GRADE : 10

SUBJECT : Mathematics

TITLE : Nov P1

EXAMINER : ~~Mr A. Slaughter~~ DOE

TOTAL MARKS : 100

DATE : 4 / 11 / 2016

SOLUTIONS

TIME : 2 hour(s)

1.1. 1. $x^2 - x$

$= x(x-1)$

1.1. 2. $3x^2 + 3px - 2mx - 2mp$

$= 3x(x+p) - 2m(x+p)$

$= (x+p)(3x-2m)$

1.1. 3. $2p^2 - 2p - 12$

$= 2(p^2 - p - 6)$

$= 2(p-3)(p+2)$

1.2. 1. $\frac{2^{a+1} - 2^{a-1}}{2^a}$

$= \frac{2^a \cdot 2^1 - 2^a \cdot 2^{-1}}{2^a}$

$= \frac{2^a(2 - 2^{-1})}{2^a}$

$= 2 - \frac{1}{2}$

$= \frac{3}{2}$

1.2. 2. $\frac{x^2 - x + 1}{x^3 + 1} \div \frac{2x}{2x+2}$

$= \frac{x^2 - x + 1}{(x+1)(x^2 - x + 1)} \div \frac{2x}{2(x+1)}$

$= \frac{1}{x+1} \div \frac{x}{x+1}$

$= \frac{1}{x+1} \times \frac{x+1}{x}$

$= \frac{1}{x}$

2.1. 1. $x(x-1) = 20$

$x^2 - x = 20$

$x^2 - x - 20 = 0$

$(x-5)(x+4) = 0$

$\therefore x = 5$ or -4

2.1. 2. $\frac{3x-2}{2} = x + 1$

LCD : 2

x thru

$\frac{3x-2}{2_1} \cdot 2^1 = x \cdot 2 + 1 \cdot 2$

$3x - 2 = 2x + 2$

$x = 4$ →

2.2. 1. $-4 \leq -\frac{1}{2}m < 5$

$\div -\frac{1}{2}$:

$8 \geq m > -10$ →

2.2. 2. $m \in (-10; 8]$ →

2.3. $4x^2 - y^2 = 171 \quad \ldots 1$

$2x - y = 9 \quad \ldots 2$

2.3. 1. (1) : $(2x - y)(2x + y) = 171$

(2) : $(9).(2x + y) = 171$

$\therefore \; 2x + y = 19$ →

2.3. 2. $2x + y = 19 \quad \ldots 3$

$2x - y = 9 \quad \ldots 2$

(3) : $y = 19 - 2x$

(2) : $2x - (19 - 2x) = 9$

$2x - 19 + 2x = 9$

$4x = 28$

$x = 7$ →

$\therefore \; y = 19 - 2(7)$

$= 5$ →

OR

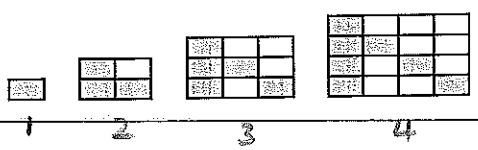
(3) + (2) : $4x = 28$

$x = 7$

(3) : $2(7) + y = 19$

$y = 5$

3.



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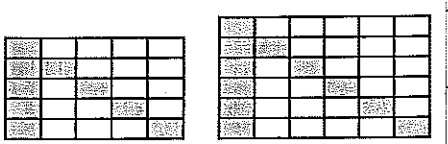


Assuming Pattern 2 as shown above :

Pat n	1	2	3	4	5	6
D	1	3	5	7	9	11
L	0	1	4	9	16	25

3.1. $D_5 = 9$ ⟶

3.2. $L_6 = 25$ ⟶

3.3. D 1; 3; 5; 7; ...

(2 2 2)

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

$D_n = 1 + (n-1)(2)$

$= 1 + (2n-2)$

$= 1 + 2n - 2$

$= \underline{2n-1}$ ⟶

3.4. L: 0; 1; 4; 9; ...

$L_n = (n-1)^2$ ⟶

3.5. $L_n = (n-1)^2$

$64 = (n-1)^2$

$\pm\sqrt{64} = n-1$

reject −

$8 = n-1$

$9 = n$

∴ pattern 9 ⟶

3.6.

n	D	D^{Total}
1	1	1
2	1+3	4
3	1+3+5	9
4	1+3+5+7	16

∴ $D_n^{Total} = n^2$

∴ $D_{100}^{Total} = 100^2$

$= 10\,000$ tiles

$A_{tile} = 0,3 \times 0,6$

$= 0,18 \ m^2$

∴ Total area

$= 10\,000 \times 0,18$

$= 1\,800 \ m^2$ ⇒

4.1. 1. Value of loan (excluding interest)

$= 15\,550 - \frac{15}{100} \times 15\,550$

$= 15\,550 - 2\,332,50$

$= R \ 13\,217,50$ ⇒

4.1. 2. $P = 13\,217,50$

$A = ?$

$i = \frac{16,25}{100}$

$n = \frac{54}{12}$

$= 4,5$

$A = P(1 + in)$

$= 13\,217,50\left(1 + \frac{16,25}{100} \times 4,5\right)$

$= R \ 22\,882,80$ ⇒

4.1. 3 Total cost of fridge

$= 2\,332,50 + 22\,882,80$

$= 25\,215,30$

Annual insurance

$= \frac{1,5}{100} \times 25\,215,30$

$= 378,22\ldots$

∴ Monthly insurance

$= \frac{378,22\ldots}{12}$

$= 31,51\ldots$

∴ Monthly repayment

$= 31,51\ldots + \frac{22882,50}{54}$

$= 31,51\ldots + 423,75$

$= R\ 455,27$ ▷

(OR)

Monthly repayment

$= \frac{378,22\ldots \times 4,5 + 22882,50}{54}$

$= \frac{1702,03\ldots + 22882,50}{54}$

$= \frac{24584,53\ldots}{54}$

$= R\ 455,27$

4.2. $1\ £ = R\ 21,41$

$1\ \$ = R\ 13,45$

4.2.1. $R\ 4800 \times \frac{\$\ 1}{R\ 13,45}$

$= \$\ 356,88$ ▷

4.2.2. $\$85 \times \frac{R\ 13,45}{\$\ 1} \times \frac{£\ 1}{R\ 21,41}$

$= \frac{85 \times 13,45}{21,41}$

$= £\ 53,38$ ▷

4.3. $P = x$

$A = 2x$

$i = ?$

$n = 5$

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

$2x = x(1+i)^5$

$\div x \quad (x \neq 0)$

$2 = (1+i)^5$

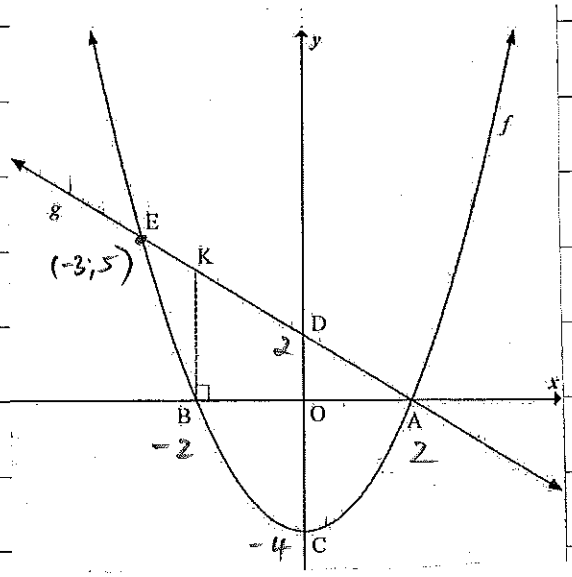
$\sqrt[5]{2} = 1+i$

$1,14\ldots = 1+i$

$0,14\ldots = i$

∴ $I = 14,87\ \%$ pa ▷

5.



$f: y = x^2 - 4$ $g: y = -x + 2$

5.1. $y = x^2 - 4$

$y_{int}: y = -4$

$\therefore C(0;-4)$

5.2. $y = -x + 2$

$y_{int}: y = 2$

$\therefore D(0;2)$

5.3. $CD = y_D - y_C$

$= 2 - (-4)$

$= 6$

5.4. $y = x^2 - 4$

$x_{int}: 0 = x^2 - 4$

$4 = x^2$

$\pm\sqrt{4} = x$

$\pm 2 = x$

$\therefore B(-2;0)$

5.5. $f \cap g$: Sim eqns:

$y = x^2 - 4 \ldots 1 \quad y = -x + 2 \ldots 2$

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

$x^2 + x - 6 = 0$

$(x - 2)(x + 3) = 0$

$\therefore x = \cancel{2}$ or -3

reject

$\therefore y = -(-3) + 2$

$= 5$

$\therefore E(-3;5)$

5.6. 1. $f(x) < g(x)$

$y_f < y_g$

$\therefore x \in (-3;2)$

5.6.2 $f(x) \cdot g(x) \geq 0$

$y_f \times y_g \quad \overset{+}{0}$

$\therefore x \in (-\infty; -2]$ or $x = 2$

5.7. $x_K = x_B$

$= -2$

$\therefore y_K = -(-2) + 2$

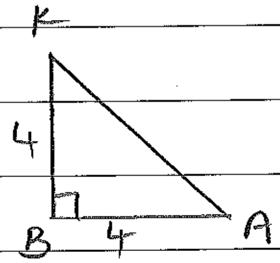
$= 4$

$\therefore KB = 4$

$x_B = -2 \qquad x_A = 2$

$\therefore AB = 4$

$\therefore$



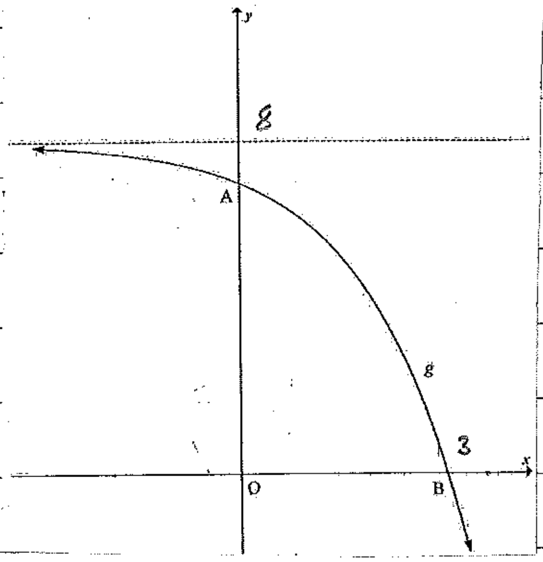
$AB^2 = 4^2 + 4^2$ Pythag

$= 32$

$\therefore AB = \pm\sqrt{32}$

$= 5{,}66$ reject −

6.



$g: y = -2^x + 8$

$= -1 \cdot 2^x + 8$

6.1 ha: $y = 8$

$\therefore R_g: \; y \in (-\infty; 8)$

6.2 x int: $0 = -2^x + 8$

$-8 = -1 \cdot 2^x$

$8 = 2^x$

$2^3 =$

$3 = x$

$\therefore B(3; 0)$

6.3 Reflect x-axis

. $y \to -y$

. $x \to x$

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

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

$\therefore \quad y = 2^x - 8$ ▷

6.4 At the x ints of g and h, $y = 0$

$y = 0$ and $y = -0$ are the same

The graphs don't move horizontally when reflected in x-axis

$\therefore g(2) = h(2)$

$= 0$

ie g and h's x ints are both at B.

7. Hyperbola

. va : $x = 0$

$\therefore y = \frac{k}{x}$

. $R_h: y \in (-\infty; 3) \cup (3; \infty)$

$\therefore$ ha : $y = 3$

$\therefore y = \frac{k}{x} + 3$

$\therefore y = \frac{k}{x} + 3$

. x int : $x = 2$

Sub $(2; 0)$

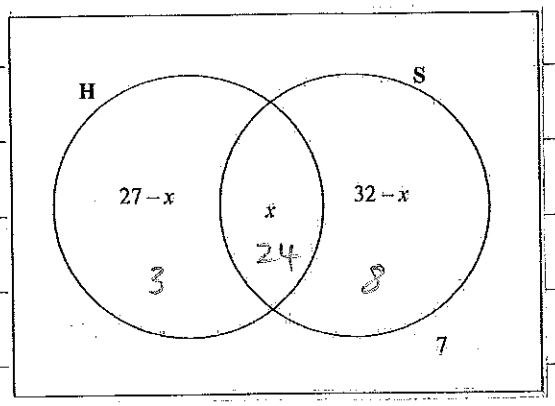
$0 = \frac{k}{2} + 3$

$-3 = \frac{k}{2}$

$\therefore -6 = k$

$\therefore y = \frac{-6}{x} + 3$ ▷

8.1. $\mathcal{U} = 42$



8.1. 1. $27 - x + x + 32 - x + 7 = 42$

$24 = x$

8.1. 2(a) Does not play: HUS

$\therefore (H \cup S)'$

$\therefore P(H \cup S)'$

$= \frac{7}{42}$

$= \frac{1}{6}$

8.1. 2(b) $P(S \text{ only})$

$= \frac{8}{42}$

$= \frac{4}{21}$

8.2. 3 B x y

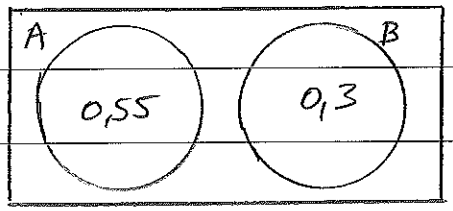
8.2. 1. $n = x + 3$

8.2. 2. $P(B) = \frac{3}{x+3}$

8.3. 1. Mut. excl.

$\therefore P(A \cap B) = 0$

8.3. 2. $\mathcal{S} = 1$



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

$P(B) + 0,7 = 1$

$P(B) = 0,3$

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0,55 + 0,3 - 0$

$= 0,85$