

Sec 4/5 Preliminary Examination 2019
Additional Mathematics Paper 1
Answer Key

1(i)	$k > \frac{25}{12}$	1(ii)	For values of $k > \frac{25}{12}$, $3x^2 - 5x + k > 0$ $\therefore (x-2)^2 \geq 0$ for all real values of x . Therefore $\frac{(x-2)^2}{3x^2 - 5x + k} \geq 0$
2	$x = 16$	3	$-\frac{621}{200}$ or $-3\frac{21}{200}$ or -3.105 .
4(i)		4(ii)	$y = -2x + 1$
		4(iii)	0 solutions
5	20	6(ii)	$x = -23.6^\circ, -156.4^\circ, 203.6^\circ, 336.4^\circ$
7(i)	12 cm	7(ii)	$\frac{1}{4} \text{ cm}^2/\text{s}$
7(iii)	The rate will decrease. Since $\frac{dr}{dt} = \frac{3}{r}$ (as $r \uparrow$, $\frac{dr}{dt} \downarrow$)	8(i)	$2x - 3 - \frac{2}{3x+2} + \frac{1}{2x-1}$
8(ii)	$x^2 - 3x - \frac{3}{2} \ln 3x+2 + \frac{1}{2} \ln 2x-1 + c$	9	$y = \frac{3}{2}x^3 - 3x^2 + \frac{3}{2}x + 4$
10(ii)(a)	$p = 2.0$ (Accept 1.9 – 2.1) $q = 3.0$ (Accept 2.5 – 3.1)	10(ii)(b)	$x = 4.39$ (Accept 4.36 – 4.49)
11(i)	$y = x - 3$	11(ii)	$O(9, 0)$ $S(3, 6)$
11(iii)	$T(-15, 24)$	11(iv)	96 units ²
11(v)	18.8 units	12(iii)	$x = \frac{2}{3}$ Maximum $V = 9.93 \text{ cm}^3$

~ End of Paper ~

Sec 4 Express Prelim Examination 2019

Additional Mathematics Paper 2

Answer Key

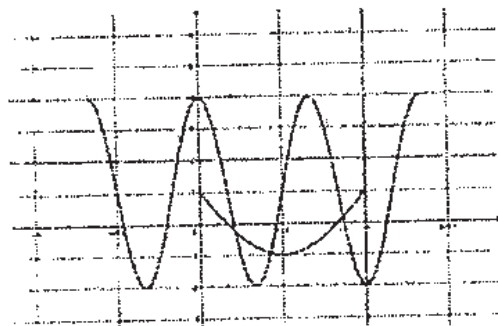
1. $h = 2 + \sqrt{3}$

2. (ii) 50

(iii) As t becomes very large, $e^{-0.14t}$ approaches zero.Therefore, P approaches 100.This means that the population of Cockatoos will not exceed 100.

3 (i) $a = 3, b = 3, c = 1$

(ii)



4(i) $\frac{dy}{dx} = \frac{18}{(3+x)(5x-3)}$

4(ii) For $x > \frac{3}{5}$, $5x-3 > 0$.

Since $(3+x) > 0$ and $(5x-3) > 0$ for $x > \frac{3}{5}$,

$$\Rightarrow (3+x)(5x-3) > 0$$

$$\therefore -\frac{18}{(3+x)(5x-3)} < 0 \text{ for } x > \frac{3}{5}$$

$$\Rightarrow \frac{dy}{dx} < 0$$

Thus, y is a decreasing function for $x > \frac{3}{5}$ (Shown)

5(ii) $\therefore a = -3\frac{309}{343}, b = 3\frac{276}{343}$

6(i) $\frac{3}{4}$

6(ii) $C(0, -2)$

6(iii) $D(-6, 6)$

6(iv) 50 units²

7(a) $x = 3, y = 4$

7(b) $x = 1$ or 2.46 (to 3 s.f.)

7(c) $c = p - 3q$

8(ii) $f(x) = (3x-2)(2x^2+9)$

8(iii) $\frac{2}{3x-2} - \frac{4x+5}{2x^2+9}$

9(i) $PQ = \frac{5}{3}(15-x)$

9(iii) -0.0918 (to 3 s.f.) or $-\frac{9}{98}$ cm/s

10(i) $2 + \frac{2}{2x-1}$

10(ii) $\frac{4x}{2x-1} + 2\ln(2x-1)$

10(iii) $x\ln(2x-1) - x - \frac{1}{2}\ln(2x-1) + c$

11(ii) $P = 30\cos(\theta - 36.9^\circ)$ (to 1 d.p.)

11(iii) Max. $P = 30$ when $\theta = 36.9^\circ$

11(iv) $\theta = 15.8^\circ, 57.9^\circ$

12(i) $4\frac{4}{5}$ m/s

12(ii) $\ln 25$ or 3.22 (to 3 s.f.)

12(iii) -0.2 m/s²

12(iv) 4.35 m (to 3 s.f.)

