

1a) $20x^2 + 50x - 3 = 12x + 1$

$20x^2 - 7x - 4 = 0$
 $(20x+1)(x-4) = 0$

$x = -\frac{1}{20}$ or $x = 4$

(5)

ii) $(2x+3)(x-2) > 0$

$\begin{matrix} + & & - & & + \\ \leftarrow & -\frac{3}{2} & & 2 & \rightarrow \end{matrix}$

$x < -\frac{3}{2}$ or $x > 2$

(4)

iii) $10 - 3x = x^2 - 4x + 4$

$0 = x^2 - x - 6$
 $0 = (x-3)(x+2)$

$x = 3$ or $x \neq -2$

(5)

iv) $2^{3x-6} = 2^{3/2}$

$3x = \frac{15}{2}$
 $x = \frac{5}{2}$

(3)

v) $3^x = 3^3$ or $3^x = -1$

$x = 3$ No solution.

(3)

b) $\frac{2^m(3-4 \cdot 2^3)}{2^m(1-2)}$

$= \frac{-15}{-1}$

$= 15$

(4)

2a) 41 43 47 53 61

1st d 2 4 6 8
 2nd 2 2 2

\therefore Quadratic

$a = 1$
 $3a + b = 2$
 $b = -1$

$a + b + c = 41$
 $c = 41$

$\therefore T_n = n^2 - n + 41$

(5)

b) $T_{41} = 41^2 - 41 + 41$
 $= 41^2$

\therefore More than 2 factors
 \therefore Not prime.

(3)

3a) i) $1 + i = \left(1 + \frac{3i}{2}\right)^2$

$re = 8, 2^9$

(2)

ii) $100000 = P \left(1 + \frac{8\%}{2}\right)^8$

$P = \frac{100000}{\left(1 + \frac{8\%}{2}\right)^8}$

$P = R73069,02$

(3)

b) $\frac{10P}{10} = P \left(1 + \frac{r}{12}\right)^{12}$

$\sqrt[12]{10} = 1 + \frac{r}{12}$
 $\frac{r}{12} = 21,2\%$

$r = 253,8\%$ pa

(3)

(2)

4a) $x^2 = 20x$

$x^2 - 20x = 0$
 $x(x-20) = 0$

$x = 0$ or $x = 20$

$P(2;4) \therefore y = 4$

(4)

b) $x \in \mathbb{R}$

(1)

ii) $x < 0$ or $x > 2$

(2)

iii) No values

(1)

c) $f(x) = 2x + 4$

(2)

5a) $q = -6$

(1)

b) $f(x) = a \cdot 2^{x-1} - 6$

Sub $(-1, -5\frac{1}{4})$
 $\frac{-21}{4} = a \cdot 2^{-1-1} - 6$
 $\frac{3}{4} = a \cdot \frac{1}{4}$

$a = 3$

(4)

6a) $x = -2, y = 3$

(2)

b) $A(0;5)$

At B, $\frac{1}{2}x + 5 = 0$
 $x = -10$

$\therefore B(-10;0)$

(2)

c) $\frac{1}{2}(-6) + 5 = t$

(2)

d) $f(x) = \frac{a}{x+2} + 3$

Sub $(0;5)$
 $5 = \frac{a}{2} + 3$
 $2 = \frac{a}{2}$

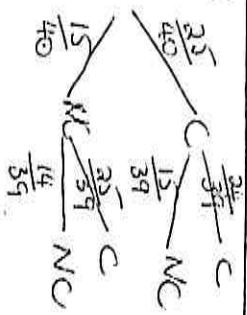
$a = 4$

(3)

e) No values

(1)

7a) i)



(6)

ii) $\left(\frac{25}{40} \times \frac{15}{39}\right) + \left(\frac{15}{40} \times \frac{25}{39}\right)$

$= \frac{25}{52}$

(3)

b) $P(M) \times P(N)$

$= \frac{1731}{3201} \times \frac{1490}{3201}$

$= 0,532 \dots$

$P(M \text{ and } N)$

$= \frac{1364}{3201}$

$= 0,619 \dots$

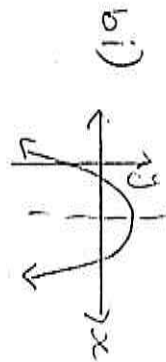
$P(M) \times P(N) \neq P(M \text{ and } N)$
 \therefore Dependent

(4)

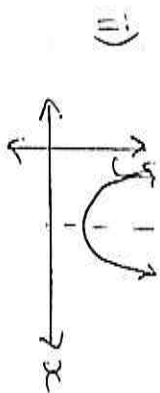
(4)

13ai) Reflect about x-axis (2)

ii) shift 3 units left (2)



(2)



(2)

14a) $\frac{t-3+t+1}{2} = 1$
 $2t-2=2$
 $t=2$

(3)

b) $C(-1;0); B(3;0)$
 $f(x) = a(x+1)(x-3)$
 Sub $(0; -3)$
 $-3 = a(1)(-3)$
 $\therefore a = 1$
 $\therefore f(x) = x^2 - 2x - 3$

(5)

c) $f(1) = 1^2 - 2 - 3 = -4$

(2)

d) $x \leq -1$ or $x \geq 3$

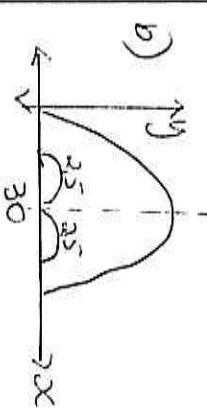
(2)

ii) $x > -1; x \neq 3$

(2)

e) Shift graph up more than 4 units $\therefore k > 1$ (2)

15a) 18 metres (1)



b) $f(30) = -\frac{1}{50}(31.5-30)^2 + 18 = 17.955m$ (3)

16a) $E = -\frac{1}{90}n^2 + \frac{2}{3}n$
 $n = \frac{-(-\frac{1}{90}) \pm \sqrt{(\frac{1}{90})^2 - 4(-\frac{1}{90})(\frac{2}{3})}}{2(-\frac{1}{90})}$
 $n = 30$

(3)

b) $-\frac{1}{90}n^2 + \frac{2}{3}n = 0$
 $n(-\frac{1}{90}n + \frac{2}{3}) = 0$
 $n \neq 0$ or $n = 60$

(3)

13 marks

Total: 150 marks

Section B

(3)

8a) Area = $\pi(4 + \sqrt{5})^2$
 $= \pi(16 + 8\sqrt{5} + 5)$
 $= \pi(21 + 8\sqrt{5})$ (3)

b) $F = 256 \times (2^{\frac{1}{2}})^9$
 $= 2^8 \times 2^{34}$
 $= 2^{42}$ (3)

9a) $5x+2 - (2x-3) = x-7 - (5x+2)$
 $3x+5 = -4x-9$
 $7x = -14$
 $x = -2$
 $\therefore -7, -8, -9, \dots$ (5)

bi) $a^2 = 2$
 $a = \sqrt{2}$
 $b^2 = 2(\sqrt{2})^2$
 $b = 2$
 $c^2 = 2(a)^2$
 $c = 2\sqrt{2}$
 $d^2 = 2(2\sqrt{2})^2$
 $d = 4$
 $e^2 = 2(4)^2$
 $e = 4\sqrt{2}$ (5)

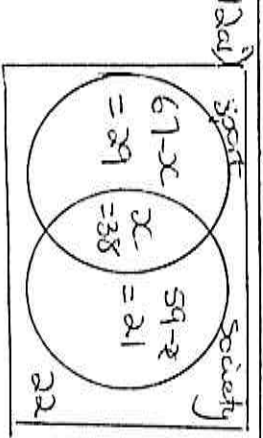
ii) Multiply by $\sqrt{2}$ (2)
 iii) 8; $8\sqrt{2}$ (2)

10a) R15000 (1)

b) R4000 (1)

c) $A = P(1 - i)^n$
 $2000 = 15000(1 - i, 10)^{\frac{7}{15}}$
 $10i = \frac{13}{15}$
 $i = 8.7\%$ (4)

ii) P - 2000
 0 1 2 3 4 5
 $23564 = P(1 + \frac{12\%}{12})^{60}$
 $23564 = P(1 + \frac{12\%}{12})^{60}$
 $P = \frac{23564 + 2000(1 + \frac{12\%}{12})^{60}}{(1 + \frac{12\%}{12})^{60}}$
 $P = R114642.83$ (5)



$61-x+x+59-x+22=110$
 $x=38$ (4)

b) $\frac{29}{110}$ (1)

c) $\frac{88}{110}$ (1)

d) $\frac{51}{110}$ (1)