Grade 10 Nov P1 TOO 01.11.2024

1.1.1 (a) UD $3 - 4x = 0$

$x = \frac{3}{4}$ ✓

(1)

(b) $R'$ $3 - 4x < 0$

$-4x < -3$

$x > \frac{3}{4}$ ✓A

(1)

1.1.2. $144 < 151 < 169$ ✓ (144, 169)

$\sqrt{144} < \sqrt{151} < \sqrt{169}$

: 12 and 13 ✓

(2)

a.o. 0/2

1.1.3. $1000x = 1678,678\ldots$

$x = 1,678\ldots$

$999x = 1677$

$x = \frac{1677}{999}$ ✓

$= \frac{559}{333}$ ✓

(3)

2.1.1 $\left(\frac{2}{y} + \frac{x}{2}\right)^2$

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

$= \frac{4}{y^2} + \frac{x}{y} + \frac{x}{y} + \frac{x^2}{4}$ ✓ ✓ ✓

$= \frac{4}{y^2} + 2.\frac{x}{y} + \frac{x^2}{4}$ ✓

(3)

2.1.2 $\frac{2^{3n+2} \cdot (2^3)^{n-3}}{(2^2)^{3n-2}}$

$= \frac{2^{3n+2} \cdot 2^{3n-9}}{2^{6n-4}}$ ✓

$= \frac{2^{3n+2+3n-9}}{2^{6n-4}}$

$= \frac{2^{6n-7}}{2^{6n-4}}$ ✓

$= 2^{6n-7-(6n-4)}$

$= 2^{6n-7-6n+4}$

$= 2^{-3}$

$= \frac{1}{2^3}$

$= \frac{1}{8}$ ✓

(3)

2.2.1. $2x^4 - 32$

$= 2(x^4 - 16)$ ✓

$= 2(x^2+4)(x^2-4)$ ✓

$= 2(x^2+4)(x+2)(x-2)$ ✓

3

2.2.2. $64x^3 + 27$

$= (4x+3)(16x^2 - 12x + 9)$ ✓ ✓

2

2.3. • $\frac{3}{x-y} - \frac{2}{x+y}$

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

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

$= \frac{x + 5y}{(x-y)(x+y)}$ ✓num ✓den

$\therefore \frac{\frac{1}{x+y}}{\frac{x+5y}{(x-y)(x+y)}}$

$= \frac{1}{x+y} \times \frac{(x-y)(x+y)}{x+5y}$ ✓

$= \frac{x-y}{x+5y}$ ✓

4

3.1.1. $3x^{3/2} - 192 = 0$

$x^{3/2} = 64$ ✓

$(x^{3/2})^{2/3} = (64)^{2/3}$

$x = 16$ ✓ (2)

3.1.2. $x(x+5) = 24$

$x^2 + 5x - 24 = 0$ ✓

$(x-3)(x+8) = 0$ ✓

$\therefore x = 3$ or $-8$ ✓ (3)

- factors not shown
  max 2/3

3.1.3. $3^x \cdot 9^{3x-1} = \frac{1}{81}$

$3^x \cdot (3^2)^{3x-1} = \frac{1}{3^4}$

$3^x \cdot 3^{6x-2} = 3^{-4}$

$3^{x+6x-2} = 3^{-4}$

$3^{7x-2} = 3^{-4}$ ✓ ✓

$\therefore 7x - 2 = -4$

$x = -\frac{2}{7}$ ✓ (3)

3.2. $\frac{1}{a} + a = x$

LHS $(a + \frac{1}{a})^2 = (x)^2$ ✓

$a^2 + 2 + \frac{1}{a^2} = x^2$

RHS $a^2 + \frac{1}{a^2} = x^2 - 2$ ✓ (2)

3.3.1. $-3 \leq \frac{2x+1}{2} < 7$

$\times 2$: $-6 \leq 2x+1 < 14$

$-1$: $-7 \leq 2x < 13$ ✓

$\div 2$: $-\frac{7}{2} \leq x < \frac{13}{2}$ ✓ (2)

3.3.2. $x \in [-\frac{7}{2}; \frac{13}{2})$ ✓ (1)

NB $x \in$

4.1. 6 ; 10 ; 14 ; ...

4 4

4.1.1. $T_4$ ; $T_5$ = 18 ✓ → (1)

4.1.2. $T_n = a + (n-1)d$
$= 6 + (n-1)4$
$= 6 + 4n - 4$
$= 4n + 2$ → (2)

4.1.3. $T_n = 4n + 2$
$2802 = 4n + 2$ ✓
$700 = n$ ✓ → (2)

4.2. $9x - 5$ ; $7x + 6$ ; $97 - 3x$

$7x + 6 - (9x - 5)$
$= 7x + 6 - 9x + 5$
$= -2x + 11$ ✓

$97 - 3x - (7x + 6)$
$= 97 - 3x - 7x - 6$
$= 91 - 10x$ ✓

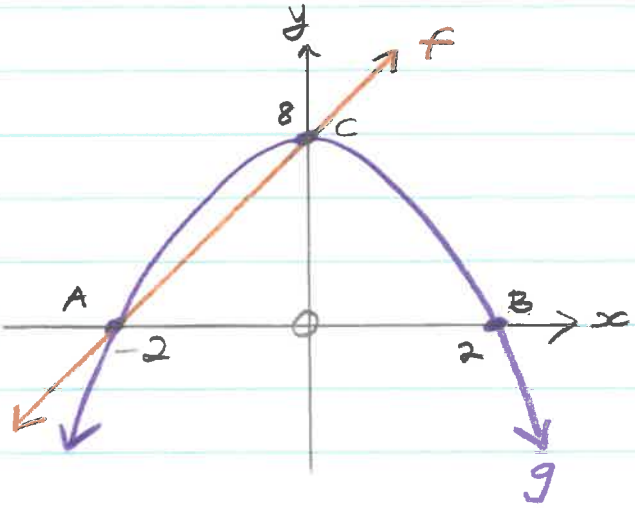
linear ∴ $d$ = const

$-2x + 11 = 91 - 10x$ ✓
$8x = 80$
$x = 10$ ✓ → (4)

4.3. × 2
∴ $x = 16$ ✓ → (1)

5. $f: y = mx + c$

$g: y = ax^2 + q$




5.1. $R_g: y \in (-\infty; 8]$ ✓ (1)

OR

$y \leq 8$

5.2. $A(-2; 0)$ ✓ (1)

5.3. $q = 8$ ✓

$y = ax^2 + 8$

sub $B(2; 0)$

$0 = a(2)^2 + 8$ ✓

$-8 = 4a$

$-2 = a$ ✓ (3)

5.4.1. $f(x) = g(x)$

$y_f = y_g$

$x = -2$ or $0$ ✓A (1)

5.4.2. $ax^2 + q - mx - c > 0$

$ax^2 + q > mx + c$

$y_g > y_f$

$\therefore x \in (-2; 0)$ ✓✓A (2)

5.4.3. $(ax^2 + q)(mx + c) \leq 0$

$y_g \cdot y_f \leq 0$

$\therefore x = -2$ ✓A or $x \in [2; \infty)$ ✓A (2)

OR

$x = -2$ or $2 \leq x$

5.4.4. $x \cdot f(x) \geqslant 0$

$x \cdot y_f \geqslant 0$

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

OR

$x \leq -2$ or $0 \leq x$

5.5 $y = 0$ x axis

$y = ax^2 + q$

$-y = ax^2 + q$

$y = -ax^2 - q$

OR

$y = -2x^2 + 8$

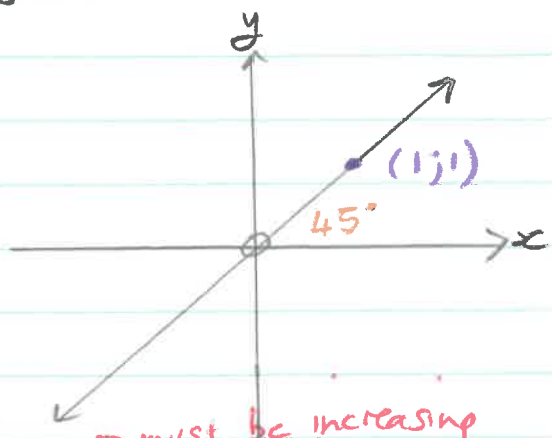
$-y = -2x^2 + 8$ ✓

$y = 2x^2 - 8$ ✓

(2)

• ans only 2/2

6.1. $y = x$




must be increasing

• shape + yint ✓

• 45° or (1;1) ✓

(2)

6.2. $y = -2^x - 1$

$= -1.2^x - 1$

• yint: $y = -2^0 - 1$

$= -2$

• xint: $0 = -2^x - 1$

$2^x = -1$

no soln

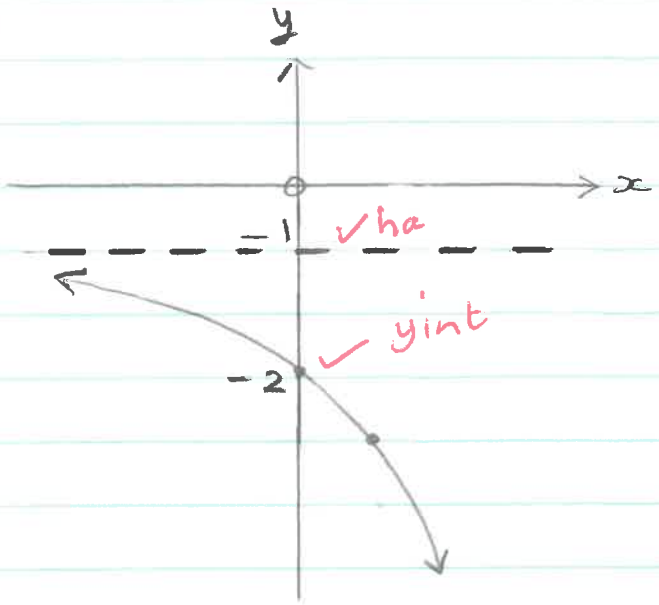
∴ no xint

• ha: $y = -1$

• other pt

$x = 1$ $y = -2^1 - 1$

$= -3$




- shape + no xint ✓
  ↳ must be decreasing ✓

(3)

7. $f: y = \frac{k}{x} + 1$

$g: y = -\frac{x}{4} + 1$

7.1. xint: $0 = -\frac{x}{4} + 1$

$\frac{x}{4} = 1$

$x = 4$

$\therefore A(4;0)$ ✓ NB Coord (1)

7.2. $x = 0$ ✓ va

$y = 1$ ✓ ha (2)

7.3. $y = \frac{k}{x} + 1$

sub $A(4;0)$

$0 = \frac{k}{4} + 1$ ✓

$-1 = \frac{k}{4}$

$-4 = k$ (1)

$f: y = -\frac{4}{x} + 1$

7.4. $OM = 10$

$\therefore x_M = -10$

$y_K = -\frac{(-10)}{4} + 1$

$= \frac{7}{2}$ ✓ 3,5

$y_L = -\frac{4}{(-10)} + 1$

$= \frac{7}{5}$ ✓ 1,4

$KL = y_K - y_L$

$= \frac{7}{2} - \frac{7}{5}$

$= \frac{21}{10}$ ✓ 2,1

→ (3)

7.5 $-\frac{4}{x} + 1 = -\frac{x}{4} + 1$ ✓

$\frac{x}{4} = \frac{4}{x}$

$x^2 = 16$ ✓

$x = \pm\sqrt{16}$ ✓ NB ±

$= \pm 4$

reject 4

$x_P = -4$ ✓

→ (4)

OR

$x^2 - 16 = 0$

$(x+4)(x-4) = 0$ ✓ NB fact

$x = -4$ or $4$

reject

$\therefore x_P = -4$

7.6. $y = -x + 1$ ✓✓A

→ (2)

• $y = x + 1$ 0/2

8.1.1. $18\,575 \times \frac{7,5}{100}$

$= R\ 1\,393,13$ ✓ (1)

8.1.2. $P = 18\,575 - 1393,13$

$= 17\,181,87$ ✓

$A = P(1 + in)$

$= 17\,181,87\left(1 + \frac{21,1}{1200} \times 36\right)$ ✓

$= 28\,057,99\ldots$

Monthly repayments

$= \frac{28\,057,99\ldots}{36}$ ✓ $+ 300$

$= R\ 1\,079,39$ ✓ (4)

(OR)

$A = 17\,181,87\left(1 + \frac{21,1}{100} \times 3\right)$

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

$13\,818,83 = 8\,000\left(1 + \frac{5}{400}\right)^n$ ✓

$1,72\ldots = \left(\frac{81}{80}\right)^n$

must show logs

$n = \frac{\log 1,72\ldots}{\log \frac{81}{80}}$ ✓

$= 43,99\ldots$ $\frac{1}{4}$'s ✓

$= 11$ years ✓ (4)

9.1.1. 0 ✓ NOT $\emptyset$ (1)

9.1.2. 1 ✓ (1)

9.2.1. $P(B) + P(B') = 1$

$P(B) + 0,6 = 1$

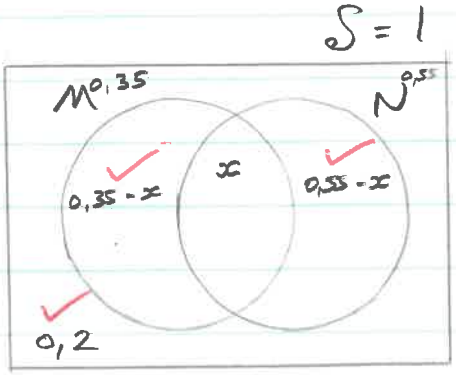
$P(B) = 0,4$ ✓ (1)

9.2.2. $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ ✓

$0,7 = 0,5 + 0,4 - P(A \text{ and } B)$

$P(A \text{ and } B) = \frac{1}{5}$ ✓ $0,2$ (2)

9.3.1.

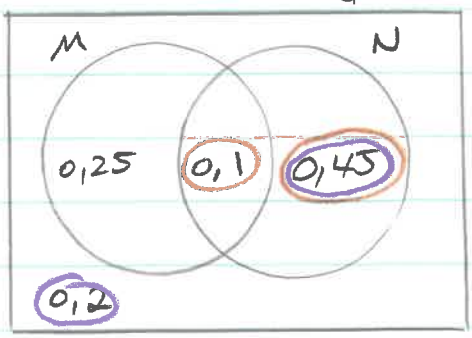



(3)

9.3.2. (a) $0,35 - x + x + 0,55 - x = 0,8$ ✓

$0,1 = x$ (1)

9.3.2. (b) $\xi = 1$

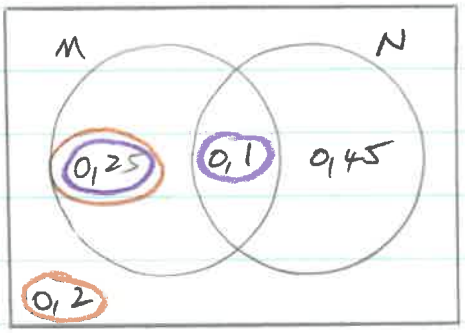



$P(M' \cup N')$

$= 0,2 + 0,1 + 0,45$

$= 0,75$ ✓ (1)

(c)




$P(M \cap N')$

$= 0,25$ ✓ (1)

9.4.1 $n(\mathcal{U}) = 100$ ✓ (1)

9.4.2. $n(B \cap M \text{ but } T')$

$= 5$ ✓ (1)

9.4.3. $n(\geq 2)$

$= 5 + 15 + 10 + 7$

$= 37$ ✓ (1)