HSC Mathematics 2002
Quick Answers

Disclaimer

These answers are intended as a quick guide only. To save space there are no proofs or diagrams. For greater detail please refer to fully worked solutions.

Question 1

(a) 0.0714

(b) $3x^2$.

(c) $x = 0$ or $x = 5$

(d) $3\ln x + c$

(e) $x = \frac{7}{4}$.

(f) $x = 2,\ y = -3$.

Question 2

(a) $y = 2x + 1$

(b) (i) $\sin x + x\cos x$

(ii) $\frac{1 - 2\ln x}{x^3}$

(c) $\frac{\sqrt{6}}{2}$.

(d) (i) $\frac{1}{3}\sin 3x + c$

(ii) $\frac{e^5 - 6}{5}$

Question 3

(a) \$1989.79

(b) $x = 72°$.

(c) (i) $\left(1\frac{1}{2}, 3\frac{1}{2}\right)$

(iii) C is the point $(0,3)$.

(iv) D is the point $(6,5)$.

(v) $7\frac{1}{2}$ square units.

Question 4

(a) $x \le -2$ or $x \ge 4$.

(b) $\theta = 66°$ or $\theta = 294°$.

(c) (i) $MN \approx 11.74$ metres.

(ii) Area ≈ 21.74 square metres.

(d) (ii) $10\frac{2}{3}$ square units.

Question 5

(a) (i) 21 times.

(ii) 714 metres.

(b) $\theta \approx 109°$.

(c) (i) $(4,-12)$.

(ii) $\left(4,-11\frac{3}{4}\right)$.

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Question 6

(a) $0 \le y \le 2$.

(b) (i) $f(x) = x^3 - 3x^2 - 9x + 12$.

(ii) Max TP at $(-1,17)$; Min TP at $(3,-15)$; y-intercept of 12.

(iii) Curve is concave up when $x > 1$.

(c) $\frac{32\pi}{3}$ cubic units.

Question 7

(a) (i) Because the common ratio is $(\sqrt{5} - 2)$ which is between -1 and 1.

(ii) $\frac{3 + \sqrt{5}}{4}$.

(b) (i) 25 Litres.

(ii) 30 seconds.

(iii) $\frac{5}{12}$ L/s.

(c) (i) After selecting one sock, there are 6 of the remaining 7 that won't match the first one.

(ii) $\frac{4}{7}$

(iii) $\frac{3}{7}$

Question 8

(a) (i) $Q_0 = 6$, $k = \frac{\log_e 2}{15} \approx 0.046$.

(ii) After 45 hours.

(b) (ii) $t = \frac{\pi}{4}$, $x = 4$.

$t = \frac{3\pi}{4}$, $x = 2$.

$t = \frac{5\pi}{4}$, $x = 4$.

$t = \frac{7\pi}{4}$, $x = 2$.

(iii) Particle moves back and forth on a straight line between $x = 2$ and $x = 4$. It takes π seconds for each oscillation.

Question 9

(a) (ii) 1.29

(b) $299 604.86

(c) (i) $v_1 = 10t$

(ii) $41\frac{2}{3}$ m.

(iii) $7\frac{1}{2}$ seconds.

Question 10

(b) (iii) While $x < -\sqrt{60}$, brightness is increasing. When $-\sqrt{60} < x < 0$ brightness is decreasing. When $0 < x < \sqrt{60}$ brightness increases. When $x > \sqrt{60}$ brightness decreases.

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