

①

# 2017 Trials P1

Q1

a)  $D_K$

b)  $D_{CP}$

c)  $C_{RP}$

d)  $D_K$

e)  $C_{RP}$

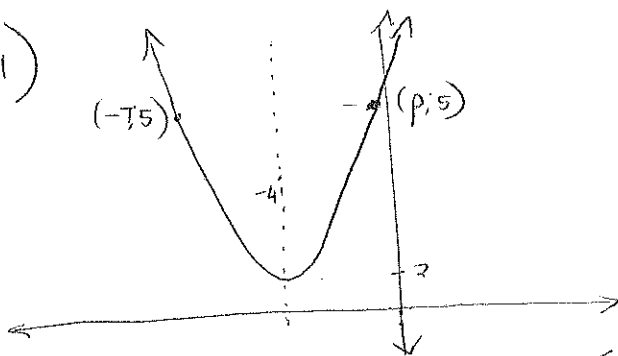
[9]

Q2

a)  $y = -\left(\frac{-4}{(x+1)-2}\right) = \frac{4}{x-1}$

(2) K

b) (1)



$$-4 = \frac{p-7}{2}$$

$$-8 = p-7$$

$$\therefore p = -1$$

(3) K

(2)

$$y = a(x+4)^2 + 2$$

$$(-7, 5) \Rightarrow 5 = a(-7+4)^2 + 2$$

$$3 = 9a$$

$$\therefore a = \frac{1}{3}$$

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

(4) RP

c)

(1)

$$(-2; 0) \Rightarrow 0 = a(-2)^3 + b(-2) + 8$$

$$0 = -8a - 2b + 8$$

$$0 = -4a - b + 4$$

$$\therefore b = -4a + 4$$

$$0 = 3ax^2 + b$$

$$0 = 3a(-2)^2 + b$$

$$\therefore b = -12a$$

$$-4a + 4 = -12a$$

$$8a = -4$$

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

$$\therefore b = -12\left(-\frac{1}{2}\right) = 6$$

(5) RP

(2)

$$(2) \quad y = -\frac{1}{2}x^3 + 6x + 8$$

$$0 = -\frac{3}{2}x^2 + 6 \checkmark$$

$$\frac{3}{2}x^2 = 6$$

$$x^2 = 4 \checkmark$$

$$\therefore x = \pm 2 \checkmark$$

$$x_Q = 2 \Rightarrow y = -\frac{1}{2}(2)^3 + 6(2) + 8 = 16$$

$\therefore Q(2; 16)$

(5) RP

$$(3) \quad t > 8 \quad \text{or} \quad t < -8$$

(2) K

Q3

$$a) \quad (1) \quad \frac{T_8}{T_3} = \frac{ar^7}{ar^2} \Rightarrow r^5 = \frac{1}{8} \checkmark$$

$$r^5 = \frac{1}{32}$$

$$\therefore r = \frac{1}{2} \checkmark$$

(3) RP

$$(2) \quad a \Rightarrow 8 = a\left(\frac{1}{2}\right)^2$$

$$\therefore a = 32 \checkmark$$

$$S_8 = \frac{(1 - (\frac{1}{2})^8)}{1 - \frac{1}{2}} \checkmark$$

$$= \frac{255}{4} \checkmark$$

(3) RP

$$b) \quad a = 2$$

$$T_2 = 4 \checkmark$$

$$T_3 = 6 \checkmark$$

$$420 = \frac{p}{2} [2 \times 2 + (p-1)2] \checkmark$$

$$840 = p(4 + 2p - 2)$$

$$840 = 2p + 2p^2$$

$$0 = p^2 + p - 420 \checkmark$$

$$0 = (p-20)(p+21) \checkmark$$

$$\therefore p = 20 \checkmark$$

(5) RP

3

c)

$$S_9 - S_8 = T_9$$

$$\therefore T_9 = 3(9)^2 - 1 - [3(8)^2 - 1]$$

$$= 242 - 191$$

$$= 51$$

3 (CP)

Q4

a)  $50 = 3200(1 - 0,13)^n$

$$\frac{1}{64} = (0,87)^n$$

$$\therefore n = \log_{0,87} \left( \frac{1}{64} \right)$$

$$= 29,9$$

$$\therefore n = 30 \text{ years}$$

4 (RP)

b) (1)  $22000 \left(1 + \frac{0,06}{12}\right)^{12 \times 17} - 12000 \left(1 + \frac{0,06}{12}\right)^{6 \times 12} - 12000$

$$= R 31\,670,89$$

4 (CP)

(2)  $12000(1 + 0,065)^6 = R 17\,509,71$

2 (K)

c) (1)  $7 \times 13\,550 \times 16,50 = R 1\,565\,025$

2 (K)

(2)  $i_{\text{eff}} = \left(1 + \frac{0,113}{4}\right)^4 - 1 = 0,1179 \therefore r = 11,8\%$

2 (K)

(3)  $1\,565\,025 = X \frac{[1 - \left(1 + \frac{0,113}{4}\right)^{-24}]}{\frac{0,113}{4}}$

$$\therefore X = R 906\,77,34$$

(3) RP

4

Q5

a) (1)  $5! = 120$  ✓

1 (K)

(2)  $4! \times 2! = 48$  ✓

2 (K)

b)  $\frac{3 \times 4}{5^2} = \frac{12}{5^2} = \frac{3}{13}$  ✓

3 (RP)

c) (1)  $x = 1 - (0,15 + 0,3 + 0,45) = \frac{1}{10}$  (or 0,1) ✓

1 (K)

(2)  $2 \times \frac{1}{10} \times 0,45 + 2 \times 0,15 \times 0,3 = 0,18$  ✓

3 (CP)

d)  $\frac{21 \times 5 \times 9 \times 10 \times 10 \times 10 \times 4}{1000000} = 3780000$  ✓

4 (CP)

Q6

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

$= \lim_{h \rightarrow 0} \frac{\frac{1}{2}x^2 + xh + \frac{1}{2}h^2 - \frac{1}{2}x^2}{h}$

$= \lim_{h \rightarrow 0} \frac{h(x + \frac{1}{2}h)}{h}$  ✓

$= x + \frac{1}{2}(0)$  ✓

$= x$  ✓

5 (RP)

b) (1)  $y = 4(x^2 - 8x + 16) = 4x^2 - 32x + 64$  ✓

$\therefore y' = 8x - 32$  ✓

3 (RP)

(2)  $y = \frac{2(x^3 - 8)}{x^2 + 2x + 4} = \frac{2(x-2)(x^2 + 2x + 4)}{(x^2 + 2x + 4)} = 2x - 4$  ✓

$\therefore y' = 2$  ✓

4 (CP)

5

$$c) \quad f(x) = \frac{3}{2} x^{-\frac{1}{2}} \quad f'(x) = \frac{3}{2} \times \left(-\frac{1}{2}\right) x^{-\frac{3}{2}}$$

$$= -\frac{3}{4} x^{-\frac{3}{2}}$$

$$\therefore f'(9) = -\frac{3}{4} \left[ \sqrt{9}^2 \right]^{-\frac{3}{2}}$$

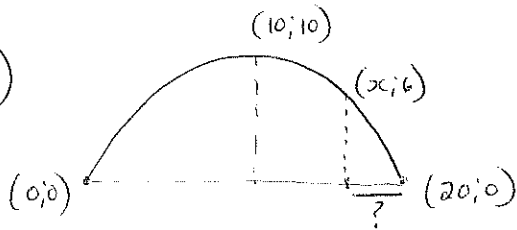
$$= -\frac{3}{4} \left( \sqrt{9} \right)^{-3}$$

$$= -\frac{1}{36} \checkmark$$

5 (CP)

7

a)



$$y = a(x-10)^2 + 10$$

$$(0, 0) \Rightarrow 0 = a(0-10)^2 + 10$$

$$100a = -10$$

$$a = -\frac{1}{10} \checkmark$$

$$\rightarrow y = -\frac{1}{10}(x-10)^2 + 10$$

$$6 = -\frac{1}{10}(x-10)^2 + 10$$

$$-4 = -\frac{1}{10}(x-10)^2$$

$$(x-10)^2 = 40 \checkmark$$

$$x = \sqrt{40} + 10$$

$$= 16,3 \checkmark$$

$$\therefore CB = 20 - 16,3 = 3,7 \text{ m}$$

7 (CP)

$$b) \quad \frac{x_1 + x_2}{2} = p \Rightarrow \frac{x-6}{2} = p \checkmark$$

$$x-6 = 2p$$

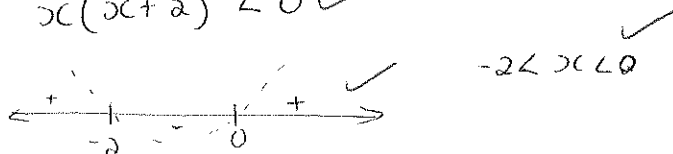
$$\therefore x = 6 + 2p \checkmark$$

3 (CP)

$$c) \quad 3x^2 + 6x < 0 \checkmark$$

$$x^2 + 2x < 0$$

$$x(x+2) < 0 \checkmark$$



$$-2 < x < 0 \checkmark$$

4 (RP)

6

Q8

$$(3)^3 + b(3) = c \Rightarrow 27 + 3b = c$$

$$(-1)^3 + b(-1) = c \Rightarrow -(-1 - b = c)$$

$$28 + 4b = 0 \checkmark$$

$$4b = -28$$

$$\therefore b = -7 \checkmark$$

$$\therefore c = 27 - 21 = 6 \checkmark$$

$$b + c = -7 + 6 = -1 \checkmark$$

6 (CP)

Q9

a)  $f'(x) = 3kx^2 + 1 \checkmark$

$$f'(1) = 3k + 1$$

$$-5 = 3k + 1 \checkmark$$

$$\therefore 3k = -6$$

$$k = -2 \checkmark$$

$$f(x) = -2x^3 + x$$

$$f(1) = -2(1)^3 + (1) \checkmark$$

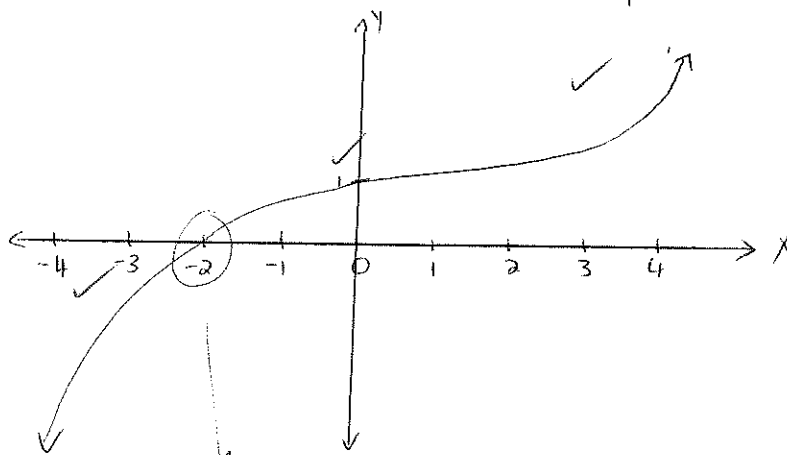
$$= -1 \checkmark$$

$$(1, -1) \Rightarrow -1 = -5(1) + p \checkmark$$

$$\therefore p = 4 \checkmark$$

7 (CP)

b)

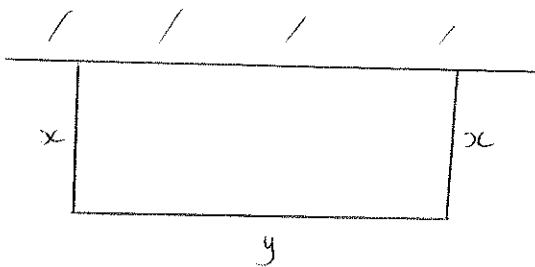


only a suggestion  
(mark slope)

3 (CP)

(7)

c)



$$2x + y = 82$$

$$y = 82 - 2x \checkmark$$

$$\text{Area} = (82 - 2x)(x) \checkmark$$

$$= 82x - 2x^2 \checkmark$$

$$\therefore A' = 0 = 82 - 4x \checkmark$$

$$4x = 82$$

$$x = 20\frac{1}{2} \text{ m} \checkmark$$

$$y = 41 \text{ m} \checkmark$$

6 (CP)

Q10

$$a) \log \frac{7}{6} + \log \frac{8}{7} + \log \frac{9}{8} + \dots + \log \frac{35}{34} + \log \frac{36}{35} \checkmark$$

$$= \log 7 - \log 6 + \log 8 - \log 7 + \log 9 - \log 8 + \dots \log 36 - \log 35$$

$$= \log 36 - \log 6 \checkmark$$

$$= \log \frac{36}{6} \checkmark$$

$$= \log 6$$

$$= 0,8$$

4 (PS)

8

$$b) (199 - 197) + (195 - 193) + (191 - 189) + \dots + (7 - 5) + (3 - 1) = x$$

$$a = 3$$

$$T_{\text{last}} = 199$$

$$d = 4$$

$$n = ?$$

$$199 = 3 + (n-1)4$$

$$196 = 4n - 4$$

$$\therefore 4n = 200$$

$$n = 50$$

$$\therefore x = 2 \times 50$$

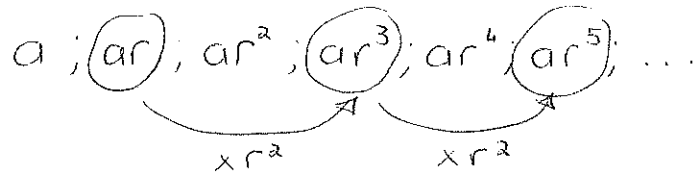
$$= 100$$

5 (PS)

Q11

$$S_{\infty} = 24 = \frac{a}{1-r}$$

$$a = 24(1-r)$$



$$S_{\infty} = 6 = \frac{ar}{1-r^2}$$

$$ar = 6(1-r^2)$$

$$a = \frac{6(1-r^2)}{r}$$

$$\therefore 24(1-r) = \frac{6(1-r)(1+r)}{r}$$

$$4 = \frac{(1+r)}{r}$$

$$4r = 1 + r$$

$$3r = 1$$

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

$$a = 24\left(1 - \frac{1}{3}\right)$$

$$= 16$$

$$\therefore 16; \frac{16}{3}; \frac{16}{9}; \dots$$

7 (PS)



(9)

Q12

$$P = 200 - \frac{625}{T} - (20 + T)$$

$$= 180 - \frac{625}{T} - T$$

$$= 180 - 625T^{-1} - T$$

$$\therefore P' = 0 = 625T^{-2} - 1$$

$$0 = \frac{625}{T^2} - 1$$

$$\frac{625}{T^2} = 1$$

$$T^2 = 625$$

$$\therefore T = 25^\circ\text{C}$$

6 (PS)

$$\left. \begin{array}{l} K : \frac{20}{150} = 13,3\% \\ RP : \frac{55}{150} = 36,7\% \end{array} \right\} 50\%$$

$$\left. \begin{array}{l} CP : \frac{53}{150} = 35,3\% \\ PS : \frac{22}{150} = 14,7\% \end{array} \right\} 50\%$$