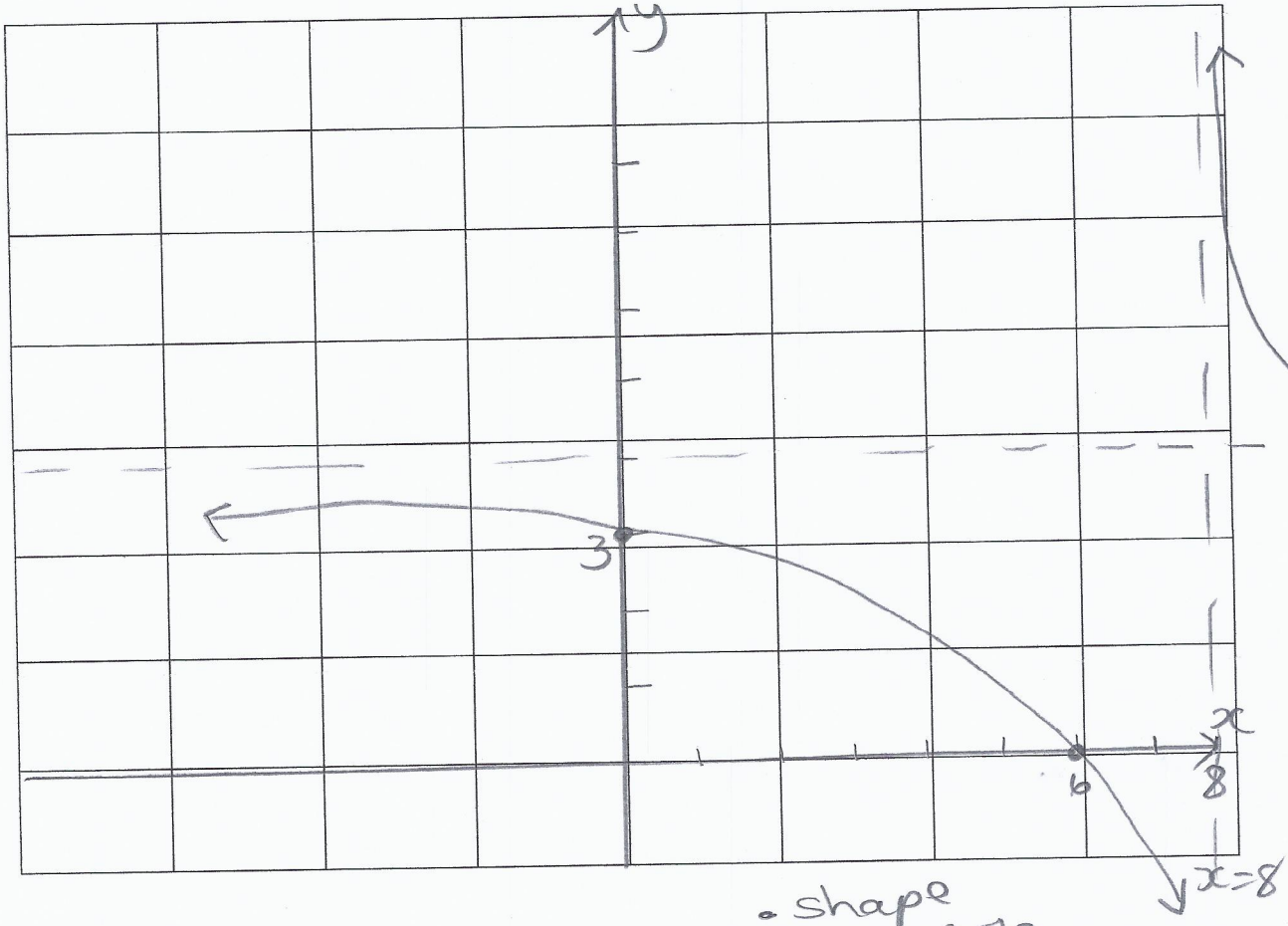
$y = 4$ • y

b. Write down the domain and range of f. (2)

D $x \in R$ $x \neq 8$ • $x \neq 8$ (2)

R $y \in R$ $y \neq 4$ • $y \neq 4$

c. Sketch the graph of f showing all intercepts and asymptotes. (4)



• shape
• asymptote
• $y = 3$
• $x = 6$

(4)

d. Use your graph to solve for x:

1. $\frac{8}{x-8} \geq -4$ (3)

$\frac{8}{x-8} + 4 \geq 0$

$f(x) \geq 0$

$x \leq 6 \quad x > 8$

- Std form
- $x \leq 6$
- $x > 8$

2. $f(x) \leq 3$ (3)

$0 \leq x < 8$

- $x \geq 0$
- $x < 8$
- Signs / notation

e. Determine the equation of the axis of symmetry of f which has a positive slope. (2)

$y = x - 8 + 4$

$y = x - 4$

- $x - 8 + 4$
- Answer.

f. Determine the equation of g if $g(x-2) - 2$. (2)

$f(x-2) - 2$

$g(x) = \frac{8}{x-10} + 2$

- $x - 10$
- $+2$

Question 5

a1) $1 = R13,45
$x = R 4 800

∴ $ 356,88

- ÷ 13,45
- Answer (2)

2) $1 = R13,45
$85 = R1143,25

£1 = R21,41
£x = R1143,25

£ = 53,40

- $1 = R13,45
- £1 = R21,41
- Answer (3)

b1) $A = P(1-i)^n$
$= 315\,000(1-7\%)^3$
$= R\,253\,372,46$

- Formula
- Subst
- Answer (3)

2) $SI = \frac{Prt}{100}$

$39\,500 = \frac{315\,000 \cdot r \cdot 3}{100}$

$r = 4,18\%$

- Formula
- Subst
- Answer (3)

c) $A = P(1+i)^n$
$2x = x(1+i)^5$
$i = 0,148698....$
$r = 14,87\%$

- Subst
- i
- rate (3)

Question 6

a) i) $27 - x + x + 32 - x + 7 = 42$

$x = 24$

- Equation
- x

(2)

ii) $\frac{7}{42} = \frac{1}{6}$

- answer

(1)

iii) $\frac{8}{42} = \frac{4}{21}$

- Answer
- 2 marks (2)

b) i) $x + 3$

- Answer (1)

ii) $P(\text{Blue}) = \frac{3}{x+3}$

- answer
- 2 marks (2)

Question 7

a) $P(A \text{ and } B) = 0$

- Answer (1)

b) $P(B) = 1 - P(B')$

$= 1 - 0,7$

$= 0,3$

- $P(B) = 0,3$
- subst
- Answer

(3)

$P(A \text{ or } B) = P(A) + P(B)$

$= 0,55 + 0,3$

$= 0,85$

Question 8

a) $y = a(x - x_1)(x - x_2)$

$2 = a(0+5)(0+1)$

$a = \frac{2}{5}$

$y = \frac{2}{5}(x+5)(x+1)$

$= \frac{2}{5}x^2 + \frac{12}{5}x + 2$

- $(x+5)(x+1)$
- Subst (0, 2)
- a
- answer

(4)

b) $y = k \cdot m^x$

$2 = k \cdot m^0$

$k = 2$

$y = 2 \cdot m^x$

$6 = 2 \cdot m$

$m = 3$

- $k = 2$
- Subst (2, 6)
- m

(3)

c) $y = 0$

- answer (1)

d) 1) $x = -3$ Tpnt

$\therefore x < -3$

- Tpnt x
- answer (2)

2) $0 \leq x \leq 1$

3) $x \leq 0$

- $x \geq 0$
- $x \leq -1$ (2)
- answer (1)

4) $-5 < x < -1$

- $x > -5$
- $x < -1$

(2)

e) $(-5,0)\ (0,2)$

$m = \frac{2-0}{0+5}$

$= \frac{2}{5}$

- $(0,2)$
- Subst
- answer

(3)

Question 9

a) 10^{x+3}

$= 10^x \cdot 10^3$

$= 1,5 \times 10^3$

$= 1500$

- Each exp
- answer

(2)

b) $0,5^x \sqrt{1+\frac{9}{16}} = 10$

$(\frac{1}{2})^x \left(\sqrt{\frac{25}{16}}\right) = 10$

$2^{-x} = 8$

$2^{-x} = 2^3$

$x = -3$

- $\frac{25}{16}$
- 8
- 2^{-x}
- 2^3
- answer

(5)

Question 10

a) .... 6, 2, x, -18

-4 $\quad x-2 \quad -18-x$

$x+2 \quad -2x-16$

$x+2 = -2x-16$

$x = -6$

and diff $= -4$

- method
- Equation
- $x = -6$
- and diff

(4)

2) $a_1 = 0$
$T_1 = 6$

- answer 2 marks (3)

b1) $y = b^x$
$y = b^{x-2} + 4$
$8 = b^{4-2} + 4$
$b = 2$

- $y = b^{x-2}$
- $+4$
- Subst (4, 8)
- b (4)

2) $y = 2^{x-2} + 4$

- answer (1)

Question 11

$$\frac{17}{22} = \frac{1}{1 + \frac{1}{a + \frac{b}{c}}}$$

$$\frac{22}{17} = 1 + \frac{1}{a + \frac{b}{c}}$$

- Swap Fracti

$$\frac{22}{17} = 1\frac{5}{22}$$

- $\frac{22}{17}$

$$\frac{5}{22} = \frac{1}{a + \frac{b}{c}}$$

- $\frac{22}{5}$

$$\frac{22}{5} = a + \frac{b}{c}$$

- $4\frac{2}{5}$
- Answer.

(5)

$$4\frac{2}{5} = a + \frac{b}{c}$$

$a = 4 \quad b = 2 \quad c = 5$