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QUESTION 1 [18 MARKS] Downloaded from eduresourceza.com

- (a) $x^2 - x - 30 = 0$ 1A
 $(x - 6)(x + 5) = 0$ 1CA
 $x = 6$ or $x = -5$ 1CA
[3]
- (b) $\sqrt{x+1} = x+1$ 1A
 $x+1 = x^2 + 2x = 1$
 $x^2 + x - 6 = 0$
 $(x+3)(x-2) = 0$ 1CA
 $x = -3$ n.a. or $x = 2$ 2CA
[4]
- (c) $3^x(9-1) = 72$ 1M
 $3^x = 9$ 1CA
 $x = 2$ 1CA
[3]
- (d) $x(x-1) > 12$ 1A
 $x^2 - x - 12 > 0$ 1CA
 $(x-4)(x+3) > 0$ 1CA for critical values
 $x > 4$ or $x < -3$ 2CA (-1 if 'and' is used)
[5]
- (e) $\log\left(\frac{x}{4}\right) = \log(x-4)$ 1A
 $\frac{x}{4} = x-4$ 1CA
 $x = \frac{16}{3}$ 1CA
[3]

QUESTION 2 [13 MARKS]

- (a) Lydia: Geometric sequence
 $a = 4$; $r = 2$ 1A for Geom
 Abdul: Quadratic sequence – second diff = 4 1A for Quadratic
[2]
- (b) $a = 2$; $b = -2$; $c = 4$ 3A any method
[3]
- (c) $2n^2 - 2n - 264 = 0$ 1A
 $n^2 - n - 132 = 0$ 1CA
 $(n-12)(n+11) = 0$ 1CA
 $\therefore 11^{\text{th}}$ term. 1CA
[4]
- (d) $S_{18} = \frac{16(2^{18} - 1)}{2 - 1}$ 1A for 18
 $= 4194\ 288$ 1M sum formula
 1A correct substitution
 1CA
[4]

QUESTION 3

Downloaded from eduresourceza.com
[15 MARKS]

(a)

$$F_v = \frac{5000 \left(\left(1 + \frac{0,095}{4} \right)^{20} - 1 \right)}{\frac{0,095}{4}}$$

$$= R126128,39$$

1A subst into correct formula
1M choice of correct formula

1A $i = \frac{0,095}{4}$

1 CA

[4]

(b) (1)

$$780000 = \frac{x \left[1 - \left(1 + \frac{0,17}{12} \right)^{-240} \right]}{\frac{0,17}{12}}$$

1A correct sub into correct formula

1A for $n = 240$; $i = \frac{0,17}{12}$

$$x = 11\,441,04$$

1CA

[3]

1M

1A for $n = 96$

1A for substitution

(2)

$$OB = 780000 \left(1 + \frac{0,17}{12} \right)^{96} - 11441,04 \left(\frac{\left(1 + \frac{0,17}{12} \right)^{96} - 1}{\frac{0,17}{12}} \right)$$

1CA

$$= 701078,35$$

or

$$OB = \frac{11441,04 \left[1 - \left(1 + \frac{0,17}{12} \right)^{-144} \right]}{\frac{0,17}{12}}$$

$$= 701077,22$$

(c)

$$701078,35 = \frac{x \left[1 - \left(1 + \frac{0,19}{12} \right)^{-144} \right]}{\frac{0,19}{12}}$$

[4]

1M

1A $n = 144$

1CA correct substitution

$$x = \frac{701078,35 \left(\frac{0,19}{12} \right)}{\left[1 - \left(1 + \frac{0,19}{12} \right)^{-144} \right]}$$

$$x = R12390,61 \text{ or } R12390,59$$

1CA

[4]

QUESTION 4 [12 MARKS] Downloaded from eduresourceza.com

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

$$= \lim_{h \rightarrow 0} \frac{-4xh - 2h^2}{h}$$

$$= \lim_{h \rightarrow 0} (-4x - h)$$

$$\therefore f'(x) = -4x$$

2A

1CA

1 CA

1CA

[5]

(b)
$$y = \frac{4}{x}$$

$$y = 4x^{-1}$$

$$\frac{dy}{dx} = -4x^{-2}$$

$$\frac{dy}{dx} = \frac{-4}{x^2}$$

1A

1CA

1CA

[3]

(c) (1)
$$y = x^4 + 2 + x^{-4}$$

$$\frac{dy}{dx} = 4x^3 - 4x^{-5}$$

$$= 4x^3 - \frac{4}{x^5}$$

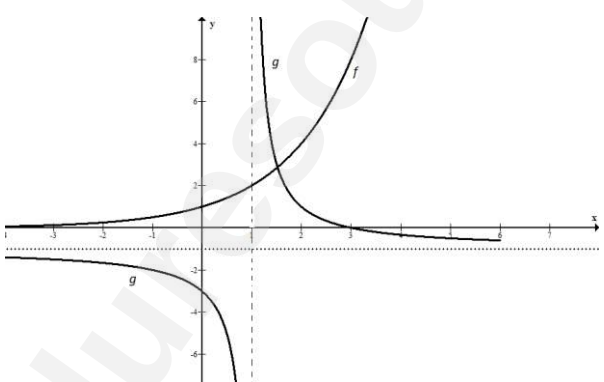
1A

2CA

1CA

[4]

QUESTION 5 [12 MARKS]

(a) 

2A Shapes

1A y – intercept

1 asymptotes

[4]

1A

[1]

1 A

1CA

[2]

(d)
$$g(x-2) + 1 = \frac{2}{x-3}$$

2A

[2]

(e) Passing through (1; -1); $m = -1$

$$y + 1 = -(x - 1)$$

$$y = -x$$

1A for gradient

1A for (1; -1)

1CA for equation

Answer only full marks

[3]

QUESTION 6

Downloaded from eduresourceza.com
[12 MARKS]

- (a) $f'(x) = -4$ 1A
 $-4x + 4 = -4$ 1CA
 $x = 2$
 Sub into f : $y = -2(2)^2 + 4(2) + 6$
 $y = 6$ 1CA
 Equ of straight line: $y - 6 = -4(x - 2)$ 1CA
 $y = -4x + 14$ 1CA
[5]
- (b) $PQ = -4x + 12 - (-2x^2 + 4x + 6)$ 1M
 $= 2x^2 - 8x + 6$ 1A
 $4x - 8 = 0$ 1CA or any other way
 $x = 2$ 1CA
 OR
 $x = \frac{-b}{2a}$ 1CA
 $x = \frac{8}{4}$ 1CA
 OR
 $PQ = 2(x - 2)^2 + 4$ 1CA
 $x = 2$ 1CA
[4]
- (c) $\frac{x-12}{-4} = -4x + 4$ 2A
 $x = \frac{4}{15}$ 1A only if previous is correct
[3]

SECTION B

QUESTION 7

[6 MARKS]

- (a) $\left(-\frac{1}{x} - \frac{1}{x}\right) + \left(x - \frac{1}{-\frac{1}{x}}\right) = 3$ 2A
 $2x^2 - 3x - 2 = 0$ 1CA
 $(2x + 1)(x - 2) = 0$ 1CA
 $x = -\frac{1}{2}$ **or** $x = 2$ 1 CA (or 2CA for both answers)
 $y = 2$ or $y = -\frac{1}{2}$ 1CA for both values
[6]

QUESTION 8 [8 MARKS]

- (a) $2 = \log_a 9$ 1A for (9; 2)
 $a = 3$ 1M correct formula
 $y = \log_3 x$ 1CA
 Full marks for answer only
[3]
- (b) $[-9; 0)$ 1A
[2]
- (c) $-f(-9) + 1$ 1A
 $= -2 + 1$ 1A
 $p = -1$ Full marks for answer only
[2]
- (d) (1) $\log_a x^3 = 3\log_a x$ 1A
[1]

QUESTION 9 [7 MARKS]

- (a) $f(1) = -2(3)^3 + 23(3)^2 - 59(3) + 24$ 1M
 $= 0$ 1CA
 $(x-3)(2x^2 - 17x + 8) = 0$ 1CA
 $(x-3)(2x-1)(x-8) = 0$ 1CA
 Underground between 0,5 sec and 3seconds 1CA
 $\therefore$ for $2\frac{1}{2}$ seconds.
[4]
- (b) $f'(x) = -6x^2 + 46x - 59$ 1A
 $f''(x) = -12x + 46 = 0$ 1CA
 $x = \frac{23}{6}$
 after $3\frac{5}{6}$ seconds 1CA
 or
 $x = \frac{6,04 + 1,63}{2}$ 1M
 $x = 3,83$ seconds 1A
 1CA
[3]

QUESTION 10

[20 MARKS]

- (a) (1) $M'(t) = -0,003t^2 + 0,2t$ 1A
 $M'(10) = -0,003(10)^2 + 0,2(10)$
 $= 1,7$ words/minute 1CA
 [2]
- (2) $M(2) = -0,001(8) + 0,1(4)$
 $= 0,392$ 1A
 $M(10) = -0,001(10)^3 + 0,1(10)^2$
 $= 9$ 1A
 Average number of words: $\frac{9 - 0,392}{10 - 2}$ 1CA
 $= 1,076$ words/minute 1CA
 [4]
- (3) $-0,003t^2 + 0,2t = 0$ 1A
 $t = 66,6$ 1CA
 $M = -0,001(66,6)^3 + 0,1(66,6)^2$
 $= 148$ words 1CA
 [3]
- (b) (1) $3x^2 + 8x - 3 = 0$ 1A
 $x = \frac{1}{3}$ or $x = -3$ 2 CA for each x-value
 [3]
- (2) $6x + 8 < 0$ 1A
 $x < -\frac{4}{3}$ 1CA
 [2]
- (3) $x \in (-\infty; -3] \cup \left[\frac{1}{3}; \infty\right)$ 2CA
 [2]
- (4) $3ax^2 + 2bx + c = 3x^2 + 8x - 3$ 1M 1A
 $a = 1; b = 4; c = -3; d = -18$ 2 CA
 [4]

QUESTION 11

[14 MARKS] Downloaded from eduresourceza.com

- (a) (1) Mutually exclusive
(1) Inclusive

1A

1A

[2]

- (b) (1) $5! = 120$ ways

2A

[2]

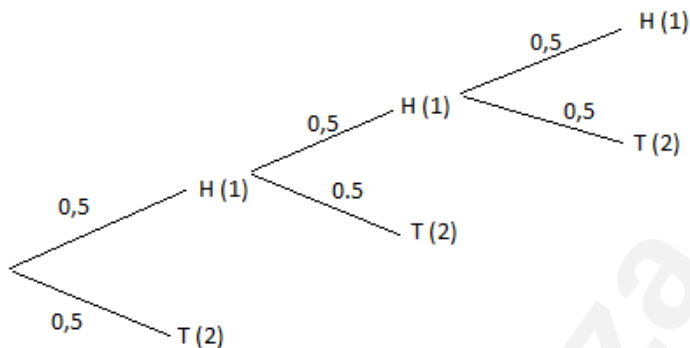
- (2) $5! - 2! \times 4!$
 $= 72$ ways

3A

1CA

[4]

- (c)



3A

$$P(3 \text{ points}) = \left(\frac{1}{2}\right)^3 + \left(\frac{1}{2}\right)^2$$

$$= \frac{3}{8}$$

2A

1CA

Answers without tree diagram – full marks

[6]

QUESTION 12

[13 MARKS]

- (a) $a = 30$; $b = 21$; $c = 102$

3A

[3]

- (b) $d = 84(0.5)^9$ $e = 60(0.5)^9$
 $= \frac{21}{128}$ $= \frac{15}{128}$

2 A

2CA

[4]

- (c) $120(84)$; $84(60)$; $60(42)$; $42(30)$
 $= 10080$; 5040 ; 2520 ; 1260

1M; 1A

1CA

[3]

- (d) $S_{\infty} = \frac{10080}{1 - 0,5}$
 $= 20160 \text{ cm}^2$

1M; 1A substitution

1CA

[3]