

# [Integration](https://assignbuster.com/integration/)

http://sahatmozac. blogspot. com ADDITIONAL MATHEMATICS FORM 5 MODULE 4 INTEGRATION http://mathsmozac. blogspot. com http://sahatmozac. blogspot. com CHAPTER 3 : INTEGRATION Content Concept Map page 2 3–4 5 6 7 8–9 10 – 11 12 4. 1 Integration of Algebraic Functions Exercise A 4. 2 The Equation of a Curve from Functions of Gradients. Exercise B SPM Question Assessment Answer http://mathsmozac. blogspot. com 1 http://sahatmozac. blogspot. com Indefinite Integral a) o o a x n a dx = ax + c. xn+ 1 + c. n+ 1 b) x n dx = c ) o d x = a o x n d x = a n x + n + 1 1 + c . Integration of Algebraic Functions ) ) The [f (x) ± g(x) ]dx = o f (x) dx ± d o Equation of a Curve from Functions of Gradients o g(x)dx y = y = o f '( x ) d x c, f (x) + http://mathsmozac. blogspot. com 2 http://sahatmozac. blogspot. com INTEGRATION 1. Integration is the reverse process of differentiation. dy 2. If y is a function of x and = f '( x) then o f '( x)dx = y + c, c = constant. dx If dy = f ( x ), then dx o f ( x)dx = y 4. 1. Integration of Algebraic Functions Indefinite Integral a) b) o o a dx = ax + c. n a and c are constants xn+ 1 x dx = + c. n+ 1 n c is constant, n is an integer and n ? - c) o ax dx = a o ax n + 1 x dx = + c. n+ 1 n and c are constants n is an d) o [f ( x ) ± g ( x ) ]dx = o f ( x) dx ± o g ( x)dx http://mathsmozac. blogspot. com 3 http://sahatmozac. blogspot. com Find the indefinite integral for each of the following. a ) ? 5dx b) ? x 3 dx c) ? 2 x dx 5 d) ? ( x ? 3x 2 )dx Always remember to include ‘+c’ in your answers of indefinite integrals. Solution : a) ? 5dx ? 5x ? c b) 3 ? x dx ? x3? 1 ? c 3 ? 1 x4 = ? c 4 2 c) 5 ? 2 x dx ? 2 x5? 1 ? c 5 ? 1 2 x6 = ? c 6 1 = x6 ? c 3 d) ? ( x ? 3x )dx ? ? xdx ? ? 3x 2 dx = x 2 3 x3 ? ? c 2 3 x2 = ? x3 ? c 2 Find the indefinite integral for each of the following. a) ? ? x ? 3x ? dx 2 x 4 b) ? x ? x 2 4 ? ? ? 3 ? ? dx x ? ? a) Solution : x ? 3x2 ? ? x 4 ? dx ? ? x 3x2 ? ? ? x4 ? x4 ? dx ? ? b) 2 4? ? ? 2 4? ? 3 ? 4 ? dx = ? ? 3x ? 2 ? dx x ? x ? ? ? = ? 3x2 ? 4 x ? 2 dx ? x ? 1 ? 3x 3 = ? 4? ?? c 3 ? ? 1 ? 4 = x3 ? ? c x ? ? x? 3 ? 3x? 2 dx ? x? 1 ? x? 2 = ? 3? ?? c ? 2 ? ? 1 ? 1 3 =? 2 ? ? c 2x x ? ? ? ? http://mathsmozac. blogspot. com 4 http://sahatmozac. blogspot. com 1. Find ? ? 3x 2 ? 4 x ? 10 dx. ? [3m] 2. Find ? ? x 2 ? 1 ? 2 x ? 3 ? dx. ? [3m] 1? ? 3. Find ? ? 2 x ? ? dx. x? ? 2 [3m] 4. Find ? ? 2x ? ? 3 ? x? 3 ? ? 2 ? dx. 4 x ? [3m] 6x ? 5 5. Integrate with respect to x. x3 [3m] 6. Find ? ? x 5 ? 4x2 2x 4 ? dx [3m] 3 ? ? 7. Find ? x ? 6 ? 6 ? x . x ? ? 2 [3m] 8. Integrate x 2 ? 3x ? 2 with respect to x. x ? 1 [3m] http://mathsmozac. blogspot. com 5 http://sahatmozac. blogspot. com The Equation of a Curve from Functions of Gradients dy ? f '( x), then the equation of the curve is dx If the gradient function of the curve is y ? ? f '( x ) dx c is constant. y ? f ( x) ? c, Find the equation of the curve that has the gradient function 3x ? 2 and passes through the point (2, ? 3). Solution The gradient function is 3x ? 2. dy ? 3x ? 2 dx y ? ? (3x ? 2)dx y? 3x2 ? 2x ? c 2 The curve passes through the point (2, ? 3). Thus, x = 2, y = ? 3. 3(2) 2 ? 3 ? ? 2x ? c 2 ? 3 ? 6 ? 4 ? c c ? 5 Hence, the equation of curve is y? 3x 2 ? 2x ? 5 2 http://mathsmozac. blogspot. com 6 http://sahatmozac. blogspot. com 1. Given that dy ? 6 x ? 2 , express y in terms of x if y = 9 when x = 2. dx 2. Given the gradient function of a curve is 4x ? 1. Find the equation of the curve if it passes through the point (? 1, 6). 3. The gradient function of a curve is given by dy 48 ? kx ? 3 , where k is a constant. dx x Given that the tangent to the curve at the point (-2, 14) is parallel to the x-axis, find the equation of the curve. http://mathsmozac. blogspot. com 7 http://sahatmozac. blogspot. com SPM 2003- Paper 2 : Question 3 (a) Given that y ? 2 x ? 2 and y = 6 when x = ? 1, find y in terms of x. dx [3 marks] SPM 2004- Paper 2 : Question 5(a) The gradient function of a curve which passes through A(1, ? 12) is 3 x 2 ? 6 x. Find the equation of the curve. [3 marks] http://mathsmozac. blogspot. com 8 http://sahatmozac. blogspot. com SPM 2005- Paper 2 : Question 2 A curve has a gradient function px 2 ? 4 x , where p is a constant. The tangent to the curve at the point (1, 3) is parallel to the straight line y + x ? 5 = 0. Find (a) the value of p, [3 marks] (b) the equation of the curve. [3 marks] http://mathsmozac. blogspot. com 9 http://sahatmozac. blogspot. com 1.

Find the indefinite integral for each of the following. (a) ? ? 4x 3 ? 3 x ? 2 dx ? (b) ?? 3? x ? ? 2 2 ? 6? ? dx x3 ? 1 ? 2 ( c) (c) ? ? x 5 + 5 6x ? 3 ? ? dx ? ? x2 ? 3 (d) ? ? ? x2 ? ? ? 2 ? ? dx ? ? 2. If dy ? 4 x3 ? 4 x, and y = 0 when x = 2, find y in terms of x. dx http://mathsmozac. blogspot. com 10 http://sahatmozac. blogspot. com 3. If dp v3 ? 2v ? , and p = 0 when v = 0, find the value of p when v = 1. dv 2 4. Find the equation of the curve with gradient 2 x 2 ? 3 x ? 1, which passes through the origin. 5. d2y dy dy Given that ? 4 x, and that ? 0, y = 2 when x = 0. Find and y in terms 2 dx dx dx of x. http://mathsmozac. blogspot. om 11 http://sahatmozac. blogspot. com EXERCISE A 1) 2) 3) 4) 5) 6) 7) 8) x ? 2 x ? 10 x ? c 3 2 SPM QUESTIONS 1) y ? x2 ? 2x ? 7 2) y ? x3 ? 3 x 2 ? 10 3) p ? 3, y ? x3 ? 2 x 2 ? 4 x4 ? x3 ? 3x ? c 2 4 3 1 x ? 4x ? ? c 3 x 4 2 x x 1 ? ? 3 ? 2x ? c 2 2 x 6 5 ? ? 2 x 2x 2 x 2 ? ? c 4 x 1 2 x3 ? 3 ? c x 2 x ? 2x ? c 2 ASSESSMENT 1) (a ) x 4 ? 3 2 x ? 2x ? c 2 2 3 (b) 3x ? ? 2 ? c x x 6 x 1 (c ) ? ? c 9 24 x 4 x3 9 (d ) ? 6x ? ? c 3 x y ? x4 ? 2 x2 ? 8 p? 7 8 2 3 3 2 x ? x ? x 3 2 2 3 x ? 2 3 EXERCISE B 1) y ? 3x 2 ? 2 x ? 1 3 x 2 24 ? 2 ? 2 2 x 2) 2) y ? 2 x 2 ? x ? 3 3) y ? 3) 4) y? 5) y? http://mathsmozac. blogspot. com 12 http://sahatmozac. logspot. com ADDITIONAL MATHEMATICS FORM 5 MODULE 5 INTEGRATION http://mathsmozac. blogspot. com 13 http://sahatmozac. blogspot. com CONTENT CONCEPT MAP INTEGRATION BY SUBSTITUTION DEFINITE INTEGRALS EXERCISE A EXERCISE B ASSESSMENT SPM QUESTIOS ANSWERS 2 3 5 6 7 8 9 10 http://mathsmozac. blogspot. com 14 http://sahatmozac. blogspot. com CONCEPT MAP INTEGRATION BY SUBSTITUTION un ? ax ? b ? dx ? ? du ? a n DEFINITE INTEGRALS If b d g(x) ? f (x) then dx b where u = ax + b, a and b are constants, n is an integer and n ? -1 OR (a) ? f (x)dx ?? g(x)? ? g(b) ? g(a) a a (b) ? f (x)dx ??? f (x)dx a a b b (c) ? f (x)dx ?? f (x)dx ? ? f (x)dx a b a b c ? ax ? b ? ? ? ax ? b ? dx ? a ? n ? 1? n n ? 1 ? c, where a, b, and c are constants, n is integer and n ? -1 http://mathsmozac. blogspot. com 15 http://sahatmozac. blogspot. com INTEGRATION BY SUBSTITUTION un ? ? ax ? b ? dx ? ? a du n where u = ax + b, a and b are constants, n is an integer and n ? -1 O R ? ax ? b ? ? ? ax ? b ? dx ? a ? n ? 1? n n ? 1 ? c, where a, b, and c are constants, n is integer and n ? -1 Find the indefinite integral for each of the following. (a) ? ? 2 x ? 1? dx 3 (b) ? 4(3 x ? 5)7 dx 2 (c) ? dx (5 x ? 3)3 SOLUTION (a) ? ? 2 x ? 1? dx 3 Let u = 2x +1 du du ? 2 ? dx ? dx 2 3 3 ? du ? ? (2 x ? 1) dx ? ? u ? ? ? ? u3 = ? du 2 u 3 ? 1 = ? c 2(3 ? 1) u4 +c 8 (2 x ? 1) = +c 8 = Substitute 2x+1 and substitute dx with du dx = 2 OR (2 x ? 1) 4 ? c ? (2 x ? 1) dx ? 2(4) 3 = ? 2 x ? 1? 8 4 ? c Substitute u = 2x +1 http://mathsmozac. blogspot. com 16 http://sahatmozac. blogspot. com (b) ? 4(3 x ? 5) dx 7 (c) Let u ? 3 x ? 5 du du ? 3 ? dx ? dx 3 7 4u 7 du ? 4(3 x ? 5) dx ? ? 3 4u 8 = ? c 3(8) u8 ? c 6 (3u ? 5)8 = ? c 6 = 2 dx ? ? 2(5 x ? 3) ? 3 dx (5 x ? 3)3 Let u ? 5 x ? 3 du du ? 5 ? dx ? dx 5 ? 3 2u ? 3 du ? 2(5 x ? 3) dx ? ? 5 2u ? 3 = ? c 5(? 2) ? OR 4(3 x ? 5)8 ? c ? 4(3 x ? 5) dx ? 3(8) 7 u ? 2 ? c ? 5 1 = ? 2 5u 1 =? ? c 5(5 x ? 3)2 = = (3x ? 5)8 ? 6 DEFINITE INTEGRALS If d g ( x) ? f ( x) then dx b (a) (b) ? b a b f ( x)dx ? ? g ( x) ? ? g (b) ? g (a) a ? (c ) ? a b f ( x)dx ? ? ? f ( x)dx a b a f ( x)dx ? ? f ( x)dx ? ? f ( x)dx b a c c http://mathsmozac. blogspot. com 17 http://sahatmozac. blogspot. com Evaluate each of the following ( x ? 3)( x ? 3) (a) ? 12 dx x4 1 1 (b) ? 0 dx (2 x ? 1) 2 SOLUTION (a) x2 ? 9 2 ( x ? 3)( x ? 3) ? c ? ? 12 4 dx ? 1 x4 x 2 9 ? 2? x = ? 1 ? 4 ? 4 ? dx x ? ? x = ? 12 ( x ? 2 ? 9 x ? 4 )dx ? x ? 1 ? x ? 3 ? ? =? ? 9? ?? ? ? 3 ? ? 1 ? ? 1 2 2 (b) ? 0 1 1 1 dx ? ? 0 (2 x ? 1)? 2 dx 2 (2 x ? 1) 1 = ? 0 (2 x ? 1) ? 2 dx ? (2 x ? 1) ? 1 ? =? ? ? ? 1(2) ? 0 ? 1 = ?? ? ? 2(2 x ? 1) ? 0 =? ? ? 1 1 ??? ? 2[2(1) ? 1] ? 2[2(0) ? 1] ? 1 1 ? 1 3? = ?? ? 3 ? ? x x ? 1 ? 1 3 ? ? 1 3? =?? ? 3 ? ??? ? 3 ? ? 2 2 ? ? 1 1 ? 1 3 = ? ? ? (? 1 ? 3) 2 8 1 =? ? 2 8 1 =? 2 8 1 ? 1? = ? ??? ? 6 ? 2? 1 = 3 http://mathsmozac. blogspot. com 18 Distributed: 18. 1. 09 Return: 20. 1. 09 INTEGRATE THE FOLLOWING USING SUBSTITUTION METHOD. (1) ? ( x ? 1)3dx (2) ? ? 4 ? 3 x ? 5 ? dx ? 5 (3) ? 1 ? 5 x ? 3? dx 4 1 ? ? (4) ? ? 5 ? x ? dx 2 ? ? ? 3 1 ? ? (5) ? 5 ? 4 ? y ? dy 2 ? ? 4 3? 2 ? (6) ? ? 5 ? u ? du 2? 3 ? 5 19 http://sahatmozac. blogspot. com EXERCISE B 8 1. Evaluate ? 3 ( x3 ? 4)dx Answer : 1023. 75 2. Evaluate Answer: 3 ? ? 3 1 2 x( x ? x ? 5)dx 8 83 96 ? 2 ? 3. Integrate ? x ? 5 ? with respect to x ? 3 ? 4 4. Evaluate ? 1 3 1 ? ? ? 2 ? 3x ? 4 ? dx ? 1 x ? ? 1 Answer: 3 ? 2 ? ? x ? 5? ? c 10 ? 3 ? 5 Answer : 3 5. Evaluate ? 3 1 ? 2 x ? 1?? 2 x ? 1? dx 4 x2 6. Given that of 2 5 ? 5 2 f ( x)dx ? 10 , find the value 5 Answer: 1 6 ? ? 1 ? 2 f ( x)? dx Answer : 17 http://mathsmozac. blogspot. com 20 http://sahatmozac. blogspot. com ASSESSMENT ? 6 and 2. (a) ? 5(2 ? 3v) dv 4 (b) ? dx 5 3 ? 1 ? 5 x ? 1. Given that ? 2 2 1 f ( x)dx ? 3 ? 2 3 f ( x)dx ? ? 7 . Find (a) the value of k if (b) ? ? kx ? f ( x)? dx ? 8 1 ? ? 5 f ( x) ? 1? dx 3 1 Answer : (a) k = (b) 48 22 3 3.

Show that d ? x 2 ? 2 x 2 ? 6 x 4. . ? ?? dx ? 3 ? 2 x ? ? 3 ? 2 x ? 2 4 Given that ? 4 0 f ( x)dx ? 3 and Hence, find the value of Answer : 1 10 ? ? 3 ? 2x ? 0 1 x ? x ? 3? ? 0 g ( x)dx ? 5 . Find 4 0 2 dx . ? f ( x)dx ? ? g ( x)dx (b) ? ? 3 f ( x) ? g ( x)? dx (a) 0 4 0 4 Answer: (a) – 15 (b) 4 http://mathsmozac. blogspot. com 21 http://sahatmozac. blogspot. com SPM QUESTIONS SPM 2003 – PAPER 1, QUESTION 17 1. Given that ? SPM 2004 – PAPER 1, QUESTION 22 k n dx ? k ? 1 ? x ? ? c , 2. Given that ?? 1 ? 2 x ? 3? dx ? 6 , where k ; -1 , find the value of k. [4 marks] ? 1 ? x ? find the value of k and n [3 marks] Answer: k = 5 5 Answer: k = ? =-3 3 5 4 SPM 2005 – PAPER 1, QUESTION 21 6 6 3. Given that ? 2 f ( x)dx ? 7 and ? 2 (2 f ( x) ? kx)dx ? 10 , find the value of k. Answer: k = 1 4 http://mathsmozac. blogspot. com 22 http://sahatmozac. blogspot. com ANSWERS EXERCISE A 1. 3 ( x + 1)4 + c 2. 60 (3 x +5) - 4 + c 3. ? 20 EXERCISE B 1. 1023. 75 ? 5 x ? 3? 3 ? c 2. 3 83 96 5 4. 3? 1 ? ? 5 ? x? ? c 2? 2 ? ? y? ? c ? 6 4 ? 2 3 ? 2 ? 3. ? x ? 5? ? c 10 ? 3 ? 1 3 5 5. 1 6 6. 17 1 ? 5. ? 10 ? 4 ? 2 ? 6. 4. 3 2 ? ? ? 5 ? 5 ? u ? ? c 3 ? ? ASSESSMENT 22 1. (a) k = 3 (b) 48 2. (a) 90(2 – 3v) +c ? 100 (b) (1 ? 5 x) ? 4 ? c 3 3. 1 10 -5 SPM QUESTIONS 1. k = ? 2. k = 5 3. = 1 4 5 3 n=-3 4. (a) – 15 (b) 4 http://mathsmozac. blogspot. com 23 http://sahatmozac. blogspot. com ADDITIONAL MATHEMATICS MODULE 6 INTEGRATION http://mathsmozac. blogspot. com 24 http://sahatmozac. blogspot. com CHAPTER 3 : INTEGRATION Content Concept Map 9. 1 Integration as Summation of Areas page 2 3 4–6 7–8 9 – 11 12 – 14 15 Exercise A 9. 2 Integration as Summation of Volumes Exercise B SPM Question Answer http://mathsmozac. blogspot. com 25 http://sahatmozac. blogspot. com a) The area under a curve which enclosed by x-axis, x = a and x = b is a) The volume generated when a curve is rotated through 360? bout the x-axis is ? ? b a y dx b) The area under a curve which enclosed by y-axis, y = a and y = b is b a Vx ? ? ? y 2 dx a b x dy b) The volume generated when a curve is rotated through 360? about the y-axis is c) The area enclosed by a curve and a straight line ? ? f ( x) ? g ( x)? dx b a Vy ? ? ? x 2 dy a b http://mathsmozac. blogspot. com 26 http://sahatmozac. blogspot. com 3. INTEGRATION 3. 1 Integration as Summation of Area y y = f(x) b a a b 0 The area under a curve which enclosed by x = a and x = b is x 0 x y = f(x) ? b a ydx The area under a curve which is enclosed by y = a and y = b is

Note : The area is preceded by a negative sign if the region lies below the x – axis. ? b a xdy Note : The area is preceded by a negative sign if the region is to the left of the y – axis. The area enclosed by a curve and a straight line y y = g (x) y = f (x) a The area of the shaded region = = b b x ? ? ? f ( x) ? g ( x)? dx a b a a b f ( x)dx ? ? g ( x) http://mathsmozac. blogspot. com 27 http://sahatmozac. blogspot. com 1. Find the area of the shaded region in the diagram. y y = x2 – 2x 2. Find the area of the shaded region in the diagram. y y = -x2 + 3x+ 4 x -1 0 4 0 x http://mathsmozac. blogspot. com 28 http://sahatmozac. logspot. com 3. Find the area of the shaded region y y= 2 4. Find the area of the shaded region in the diagram. y y = x2 + 4x + 4 0 x = y2 x -2 -1 0 2 x http://mathsmozac. blogspot. com 29 http://sahatmozac. blogspot. com 5. Find the area of the shaded region in the diagram y 1 x = y3 - y x 6. y y = ( x – 1)2 0 0 x x= k -1 Given that the area of the shaded region in 28 the diagram above is units2. Find the 3 value of k. http://mathsmozac. blogspot. com 30 http://sahatmozac. blogspot. com 3. 2 Integration as Summation of Volumes y y= f(x) The volume generated when a curve is rotated through 360? about the x-axis is 0 a b x

Vx ? ? ? y 2 dx a b y y= f(x) The volume generated when a curve is rotated through 360? about the y-axis is b a 0 x Vy ? ? ? x 2 dy a b http://mathsmozac. blogspot. com 31 http://sahatmozac. blogspot. com y y= x(x+1) Find the volume generated when the shaded region is rotated through 360? about the x-axis. x 0 Answer : x= 2 ? ? ? y 2 dx 0 2 Volume generated ? ? ? x 2 ? x ? 1? dx 2 2 0 ? ? ? ( x 4 ? 2 x3 ? x 2 )dx 0 2 ? x 5 2 x 4 x3 ? ?? ? ? ? ? 4 3 ? 0 ? 5 2 ?? 25 2(2)4 23 ? ? ? ? ?? ? ? ? ? 0? 5 4 3? ? ?? 256 1 ? ? @ 17 ? units 3 . 15 15 y y ? 6 ? x2 The figure shows the shaded region that is enclosed by the curve y ? ? x 2 , the x-axis and the y-axis. Calculate the volume generated when the shaded region is revolved through 360? about y-axis. 0 Answer : Given y ? 6 ? x 2 substitute x ? 0 into y ? 6 ? x Then, y ? 6? 0 y? 6 2 x Volume generated ? ? ? x 2 dy 0 6 ? ? ? ? 6 ? y ? dx 6 0 ? y2 ? ? ? ? 6 y ? ? 2 ? 0 ? ?? 62 ? ? ?? 6(6) ? 2 ?? ? 18? units 3 . ? ? ? ? 0? ? ? 6 http://mathsmozac. blogspot. com 32 http://sahatmozac. blogspot. com 1. y y = x (2 – x) 0 x The above figure shows the shaded region that is enclosed by the curve y = x (2 – x) and x-axis. Calculate the volume generated when the shaded region is revolved through 360? bout the y-axis. [4 marks] http://mathsmozac. blogspot. com 33 http://sahatmozac. blogspot. com 2. y R (0, 4) Q (3, 4) P (0, 2) y? = 4 (x + 1) 0 x= 3 x The figure shows the curve y ? ( x ? 2) 2 . Calculate the volume generated when the shaded region is revolved through 360? about the x-axis. http://mathsmozac. blogspot. com 34 http://sahatmozac. blogspot. com 3. y R (0, 4) x y ? ? 3? x 0 x= k The above figure shows part of the curve y ? ? 3 ? x and the straight line x = k. If the volume generated when the shaded region is revolved through 1 360? about the x-axis is 12 ? units3 , find the value of k. 2 http://mathsmozac. logspot. com 35 http://sahatmozac. blogspot. com SPM 2003- Paper 2 : Question 9 (b) Diagram 3 shows a curve x ? y 2 ? 1 which intersects the straight line 3 y ? 2 x at point A. y 3 y ? 2x 3y ? 2x x ? y2 ? 1 ? 1 0 x Diagram 3 Calculate the volume generated when the shaded region is involved 360? about the y-axis. [6 marks] http://mathsmozac. blogspot. com 36 http://sahatmozac. blogspot. com SPM 2004- Paper 2 : Question 10 Diagram 5 shows part of the curve y ? y 3 ? 2 x ? 1? 2 which passes through A(1, 3). A(1, 3) y? 0 a) b) Diagram 5 3 ? 2 x ? 1? 2 x Find the equation of the tangent to the curve at the point A. [4 marks] A egion is bounded by the curve, the x-axis and the straight lines x= 2 and x= 3. i) Find the area of the region. ii) The region is revolved through 360? about the x-axis. Find the volume generated, in terms of ? . [6 marks] http://mathsmozac. blogspot. com 37 http://sahatmozac. blogspot. com SPM 2005- Paper 2 : Question 10 In Diagram 4, the straight line PQ is normal to the curve y ? straight line AR is parallel to the y-axis. y x2 ? 1 at A(2, 3). The 2 y? x2 ? 1 2 A(2, 3) 0 R Diagram 4 Find (a) (b) (c) Q(k, 0) x the value of k, [3 marks] the area of the shaded region, [4 marks] the volume generated, in terms of ? when the region bounded by the curve, the y-axis and the straight line y = 3 is revolved through 360? about y-axis. [3 marks] http://mathsmozac. blogspot. com 38 http://sahatmozac. blogspot. com EXERCISE A EXERCISE B 1. 1 1 ? unit 2 15 1. 1 1 units 2 3 5 units 2 6 2. 2. 20 3 6 ? unit 3 5 k ? ? 2 3. 3. 2 2 units 2 3 2 units 2 3 SPM QUESTIONS SPM 2003 Volume Generated ? 52 ? units3 15 4. 24 SPM 2004 i) Area ? 1 units 2 5 49 ? units3 1125 5. 1 units 2 2 k? 4 ii) Volume Generated ? 6. SPM 2005 a) k ? 8 1 b) Area ? 12 units2 3 c) Volume Generated ? 4? units? http://mathsmozac. blogspot. com 39