Grade 10 November Paper 1 03.11.23

100

1.1.1. $\sqrt{\frac{9}{4-x}}$

$x = \{1; 2; 3; 4; 5\}$

(a) $x = 5$ ✓ (1)

(b) $x = 1$ or 2 ✓ both (1)

(c) $x = 4$ ✓ (1)

1.1.2. 49 54 64 49 64 ✓

$\sqrt{49}$ $\sqrt{54}$ $\sqrt{64}$

7 $\sqrt{54}$ 8

$\therefore$ 7 and 8 ✓ (2)

ans only 0/2

1.1.3. $100x$ ✓ $= 146,4646\ldots$

$x = 1,4646\ldots$

$99x = 145$

$x = \frac{145}{99}$ ✓num ✓den (3)

ans only 0/3

1.2.1. $\left(2 + \frac{x}{3}\right)^2$

$= \left(2 + \frac{x}{3}\right)\left(2 + \frac{x}{3}\right)$

$= 4 + \frac{2x}{3} + \frac{2x}{3} + \frac{x^2}{9}$

$= 4 + \frac{2}{3}x + \frac{2}{3}x + \frac{1}{9}x^2$

$= 4 + \frac{4}{3}x + \frac{1}{9}x^2$ ✓ (1)

OR

$\left(2 + \frac{x}{3}\right)\left(2 + \frac{x}{3}\right)$

$= \left(\frac{6+x}{3}\right)\left(\frac{6+x}{3}\right)$

$= \frac{36 + 12x + x^2}{9}$

1.2.2. $(a^x - b^y)(a^x + b^y)$

$= a^{2x} - b^{2y}$ ✓ (1)

1.3. $\frac{3^x}{3^{x+1} - 3^{x-1}}$

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

$= \frac{3^x}{3^x(3 - 3^{-1})}$ ✓cf

$= \frac{1}{\frac{8}{3}}$

$= \frac{3}{8}$ ✓ (2)

(1)

1.4 $\left(x + \frac{1}{x}\right)^2 = (7)^2$

$x^2 + 2 + \frac{1}{x^2} = 49$ ✓LHS

$x^2 + \frac{1}{x^2} = 47$ ✓ (2)

1.5.1. $\frac{1}{2}x^2 - 8y^2$

$= \frac{1}{2}(x^2 - 16y^2)$ ✓

$= \frac{1}{2}(x - 4y)(x + 4y)$ ✓ (2)

P

OR

$\frac{x^2}{2} - 8y^2$

$= \frac{x^2 - 16y^2}{2}$ ✓

$= \frac{(x-4y)(x+4y)}{2}$ ✓

1.5.2. $7x^2 + 19xy - 6y^2$

$= (7x - 2y)(x + 3y)$ (2)

✓✓ or 0

• except

$(7x - 2)(x + 3)$ 1/2

1.6 $\frac{x^3 - 27}{2x^2 - 11x + 15} \div \frac{x^2 + 3x + 9}{5 - 2x}$

$= \frac{(x-3)(x^2+3x+9)}{(x-3)(2x-5)} \times \frac{-(2x-5)}{x^2+3x+9}$ ✓ TNT ✓

$= -1$ ✓ (5)

1.7.1. $x^{2/3} = 25$

$(x^{2/3})^{3/2} = \pm(25)^{3/2}$

$x = \pm 125$ (2)

$\pm(\quad)^{3/2}$ ✓ method

125 ✓ calc

• $\sqrt[\frac{3}{2}]{\quad}$ x

125 ✓CA 1/2

1.7.2. $3 \cdot 2^{x+3} = \frac{1}{7}$

$2^{x+3} = \frac{1}{21}$ ✓

$x + 3 = \frac{\log\left(\frac{1}{21}\right)}{\log(2)}$ ✓

$x = -7{,}39$ ✓ (3)

• logs must be shown

1.8.1 $-3 \leq -x - \frac{1}{2} < 7$

$-\frac{5}{2} \leq -x < \frac{15}{2}$ ✓

$\frac{5}{2} \geq x > -\frac{15}{2}$ ✓ (2)

1.8.2. $-\frac{15}{2}$ ○——● $\frac{5}{2}$

$x \in \left(-\frac{15}{2}; \frac{5}{2}\right]$ ✓ (1)

(2)

2.1.1 $6 ; 2 ; -2 ; \dots ; -294$

$-4 \quad -4$

(a) $T_n = a + (n-1)d$

$= 6 + (n-1)(-4)$

$= 6 + (-4n + 4)$

$= 6 - 4n + 4$

$= -4n + 10$ (2)

(b) $T_n = -294$

$-4n + 10 = -294$ ✓

$-4n = -304$

$n = 76$ terms (2)

2.1.2 $30 ; 6 ; 30 ; 2 ; 30 ; -2 ; \dots$

$T_1 \quad T_2 \quad T_3 \quad T_4 \quad T_5 \quad T_6$

$30 \quad 30 \quad 30$

$T_1^A \quad T_2^A \quad T_3^A$

$6 \quad 2 \quad -2$

$T_1^B \quad T_2^B \quad T_3^B$

(a) $T_{99} = 30$ ✓ (1)

(b) $T_{100} = T_{50}^B$ $n=50$ ✓

$= -4(50) + 10$

$= -190$ ✓ (2)

2.2. $3x+1 ; 2x ; 3x-7$

$2x - (3x+1) = 3x - 7 - 2x$ ✓

$2x - 3x - 1 = 3x - 7 - 2x$

$-x - 1 = x - 7$

$6 = 2x$

$3 = x$ (2)

2.3. $P_1 \quad P_2 \quad P_3 \quad P_4$

$1 \quad 3 \quad 5 \quad 7$

$2 \quad 2 \quad 2$

2.3.1. $T_n = a + (n-1)d$

$T_{30} = 1 + (30-1)(2)$ ✓ a, d, n sub

$= 59$ ✓ (2)

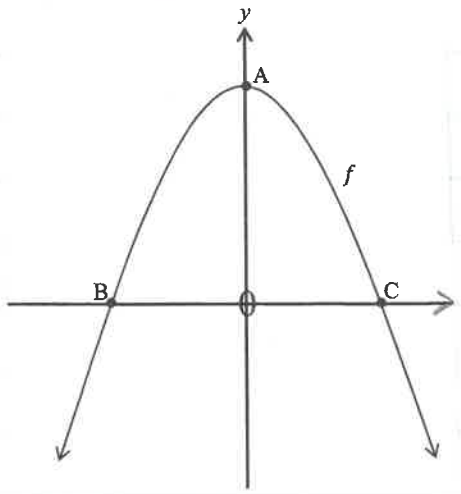
2.3.2. (a) $P_1 + P_2 + P_3 + P_4 = 16$ ✓ (1)

(b) $P_1 + \dots + P_{30} = 30^2$ ✓

$= 900$ ✓ (2)

ans only 2/2

3.1.



$f: \quad y = -3x^2 + 8$

3.1. $R_f: \quad y \in (-\infty; 8]$ ✓ (1)

(OR)

$y \leq 8$

3.2. x int: $\quad 0 = -3x^2 + 8$

$3x^2 = 8$

$x^2 = \frac{8}{3}$ ✓

$x = \pm\sqrt{8/3}$ 1,63...

$\therefore BC = \sqrt{\frac{8}{3}} - \left(-\sqrt{8/3}\right)$

$= 3,27$ ✓ (2)

3.3. y axis $\therefore \quad x = 0$ ✓ (1)

• y axis 0/1

(4)

3.4 Max value of

$2^{f(x)}$

$= 2^8$ ✓ (1)

$= 256$

3.5. Incr / UP L→R

$\therefore x \in (-\infty; 0)$ ✓ (1)

(OR)

$x < 0$

3.6. $f: \quad y = -3x^2 + 8$

$h: \quad -y = -3x^2 + 8$

$y = 3x^2 - 8$ ✓ (1)

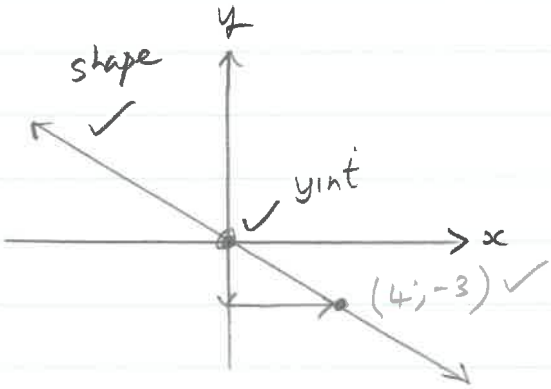
4.1.1. $3x + 4y = 0$

$4y = -3x$

$y = -\frac{3}{4}x$

- str line
- yint: $y = 0$
- grad: $m = -\frac{3}{4}$

$= \frac{-3}{4}$ $\frac{\Delta y}{\Delta x}$



(3)

- (-4; 3) ok
- shape: must be line that is "decreasing"

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

$= -1.2^x + 8$

- exponential
- yint $y = -1.2^0 + 8$

$= 7$

- xint: $0 = -2^x + 8$

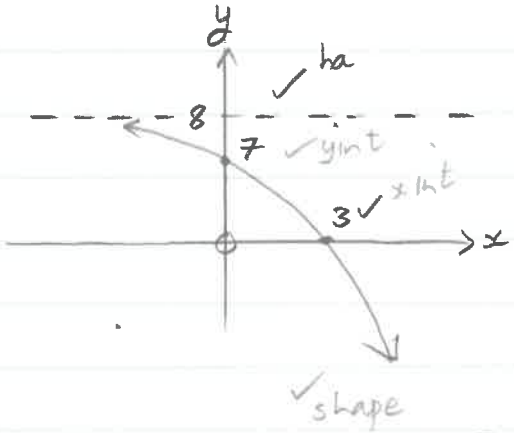
$2^x = 8$

$= 2^3$

$x = 3$

(5)

- ha: $y = 8$



(4)

4.2. $f: y = 8b^x - 7\frac{1}{2}$

Sub A(-4; 33)

$33 = 8.b^{-4} - \frac{15}{2}$ ✓ sub

$\frac{81}{2} = 8b^{-4}$

$\frac{81}{16} = b^{-4}$ ✓ isolate

$\pm\left(\frac{81}{16}\right)^{-\frac{1}{4}} = \left(b^{-4}\right)^{-\frac{1}{4}}$

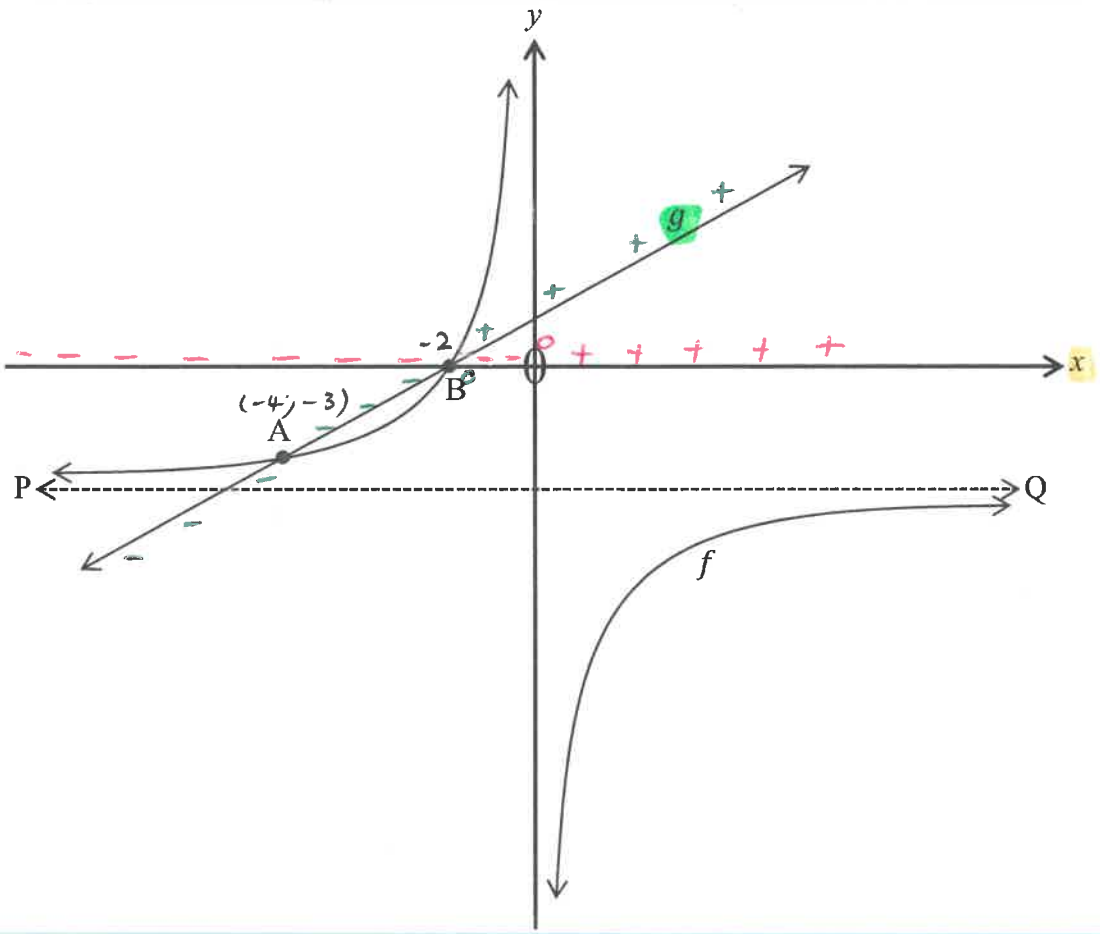
$\frac{2}{3} = b$ rej −

✓ $(\ )^{-\frac{1}{4}}$

✓ $b = 2/3$ (4)

- $-4\sqrt{\ }x$ max $\frac{3}{4}$

5.



f: $y = \frac{k}{x} + q$ g: $y = mx + c$

5.1 $y = \frac{k}{x} + q$ Sub A(-4;-3) $-3 = \frac{k}{-4} + q$ ✓

$\times -4$: $12 = k - 4q$ ... 1

Sub B(-2;0) $0 = \frac{k}{-2} + q$ ✓

$\times -2$: $0 = k - 2q$

$\times -1$: $0 = -k + 2q$ ... 2

(1) + (2): $12 = -2q$ ✓ Sim eqn

$\therefore \frac{12}{-2} = q$

$-6 = q$ ✓ sub back

$\therefore 0 = -k + 2(-6)$

$k = -12$ (4)

$$y = \frac{-12}{x} - 6 \qquad f$$

5.2.1. D_f : $x \in \mathbb{R}; x \neq 0$ ✓ (1)

(OR)

$x \in (-\infty; 0)$ or $(0; \infty)$

5.2.2. $y = -x$

$\therefore y = -x - 6$ ✓ (1)

5.3. f reflected in asymptote cause f to "change quads"

$\therefore k \longrightarrow -k$

h: $y = \frac{-k}{x} + q$ ✓ (1)

(OR)

$y = \frac{12}{x} - 6$

5.4.1. $g(x) \geq 0$

y_g $+$ 0

$x \in [-2; \infty)$ ✓A (1)

5.4.2. $g - f \geq 0$

$y_g - y_f \geq 0$

$y_g \geq y_f$

g above or = to f

$x \in [-4; -2]$ or $(0; \infty)$ ✓A ✓A (2)

5.4.3. $mx^2 + cx \leq 0$

$x(mx + c) \leq 0$ ✓cf

$x \cdot y_g$ $\underline{0}$

$x \in [-2; 0]$ ✓A (2)

ans only 2/2

6.1. Deposit $= \frac{10}{100} \times 21\,000$

$= 2100$

$P = 21\,000 - 2100$

$= 18\,900$ ✓

$A = ?$

$i = \frac{18}{1200}$ or $\frac{18}{100}$

$n = 36$ or 3

$A = P(1+in)$ i,n ✓

sub & I ✓ $= 18900\left(1 + \frac{18}{1200} \cdot 36\right)$

$= 29\,106$

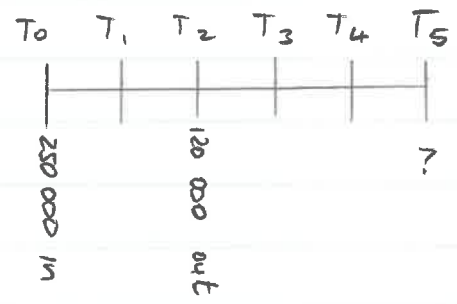
Monthly repayments

$= \frac{29\,106}{36} + 345$

✓ ÷36

$= R\ 1\,153,50$ ✓ (5)

6.2.



6,7 % pa monthly

- snowball

$T_0 - T_2$

$A = P(1+i)^n$

✓ $= 250\,000\left(1 + \frac{6,7}{1200}\right)^{2\times12}$

$= 285\,741,69\ldots$

$T_2 - T_5$ $-120\,000$ ✓

$A = 165\,741,69\ldots\left(1 + \frac{6,7}{1200}\right)^{3\times12}$ ✓

$= R\ 202\ 526,64$ ✓

- Parallel (4)

$T_0 - T_5$ $250\,000$

$A = 250\,000\left(1 + \frac{6,7}{1200}\right)^{5\times12}$ ✓

$= 349\,159,61\ldots \rightarrow A$

$T_2 - T_5$ $120\,000$

$A = 120\,000\left(1 + \frac{6,7}{1200}\right)^{3\times12}$ ✓

$= 146\,632,97\ldots \rightarrow B$

$\therefore A - B = R\ 202\ 526,64$ ✓

7.1 $P(A) = 0,38$

$P(B') = 0,55$

$P(A \text{ or } B) = 0,66$

7.1.1. (a) $P(B) + P(B') = 1$

$P(B) + 0,55 = 1$ ✓

$P(B) = 0,45$ ✓ (2)

ans only 2/2

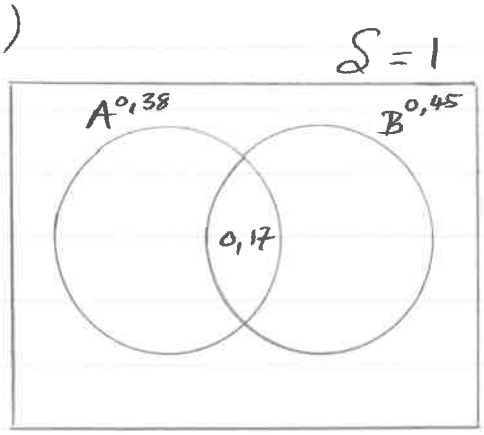
(b) $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$

$0,66 = 0,38 + 0,45 - P(A \text{ and } B)$

$P(A \text{ and } B) = 0,17$ ✓ (2)

ans only 2/2

(c)



$P(B \text{ only}) = 0,45 - 0,17$ ✓

$= 0,28$ ✓ (2)

ans only 2/2

7.1.2 No, not mutually exclusive

$P(A \text{ and } B) = 0,17$ ✓R (2)

$\neq 0$

7.2.1. $n(\text{all } 3) = 3$ ✓ (1)

7.2.2. $n(T \cap E) = 4 + 3$

$= 7$ ✓ (1)

7.2.3. $n(G \cup T)$

$= 13 + 2 + 4 + 3 + 5 + 4$

$= 31$ ✓ (1)

7.2.4. $n(\text{only one}) = 6 + 2 + 4$ ✓

$= 12$ ✓ (2)

ans only 2/2

7.2.5. $n(E \cap G \text{ but } T')$

$= 13 + 3 - 3$

$= 13$ ✓ (1)

7.3. $P(\text{at least 2})$

$= P(2, 3)$

$= \frac{13 + 3 + 4 + 5}{40}$

$= \frac{25}{40}$ ✓

$= \frac{5}{8}$ 0,63 (2)

(9)