

a(i) $2x^2 + 40x - 88 = 0 \quad \sqrt{m}$
 $x^2 + 20x - 44 = 0 \quad \sqrt{m}$
 $x = 2 \quad x = -22 \quad \sqrt{ca}$

4.

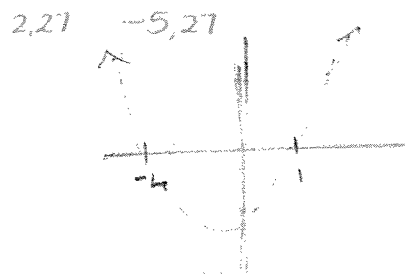
ii $3^{2x-1} = 2187 \quad \sqrt{m}$
 $\therefore 2x-1 = 7 \quad \sqrt{ca}$
 $\therefore x = 4 \quad \sqrt{ca}$

3

iii $\log_2 3 = x \quad \sqrt{m}$
 $x = 1,58 \quad \sqrt{ca}$

2

iv $0 < x^2 + 3x - 12 \quad \sqrt{m}$
 $0 < (x+4)(x-1) \quad \sqrt{m}$
 $x < -4 \quad ; \quad x > 1 \quad \sqrt{ca}$
 $x < -5,27 \quad ; \quad x > 2,27 \quad \sqrt{ca}$



3

b. $\frac{3^{2x} - 3^x - 2}{2^x 3^x - 2^x 2} = \frac{(3^x - 2)(3^x + 1)}{2^x (3^x - 2)}$
 $= \frac{3^x + 1}{2^x} \quad \sqrt{ca}$

5

[17]

Q2

a. $T_n = 4n - 17$ $-13 + (n-1) \cdot 4$ 2

b. $71 = 4n - 17$ \checkmark_m
 $\therefore n = 22$ \checkmark_{ca} 2

c. $T_{71} = 4(71) - 17$ \checkmark_{subst}
 $= 267$ \checkmark_{ca} 2

d. $S_{1041} = \frac{1041}{2} (2(-13) + (1041-1)(4))$ $\checkmark_{Formula}$ $\checkmark_{subst.}$
 $= 2151747$ \checkmark_{ca} 3

9

Q3

$$3^{-1} + \frac{1}{3} - \frac{1}{3^2} + \frac{1}{3^3}$$

a. $-\frac{1}{3}$ \checkmark_{ca} 1

b. $\frac{1}{243} = 3 \times \left(-\frac{1}{3}\right)^{n-1}$ $\checkmark_{Formula}$ $\checkmark_{subst.}$

$$\frac{1}{3^6} = \left(-\frac{1}{3}\right)^{n-1}$$

$$\therefore n-1 = 6 \quad \checkmark_{ca}$$

$$\therefore n = 7 \quad \checkmark_{ca}$$

c. $S_{\infty} = \frac{3}{1 - \left(-\frac{1}{3}\right)} = \frac{9}{4} = 2,25$ \checkmark_{ca} 3

8

Q4.

a. $65147,48 = 120\,000(1-r)^5$ ✓ Formula

$0,5428 = (1-r)^5$ ✓ subs.

$0,885 = 1-r$

$r = 0,1149$ ✓ ca

$0,115$

3.

b. $60\,000 = 120\,000(1-11\%)^n$

$\frac{1}{2} = (1-11\%)^n$ ✓ Formula
✓ subs

$0,89^n = 0,5$

$\log_{0,89} 0,5 = n$ ✓ ca

$n = 5,948$ ✓ ca

4

7

Q5

a. $x=1$ ✓ a

$y=2$ ✓ a

2

b. $y = (x-1) + 2$

$y = x + 1$ ✓ a ✓ a

2

c. $A(-3; -2)$ ✓ a ✓ a

$A(-4; -4)$

$A(-4; -4)$

3

7

Q6

$$a. \quad f'(x) = \lim_{h \rightarrow 0} \frac{\frac{2}{x+h} - \frac{2}{x}}{h}$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{\frac{2x - 2x - 2h}{x(x+h)}}{h} \times \frac{1}{h}$$

$$= \lim_{h \rightarrow 0} \frac{-2}{x(x+h)}$$

$$= \frac{-2}{x^2}$$

b)

(i)

$$y = \frac{x^{-1/2}}{\sqrt{a}} - \frac{8x^{-3}}{\sqrt{a}}$$

2

c (i)

$$= \frac{d(2) - d(0)}{2} = \frac{2 - 0}{2} = 1 \text{ m/s}$$

3

(ii)

$$d'(t) = 3t^2 - 12t + 9$$
$$d'(2) = -3 \text{ m/s}$$

4

(iii)

$$d''(t) = 6t - 12$$
$$d''(3) = 6(3) - 12 = 6 \text{ m/s}$$

3

$$(iv) \quad t^3 - 6t^2 + 9t = 0 \quad \checkmark_{m}$$

$$t(t^2 - 6t + 9) = 0$$

$$t(t-3)(t-3) = 0$$

$$t=0 \quad \checkmark_{cv} \quad \text{OK} \quad t=3 \quad \checkmark_{cv}$$

3

$$(v) \quad d'(t) = 3t^2 - 12t + 9$$

$$3t^2 - 12t + 9 = 0$$

$$t^2 - 4t + 3 = 0$$

$$(t-3)(t-1) = 0$$

$$t=3$$

$$d(3) = 0$$

$$t=1$$

$$d(1) = 4$$

→ on graph sheet.

$$d''(t) = 6t - 12 = 0$$

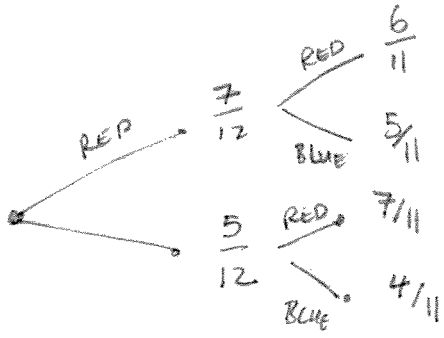
$$\therefore t = 2$$

$$d(2) = 2$$

30 27

① 7

a.



✓ tree
 ✓ first branch
 ✓ ca second branch

3.

b.

(i)

$$\frac{7}{12} \times \frac{6}{11} + \frac{7}{12} \times \frac{5}{11}$$

$$= \frac{7}{12} \left(\frac{6}{11} + \frac{5}{11} \right)$$

$$= \frac{7}{12} \checkmark \checkmark$$

2.

(ii)

$$= \frac{5}{12} \times \frac{4}{11} \checkmark \text{ca}$$

$$= \frac{20}{132} = \frac{5}{33} \checkmark \text{ca}$$

2.

(iii)

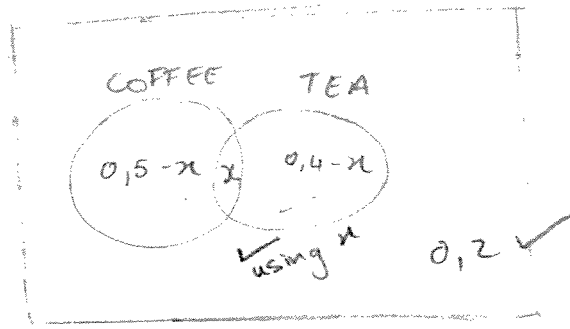
$$= \frac{7}{12} \times \frac{5}{11} + \frac{5}{12} \times \frac{7}{11} \checkmark \text{ca}$$

$$= \frac{35}{66} \checkmark \text{ca}$$

2.

9

Q8



a.)

$$0,5 - x + x + 0,4 - x + 0,2 = 1$$

✓ca

✓a

5.

$$x = 0,1 \quad \checkmark_{ca}$$

b.)

$$0,5 - 0,1$$

$$= 0,4 \quad \checkmark_{ca}$$

[7]².

Q9

a.

$$\sum_2^k \frac{1}{12} (7^{x-1}) = 80066 \frac{7}{12}$$

$$\frac{7}{12}, \frac{49}{12}, \frac{343}{12}, \dots \quad \checkmark_a$$

$$S_n = \frac{a(r^n - 1)}{r - 1} = \frac{7}{12} \frac{(7^n - 1)}{7 - 1} = \frac{7}{12} \frac{(7^n - 1)}{6}$$

subst Formeln

$$80066 \frac{7}{12} = \frac{7}{12} (7^n - 1)$$

$$823563 = 7^n \quad \checkmark_{ca}$$

$$n = 7 \quad \checkmark_{ca}$$

$$n = 8$$

6.

*

b).

$$r = 2x + 1 \sqrt{a}$$

$$-1 < 2x + 1 < 1 \sqrt{a}$$

$$-2 < 2x < 0$$

$$-1 < x < 0$$

$$\sqrt{c} \quad \sqrt{a}$$

4

[10]

Q10

$$1 + 12,68\% = \left(1 + \frac{r}{12}\right)^{12}$$

$$a. \quad 1,00999 = 1 + \frac{r}{12}$$

$$\therefore r = 0,119977$$

$$\therefore 11,2\%$$

3

b.

$$880\,000 = x \frac{\left(1 - \left(1 + \frac{12\%}{12}\right)^{-12 \times 20}\right)}{\frac{12\%}{12}} \sqrt{\frac{F}{5}}^{\sqrt{(x \cdot 12)}}$$

$$x = 9689,56$$

4

c.

$$OB = 880\,000 \left(1 + \frac{12\%}{12}\right)^{24 \times 12} - 9689,56 \frac{\left(\left(1 + \frac{12\%}{12}\right)^{24 \times 12} - 1\right)}{12\%} \sqrt{F}^{\sqrt{\text{subst}}}$$

$$= 22\,873\,60,174 - 15\,496\,24,77$$

$$= R.737\,735,40 \sqrt{c}$$

5

—————*

12

Q11

a(i) on graph. ✓ 2

$$(ii) \quad x-1 = 2^y \sqrt{a}$$

$$\log_2(x-1) = y$$

$$\therefore f^{-1}(x) = \log_2(x-1) \sqrt{a}$$

3

b. $3 \times 2^x = 2^k$

$$k = \log_2(3 \times 2^x)$$

2

7

Q12

a)

$$f(-3) = 9b - 3c + 15 = 0 \quad \checkmark_{\text{subst}}$$

$$f'(x) = -3x^2 + 2bx + c \quad \checkmark_m$$

$$f'(2) = -3(2)^2 + 2b(2) + c = 0 \quad \checkmark_{\text{subst}}$$

$$4b + c = 12$$

$$c = 12 - 4b \quad \checkmark_{ca}$$

$$9b - 3(12 - 4b) + 15 = 0 \quad \checkmark_{\text{subst}}$$

$$9b - 36 + 12b + 15 = 0$$

$$21b = 21$$

$$\therefore b = 1 \quad \checkmark_{ca}$$

$$4(1) + c = 12$$

$$\therefore c = 8 \quad \checkmark_{ca}$$

b)

$$y'(x) = 6x^2 - 3 = 3 \quad \checkmark_a \quad \checkmark_o$$

$$6x^2 = 6$$

$$x = \pm 1 \quad \checkmark_{ca} \quad \checkmark_{ca}$$

$$\text{if } x = 1$$

$$y = -2 \quad \checkmark_{ca}$$

subst:

$$-2 = 3(1) + p$$

$$\therefore p = -5 \quad \checkmark_{ca}$$

$\rightarrow x$

$$\text{if } x = -1$$

$$y = 0 \quad \checkmark_{ca}$$

$$0 = 3(-1) + p$$

$$\therefore p = 3 \quad \checkmark_{ca}$$

$\rightarrow x$

[15]

Q13.

(i) $RQ = -2x^2 + 6x - (2x)$
 $RQ = -2x^2 + 4x$

$\frac{d}{dx} RQ = -4x + 4 = 0$ 2

(ii) $\therefore x = 1$

$RQ = -2(1)^2 + 4(1)$
 $= 2$ units.

5

b)

(i) $r + h = 12$
 $\therefore r = 12 - h$

(ii) $V_{\text{cone}} = \frac{1}{3} \pi r^2 h$ subst.
 $= \frac{1}{3} \pi (12-h)^2 h$
 $= \frac{1}{3} \pi (144 - 24h + h^2) h$
 $= \frac{1}{3} \pi (144h - 24h^2 + h^3)$
 $= 48\pi h - 8\pi h^2 + \frac{1}{3} \pi h^3$
 $V' = 48\pi - 16\pi h + h^2 = 0$
 $h = 47.06$ OR $h = 3.2$ USE FORMULA
 $V = 29.50 \text{ units}^3 \cdot 8$

Q.3

(i)

$$V_c = \frac{1}{3} \pi r^2 (12 - r) \quad \checkmark_{\text{subst}}$$
$$= 4\pi r^2 - \frac{1}{3} \pi r^3$$

$\checkmark_a \quad \checkmark_a$

3.

(ii)

$$V'(r) = 8\pi r - \pi r^2 = 0 \quad \pi r(8-r) = 0$$

$\checkmark_a \quad \checkmark_a$

$$r = 0 \quad \checkmark_a \text{ OR } r = 8, \text{ max. volume} \quad \checkmark_c$$

\checkmark_a

$$V(8) = 268,08 \text{ mm}^3$$

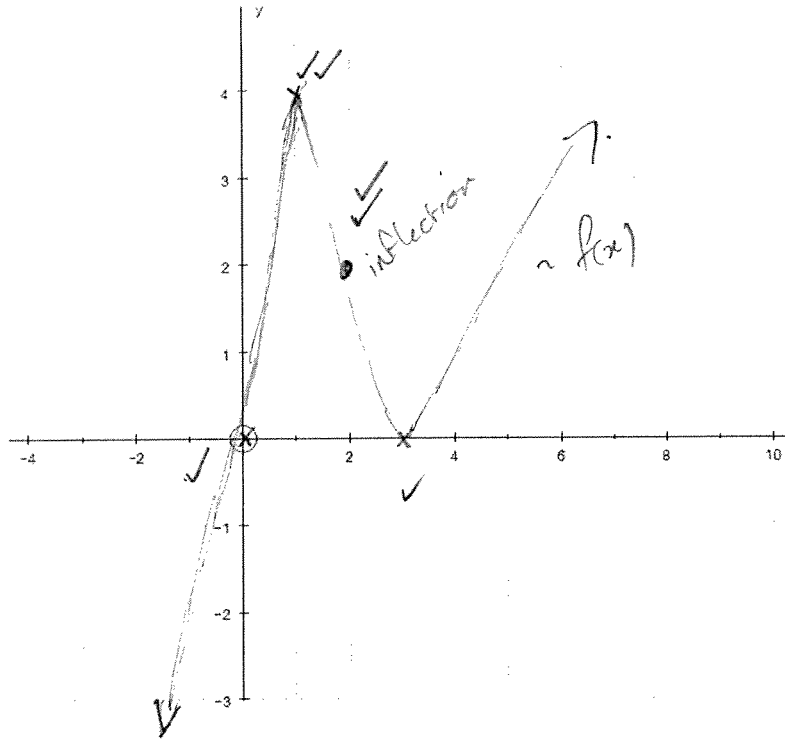
\checkmark_{ca}

[15]

ANSWER SHEET

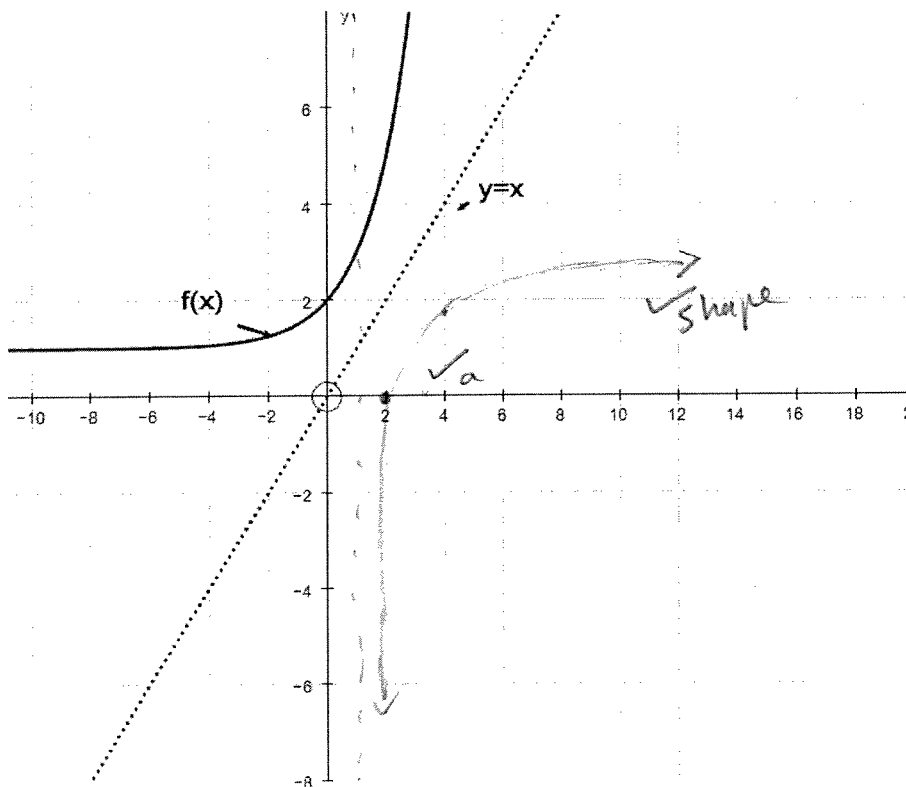
NAME: MEMO

Q6.b.v.



✓
6

Q11.a.i.



2

