**ASSESSMENT SCHEDULE**

####  **91577 Apply the algebra of COMPLEX NUMBERS in solving problems**

|  |  |  |
| --- | --- | --- |
| **Achievement**  | **Achievement with Merit**  | **Achievement with Excellence**  |
|  *Apply the algebra of complex numbers in solving problems* involves:• selecting and using methods • demonstrating knowledge of concepts  and terms • communicating using appropriate  representations. |  *Apply the algebra of complex numbers, using relational thinking*, *in solving problems* involves one or more of: • selecting and carrying out a logical  sequence of steps • connecting different concepts or  representations • demonstrating understanding of  concepts • forming and using a model;and also relating findings to a context, or communicating thinking using appropriate mathematical statements. |  *Apply the algebra of complex numbers, using extended abstract thinking, in solving problems* involves one or more of: • devising a strategy to investigate or solve a problem • identifying relevant concepts in context • developing a chain of logical reasoning, or  proof • forming a generalisation;and also using correct mathematical statements, or communicating mathematical insight. |

Sufficiency for each question:

N0: No response, no relevant evidence.

N1: Attempt at ONE question showing **limited knowledge of algebra of complex numbers in solving problems.**

N2: 1 **u**

A3: 2 **u**

A4: 3 **u**

M5: 1 **r**

M6: 2 **r**

E7: 1 **t** with minor errors ignored

E8: 1 **t** with full excellence criteria

**Judgement Statement**

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|  | **Not Achieved** | **Achievement** | **Achievement with Merit** | **Achievement with Excellence** |
| **Score range** | 0 - 6 | 7 - 13 | 14 - 18 | 19 -24 |

| Question ONE | Evidence | Achievement (u) | Merit (r) | Excellence (t) |
| --- | --- | --- | --- | --- |
|  |  | *Apply the algebra of complex numbers in solving problems.* | *Apply the algebra of complex numbers, using relational thinking, in solving problems.* | *Apply the algebra of complex numbers, using extended abstract thinking, in solving problems.*  |
| 1a | ***z2 – 8z + 16 = 16 – 22*** ***(z – 4)2 = - 6******z – 4 = ±i√6*** ***z = 4 ±i√6***  | Correct expression.  |  |  |
| 1b | ***(5 – 2i)(3 – 4i) = 7 – 26i***  | Correct solution.  |  |  |
| 1c |  ***x – k = 25 + x – 10 √x***  ***10√x = 25 + k*** ***√x = 25 + k***  ***10*** ***x = ( 25 + k )2***  ***100***  | Award u if minor error | Award r only forCorrect solution.  |  |
| 1d |  ***Let z rcisθ z3 = - n12*** ***r3cis 3θ= n12 cis(180 + 360n)*** ***r3 = n12 3θ=180 + 360n*** ***r = n4 θ = 60 + 120n******z1 = n4 cis 600******z2 = n4  cis 1800******z3 = n4 cis 3000*** |  Award u if changed correctly into polar form:r3cis 3θ= n12 cis(180+360n)either using degrees or radians.   | Correct solution either using degrees or radians. |  |
| 1e | ***x2 + 8x + 16 = 4(x + p)******x2 + 4x + (16 – 4p) = 0******2 real sols is > 0******16 – 4(16 – 4p) > 0*** ***16 – 64 + 16p > 0*** ***16p > 48*** ***p > 3*** | Award u if***x2 + 8x + 16 = 4(x + p)***is obtained | Award r if student gets quadratic in the form: ***x2 + 4x + (16 – 4p) = 0*** | Correct solution showing correct logical steps with correct mathematical statements. |

| Question TWO | Evidence | Achievement (u) | Merit (r) | Excellence (t) |
| --- | --- | --- | --- | --- |
|  |  | *Apply the algebra of complex numbers in solving problems.* | *Apply the algebra of complex numbers, using relational thinking, in solving problems.* | *Apply the algebra of complex numbers, using extended abstract thinking, in solving problems.*  |
| 2a | (4 + √3) × (5 + √3) = 23 + 9√3(5 – √3 ) (5 + √3) 22 22  | Correct expression.(*reluctantly allow* *23 + 9√3* *22* |  |  |
| 2b | ***w = 6 – 2i correctly placed at (6, -2)******z = 4 – 2i correctly placed at (4, -2)*** | If ***w*** and ***z*** are correctly worked out but not placed on Argand diagram award u | BOTH correctly placed as points on Argand plane = r |  |
| 2c | ***3 + 2i is a root and so is 3 – 2i*** ***Let 3rd root (real) = b******(z – b)(z2 – 6z + 13) = 0******Comparing number terms: -13b = -26******So b = 2******Comparing terms in z2: -8z2 = -kz2******So k = 8*** ***Solutions are 3 ± 2i and 2***  | Award u if theroot 3 – 2i is stated | Correct solution.  |  |
| 2d | ***w = ( x + yi) × (x – 6) – i (y – 8)*** ***(x – 6) + i(y – 8) (x – 6) – i (y – 8)******= x(x – 6) + y(y – 8) + i(y(x – 6) – x(y – 8))***  ***(x – 6)2 + (y – 8)2******If purely imag then Re = 0 so…*** ***x(x – 6) + y(y – 8) = 0*** ***x2 – 6x + y2 – 8y = 0*** ***x2 – 6x + 9 + y2 – 8y+ 16 = 25******or*** ***(x – 3)2 + (y – 4)2 = 25******(Locus is a circle, centre (3, 4) radius 5)***  | Award u for arranging as ***( x + yi)*** ***(x – 6) + i(y – 8)***  | Award r for mult by ***(x – 6) – i (y – 8)******(x – 6) – i (y – 8)******correctly***  | Correct solution.Exceptions z ≠ 6 + 8i or 0 + 0i **not required** for excellence.***Stating that:******“Locus is a circle, centre (3, 4)*** ***radius 5”*** ***is optional.*** **Must get correct equation though.**  |
|  |  |  |  |  |

| Question THREE | Evidence | Achievement (u) | Merit (r) | Excellence (t) |
| --- | --- | --- | --- | --- |
|  |  | *Apply the algebra of complex numbers in solving problems.* | *Apply the algebra of complex numbers, using relational thinking, in solving problems.* | *Apply the algebra of complex numbers, using extended abstract thinking, in solving problems.*  |
| 3a | ***R = f(2) = 20***  | Correct answer required for u |  |  |
| 3b | ***6cis (6θ) = 3cis(4θ)******2cis(2θ)***  | Correct solution. required for u |  |  |
| 3c | ***Let roots = α andβ******So α +β = -6 and αβ = 12******If roots are 4α and 4β******Sum = -24 and product = 16×12 =192******Equ is x2 + 24x + 192 = 0***  | Correct sum and product of roots of original equ required for u | Correct solution required for r |  |
| 3d |  ***z = rcisθ = 2cis(300 )******z5 = 25cis(1500)*** ***= 25( -√3 + i ) = -16√3 + 16i*** **2 2** |  Correct polar form and use of De Moire’s theorem for u  | Correct **exact** solution for r. |  |
| 3e | ***ln (3x – 2) = ln k2*** ***(x – 5)***  ***(3x – 2) = k2*** ***(x – 5)***  ***3x – 2 = k2(x – 5)******3x – 2 = k2x – 5k2******5k2 – 2 = k2x – 3x******5k2 – 2 = x(k2 – 3)******x = 5k2 – 2***  ***k2 – 3***  | Correct 2nd line for u | Correct equ for rNo restrictions needed. |  |

| Question THREE | Evidence | Achievement (u) | Merit (r) | Excellence (t) |
| --- | --- | --- | --- | --- |
|  |  | *Apply the algebra of complex numbers in solving problems.* | *Apply the algebra of complex numbers, using relational thinking, in solving problems.* | *Apply the algebra of complex numbers, using extended abstract thinking, in solving problems.*  |
| 3f | ***Let z = x + iy*** ***x + iy***  ***(x – 4) + iy*** ***x + iy × (x – 4) – iy line 2*** ***(x – 4) + iy (x – 4) – iy******= x(x – 4) + y2 + i( y(x – 4) – yx ) line 3******(x – 4)2 + y2 (x – 4)2 + y2*** ***If Re = Im***  ***x(x – 4) + y2 = y(x – 4) – yx*** ***-4y = x2 – 4x + y2*** ***0 = x2 – 4x + y2 + 4y*** ***8 = x2 – 4x +4 + y2 + 4y + 4******Locus is: (x – 2)2 + (y + 2)2 = 8******Locus is a circle, centre (2, -2) radius √8*** | Award u up to 2ndLine.  | Award r for getting 3rd line | Award t for correct locus.Restrictions (0, 0) and (4, 0) not required for t. |

 **ASSESSMENT SCHEDULE**

####  **91578 Apply DIFFERENTIATION methods in solving problems**

**IN RECENT YEARS, STUDENTS HAVE NOT BEEN ASKED TO DO A 1st or 2nd DERIVATIVE TEST.**

**OBVIOUSLY WE SHOULD BE TEACHING THIS AND I HAVE CHANGED QU 1(c) SO AS TO INCLUDE IT IN THE EXAM THIS YEAR.**

|  |  |  |
| --- | --- | --- |
| **Achievement**  | **Achievement with Merit**  | **Achievement with Excellence**  |
|  *Apply differentiation methods in solving problems* involves*:*• selecting and using methods • demonstrating knowledge of concepts  and terms • communicating using appropriate  representations. |  *Apply differentiation methods, using relational thinking*, *in solving problems* involves one or more of: • selecting and carrying out a logical  sequence of steps • connecting different concepts or  representations • demonstrating understanding of  concepts • forming and using a model;and also relating findings to a context, or communicating thinking using appropriate mathematical statements. |  *Apply differentiation methods, using extended abstract thinking, in solving problems* involves one or more of: • devising a strategy to investigate or solve a problem • identifying relevant concepts in context • developing a chain of logical reasoning, or  proof • forming a generalisation;and also using correct mathematical statements, or communicating mathematical insight. |

Sufficiency for each question:

N0: No response, no relevant evidence.

N1: Attempt at ONE question demonstrating limited knowledge of differentiation techniques

N2: 1 **u**

A3: 2 **u**

A4: 3 **u**

M5: 1 **r**

M6: 2 **r**

E7: 1 **t** with minor errors ignored

E8: 1 **t** with full excellence criteria

**Judgement Statement**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Not Achieved** | **Achievement** | **Achievement with Merit** | **Achievement with Excellence** |
| **Score range** | 0 - 6 | 7 - 13 | 14 - 18 | 19 -24 |

| Question ONE | Evidence | Achievement (u) | Merit (r) |   |
| --- | --- | --- | --- | --- |
|  |  | *Apply differentiation methods in solving problems.* | *Apply differentiation methods, using relational thinking, in solving problems.* | *Apply differentiation methods, using extended abstract thinking, in solving problems.*  |
| 1a | ***yꞌ = tan(x2)×2sinxcosx – sin2x×sec2(x2)×2x*** ***( tan(x2) )2*** | Correct derivative.  |  |  |
| 1b | ***yꞌ = (x – 1)(2x – 1) – (x2 – x + 9) = 0 at st.pt*** ***(x – 1)2******2x2 – 3x + 1 – x2 + x – 9 = 0******x2 – 2x – 8 = 0******(x + 2)(x – 4) = 0******x = -2 , 4*** | Correct derivative = u  | Correct derivative with correct solution = r. |  |
| 1c | ***yꞌ = x × 1 + ln(x) – 3 = 0 at max/min point*** ***x*** ***so ln(x) – 2 = 0*** ***ln(x) = 2*** ***x = e2 ≈ 7.4*** **1st *deriv. test or 2nd deriv. test******yꞌꞌ = 1/x******if x = 7.4******yꞌꞌ > 0 so min***

|  |  |  |  |
| --- | --- | --- | --- |
| ***x*** | ***7*** | ***7.4*** | ***8*** |
| ***yꞌ*** | ***-*** | ***0*** | ***+*** |

 ***min*** | Correct derivative = u  | Correct derivative with ***x = e2*** and either 1st or 2nd deriv. test correct solution = r  |  |
| 1d | ***dy = 3y2 – 12 dx = 3t2 – 27*** ***dt dt******dy = 3t2 – 12*** ***dx 3t2 – 27******if tan is vert denominator = 0******3t2 – 27 = 0 so 3(t2 – 9 ) = 0 t = ±3******If t = 3 y = -9, x = - 54 ( -54, -9)******If t = -3 y = 9, x = 54 (54, 9)*** | Correct dy for u  dx(or just the fact that dx = 0 ) dt  | Correct answer for for r  |  |
| 1e | h = 12 πr2S = 2πr2 + 2πr × 12  πr2 = 2πr2 + 24 rSꞌ = 4πr – 24r – 2  = 4πr – 24 = 0 r2  4πr = 24 r2 r3 = 6 r ≈ 1.24m h ≈ 2.48m π Min S ≈ 29 m2  | Correct S value for u | Correct derivative and r value for r | Correct r and h and min S found for t. |

| Question TWO | Evidence | Achievement (u) | Merit (r) | Excellence (t) |
| --- | --- | --- | --- | --- |
|  |  | *Apply differentiation methods in solving problems.* | *Apply differentiation methods, using relational thinking, in solving problems.* | *Apply differentiation methods, using extended abstract thinking, in solving problems.*  |
| 2a | ***yꞌ = - sin(3x2 – 4) × 6x*** | Correct derivative.  |  |  |
| 2b | ***yꞌ = 2e2x + 4*** ***e2x + 4x******sub x = 0******yꞌ = 6*** | Correct derivative and sub x = 0 to get 6for u |  |   |
| 2c | ***yꞌ = (x2+ x – 2) e same = 0******so x2 + x – 2 = 0 (as ef(x) is always > 0)******(x + 2)(x – 1) = 0******x = - 2, 1*** | Correct . for u | Correct derivative with correct solution for r.  |  |
| 2d |  ***dx = 3cost dy = - 4sint******dt dt******dy = - 4sint******dx 3cost******If t = 450 dy = - 4*** ***dx 3******so grad of normal = + 3*** ***4*** |  Correct grad of tan | Correct grad of normal |  |
| 2e | ***dV = 6 V = 4πr3 A = 4πr3******dt 3*** ***dV = 4πr3 dA = 8πr*** ***dr dr*** ***dA = dA × dr × dV******dt dr dV dt*** ***= 8πr × 1 × 6 = 12 = 12 cm2/s*** ***4πr3 r 20*** ***= 0.6 cm2/s*** | Correct derivatives dV dA dVdr dr dt for u  | Correct chain of derivatives for r | Correct derivatives with correct solution for t  |

| Question THREE | Evidence | Achievement (u) | Merit (r) | Excellence (t) |
| --- | --- | --- | --- | --- |
|  |  | *Apply differentiation methods in solving problems.* | *Apply differentiation methods, using relational thinking, in solving problems.* | *Apply differentiation methods, using extended abstract thinking, in solving problems.*  |
| 3a | ***y = (10 + x5)  1/5******yꞌ = 1 (10 + x5) -4/5 × 5x4*** ***5*** | Correct derivative.  |  |  |
| 3b | ***yꞌ = 4(3x – x2)3 ( 3 – 2x)******sub x = 1 yꞌ = 32 y = 16*** ***equ of tan is of the form y = mx + c*** ***16 = 32 + c*** ***-16 = c******equ of tangent is y = 32x – 16***  | Correct derivative with correct solution.  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 3c | ***y = x4 – 12x2*** ***yꞌ= 4x3 – 24x = 0 at max/min*** ***4x(x2 – 6)= 0******x = 0 and ±√6******yꞌꞌ= 12x2 – 24 = 0 at infl pts*** ***12(x2 – 2) = 0*** ***x = ±√2*** ***concave down if -√2 < x < √2*** | Correct ***yꞌ and***  ***yꞌꞌ*** for u | Some justification For why it is concave down not concave up. ie Sketch graphor a 1st or 2nd deriv. test.Correct solutionfor r.  |  |
| 3d | ***(i) 1 x = 7******2 x = 3, 7 , 11, 15******3 5 < x < 7 and 11 < x < 15******4. x = 5 and x < 3*** ***(ii) 6******(iii) 6******(iv) 3******(v) no lim*** |   4 correct for u  | 6 correct for r |  |
| 3e |  A D  ***x x√2*** ***B d C******d + x + x√2 = 40******d = 40 – x – x√2******Area A = xd + x2*** ***2*** ***A = 40x – x2 – x2√2 + x2*** ***2*** ***dA = 40 – 2x – 2x√2 + x = 0 for max*** ***dx******40 – x – 2x√2 = 0*** ***40 = x ( 1 + 2√2)*** ***x = 40 ≈ 10.45 cm*** ***(1 + 2√2)******AB = 10.45 cm******CD = 14.78 cm******BC = 14.78 cm*** | Correct equ for cross section = u | Correct derivative of equ for A and put equal to zero = r | Correct derivatives with correct solution. Finding max cross-sectional area not required but***max cross section is:≈ 209 cm2*** |

**ASSESSMENT SCHEDULE**

####  **91579 Apply integration methods in solving problems**

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| **Achievement**  | **Achievement with Merit**  | **Achievement with Excellence**  |
|  *Apply integration methods in solving problems* involves*:*• selecting and using methods • demonstrating knowledge of concepts  and terms • communicating using appropriate  representations. |  *Apply integration methods, using relational thinking*, *in solving problems* involves one or more of: • selecting and carrying out a logical  sequence of steps • connecting different concepts or  representations • demonstrating understanding of  concepts • forming and using a model;and also relating findings to a context, or communicating thinking using appropriate mathematical statements. |  *Apply integration methods, using extended abstract thinking, in solving problems* involves one or more of: • devising a strategy to investigate or solve a problem • identifying relevant concepts in context • developing a chain of logical reasoning, or  proof • forming a generalisation;and also using correct mathematical statements, or communicating mathematical insight. |

**PLEASE BE AWARE THAT THIS PAPER DOES NOT INCLUDE SEPARATION OF VARIABLES METHOD FOR DIFFERENTIAL EQUATIONS AND SO SOME DOUBLING UP OF AREA PROBLEMS HAS BEEN NECESSARY.**

Sufficiency for each question:

N0: No response, no relevant evidence.

N1: Attempt at ONE question showing limited knowledge of integration techniques.

N2: 1 **u**

A3: 2 **u**

A4: 3 **u**

M5: 1 **r**

M6: 2 **r**

E7: 1 **t** with minor errors ignored

E8: 1 **t** with full excellence criteria

**Judgement Statement**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Not Achieved** | **Achievement** | **Achievement with Merit** | **Achievement with Excellence** |
| **Score range** | 0 - 6 | 7 - 13 | 14 - 18 | 19 -24 |
| Question ONE | Evidence | Achievement (u) | Merit (r) | Excellence (t) |
|  |  | *Apply integration methods in solving problems.* | *Apply integration methods, using relational thinking, in solving problems.* | *Apply integration methods, using extended abstract thinking, in solving problems.*  |
| 1a | ***-cos(4x) + c*** ***4*** | Correct integration.  |  |  |
| 1b |  ***2*** ***= e2x = e4 – e2 ≈ 23.6*** ***2 1  2 2*** | Correct integration.  |  |  |
| 1c | ***u = x3 + 4x + 3 so du = (3x2 + 4)dx***  = ***ln (u) + c*** ***k*** ***= ln(x3 + 4x + 3)*** ***0*** ***= ln(k3 + 4k + 3) – ln(3)*** | Obtains log function = u | Correct integration with correct solution.  |  |
| 1d |  ***k = k + 1 – x***  ***x*** ***k = (k + 1)x – x2******x2 – (k + 1)x + k = 0***  ***(x – 1)(x – k) = 0******x = 1, k*** A =  ***k***  ***= kx + x – x2 – kln(x)*** ***2 1******= k2 + k – k2 – kln(k) – k + 1 – ½ - ln(1)*** ***2*** ***= k2 – ½ – kln(k)***  ***2*** | Correct intersection  = u | Correct integration evaluated = r |  |
| 1d |  AIntersection points: ***x3 – 4x = x2 – 2x***B ***x3 – x2 – 2x = 0*** ***x(x2 – x – 2) = 0*** ***x(x + 1)(x – 2) = 0******intersection points x = -1, 0, 2***  Area A = cubic – parabola = ) dx) dx ***0*** ***= x4 – x2– x3***  ***4 3 -1*** ***=*** Area B = parabola –cubic ) ***dx*** ***2*** ***= x4 – x2– x3***  ***4 3 0*** ***= – x4 – x2 + x3  = 8*** ***4 3 3*** ***Total area between curves = 3.083 or 37*** ***12*** | Correct intersection for u | Correct idea of area = area under cubic – area under parabola (and vice versa) shown with equations.  | Correct solution showing correct integrations and correct mathematical logic and statements. |
| Question TWO | Evidence | Achievement (u) | Merit (r) | Excellence (t) |
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|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *x* | 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 |
| *f(x)* | 1 | 3 | 7 | 13 | 15 | 11 | 5 | 4 | 2 |
|  | y0 | y1 | y2 | y3 | y4 | y5 | y6 | y7 | y8 |

*A =2 1+ 2 + 4(3 + 13 +11+4) + 2(7+15+5*  *3* *= 120.7* | *Apply integration methods in solving problems.* | *Apply integration methods, using relational thinking, in solving problems.* | *Apply integration methods, using extended abstract thinking, in solving problems.*  |
| 2a | Correct calculation.  |  |  |
| 2b | A =  = ***ln(2)***   | Correct integration = u. accept ln(2k) – ln(k)  | Award r for ***ln(2)*** |  |
| 2c |  ***Intersection points when x2 = x + 6***  ***x2 – x – 6 = 0*** ***(x – 3) (x + 2) = 0*** ***x = 3, -2*** ***A =***  ***3*** ***= x2 + 6x – x3 = 20.83***  ***2 3 -2*** | Correct intersection and correct “idea” integral of line - parabola | Correct integration with correct solution.  |  |
| 2d | ***yꞌ = 12(x – 2) – 3***  ***y = 12 (x – 2) – 2  + c******-2***  ***y = -6 + c*** ***(x – 2)2*** ***Sub x = 3, y = 4 4 = -6 + c so c = 10******y = - 6 + 10*** ***(x – 2)2*** ***Sub x = 4 y = 8.5*** | Correct integration with correct constant. | Correct integration with correct constant and ***y*** value found.  |  |
| 2e | ***Let u = 4x + 1 so du = 4dx******Also u – 1 = 4x so 2x = u – 1***  ***2*** I = = = == = + c= + c | Correct substitution ready to integrate = u | Correct manipulations needed to integrate = r | Correct solution= t Further simplification not necessary. |

| Question THREE | Evidence | Achievement (u) | Merit (r) | Excellence (t) |
| --- | --- | --- | --- | --- |
|  |  | *Apply integration methods in solving problems.* | *Apply integration methods, using relational thinking, in solving problems.* | *Apply integration methods, using extended abstract thinking, in solving problems.*  |
| 3a(i) | .***= 2x2 + 3x + 2ln*|*x*| *+ c*** | Correct integration. **|*x*|** not essential |  |  |
| 3a(ii) | ***= ex*** – ***e – 2x*** + c  2 | Correct integration.  |  |  |
| 3b |  ***yꞌ = 6t2 + 6t + c*** ***sub yꞌ = 2, t = 1 so c = -10******yꞌ = 6t2 + 6t – 10*** ***so y = 2t3 + 3t2 – 10t + d*** ***sub t = 1, y = 3 so d = 8******y = 2t3 + 3t2 – 10t + 8******sub t = 3, y = 59*** | 2 Correct integrations.  | Correct equation for ***y*** and correctly evaluated ***y*** when t = 3 |  |
| 3c | ***y =* 1 *+ 4 best idea*** ***(x + 2)******=*** ***2******= x + 4ln(x + 2)*** ***0******= 2 + 4ln(4) – 4ln(2)******= 2 + 4ln(2)*** ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_******OR let u = x + 2 so x + 6 = u + 4*** ***du = dx*** ***I =*** ***=***  ***4******= u + ln(u) = 4 + 4ln4 – 2 – 4ln2*** 2 ***= 2 + 4ln(2)***   | Correct integration = u  | CorrectIntegration evaluated = r. |  |
| 3d | Need to find equations of curves first.***Hyp is y = 8*** ***x******parab is y = -ax2+ bx******sub(2, 4) 4 = -4a + 2b******sub(4, 2) 2 = -16a + 4b******solving a = ¾ b = 3 ½*** ***parab is y = - ¾ x2 + 3 ½ x******area is*** ***= x -***  ***4******= - x3 + 7x2 – 8ln*|*x*|** 4 4 2≈ 1.45 |  | Finding both equations which is needed in order to do any integration = r | Correct integration= t**|*x*|** not requiredCorrect integration with correct logical steps and correct solution. |