[](http://www.google.co.uk/url?sa=i&rct=j&q=south+lanarkshire+council+logo&source=images&cd=&cad=rja&uact=8&docid=CPztyDuwoEJ_xM&tbnid=XTnaVdkSQHQfCM:&ved=0CAUQjRw&url=https://www.civica.co.uk/articles/217-South-Lanarkshire-Council-drives-efficiencies-with-case-management-upgrade-from-Civica&ei=9bngU7y9M8Ky0QWqm4HACw&bvm=bv.72197243,d.d2k&psig=AFQjCNFXmTQpeBma7hiudBmpA0AOeOIpfQ&ust=1407322984600190)



NATIONAL

QUALIFICATIONS

**MATHEMATICS**

**Advanced Higher**

**Revision Materials**

**Revision Materials**

**Methods Unit**

**Methods in Algebra and Calculus**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Standard derivatives** | |  | **Standard integrals** | |
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**Summations**

(Arithmetic series) ****

(Geometric series) ****

****

**Binomial theorem**

 where 

**Maclaurin expansion**



**De Moivre’s theorem**



**Vector product**



**Matrix Transformation**

Anti-clockwise rotation through an angle,  about the origin, ****

**Methods in Algebra and Calculus Assessment Standard 1.1**

**1.** Express the following in partial fractions.

(a)  (b)  (c)  (d)  (e) 

(f)  (g)  (h)  (i)  (j) 

(k)  (l)  (m)  (n) 

**Methods in Algebra and Calculus Assessment Standard 1.2**

**2.** (Chain Rule) - Differentiate the following with respect to x:

(a)  (b)  (c)  (d) 

(e)  (f)  (g)  (h) 

(i)  (j)  (k)  (l) 

**3.** (Product & Quotient Rules) - Differentiate the following with respect to x:

(a)  (b)  (c)  (d) 

(e)  (f)  (g)  (h) 

**4.** (Trig Functions) - Differentiate the following with respect to x:

(a)  (b)  (c)  (d) 

(e)  (f)  (g)  (h) 

**5.** Use implicit differentiation to find  for each equation below

(a)  (b)  (c)  (d) 

(e)  (f)  (g)  (h) ****

**6.** (a) A curve is defined by the parametric equations  and 

Find the gradient of the curve at the point with parameter 

(b) Find the gradient of the curve defined by the following pair of parametric equations

when :  and 

(c) A curve is given by the parametric equations  and 

Find  in terms of  .

(d) The position of an object at time, , is given by:  and 

Find  in terms of  .

(e) The position of an object at time, , is given by:  and 

Find the rate of change of the object when .

**Methods in Algebra and Calculus Assessment Standard 1.3**

**7.** Find

(a)  (b)  (c)  (d)  (e) 

(f)  (g)  (h)  (i)  (j) 

(k)  (l)  (m)  (n)  (o) 

(p)  (q)  (r)  (s) 

(t)  (u)  (v)  (w) 

**8.** (a) Using the substitution , find 

(b) Using the substitution , find 

(c) Using the substitution , find 

(d) Using the substitution , find 

(e) Using the substitution , find 

(f) Using the substitution , find 

(g) Using the substitution , find 

**9.** Using integration by parts, evaluate

(a)  (b)  (c)  (d) 

(e)  (f)  (g)  (h) 

(i)  (j)  (k)  (l) 

**Methods in Algebra and Calculus Assessment Standard 1.4**

**10.** Find the general solution of the differential equations

(a)  (b)  (c)  (d) 

(e)  (f)  (g)  (h) 

**11.** Find the general solution in the form  of the first order linear differential equations:

(a)  (b)  (c)  (d) 

(e)  (f)  (g)  (h) 

**12**. Find the particular solution of the 2nd order differential equations:

(a)  when  ,  and 

(b)  when  ,  and 

(c)  when  ,  and 

(d)  when  ,  and 

**12**. (continued) Find the particular solution of the 2nd order differential equations:

(e)  when  ,  and 

(f)  when  ,  and 

(g)  when  ,  and 

(h)  when  ,  and 

(i)  when  ,  and 

[*END OF REVISION PAPER*]

**Answers:**

**1 (a)**  **(b)**  **(c)**  **(d)** 

**(e)**  **(f)**  (g) 

**(h)**  **(i)**  **(j)** 

**(k)**  **(l)**  **(m)**  **(n)** 

**2 (a)  , (b) , (c) , (d) **

**(e)  (f)  (g)  (h)  (i) **

**(j)  (k)  (l) **

**3 (a)  (b) **

**(c)  (d)  (e)  (f) **

**(g)  (h) **

**4 (a)  (b)  (c)  (d)  (e) **

**(f)  (g)  (h) **

**5  (a)  (b)  (c)  (d) **

**(e)  (f)  (g)  (h) **

**6 (a)  (b)  (c)  (d)  (e) **

**7 (a)  (b)  (c)  (d)  (e) **

**(f)  (g)  (h)  (i) **

**(j)  (k)  (l)  (m) **

**(n) 1 (o)  (p)  (q)  (r) π**

**(s)  (t)  (u)  (v) **

**(w) **

**8 (a)  (b)  (c)  (d) **

**(e)  (f)  (g) **

**9 (a)  (b)  (c)  (d) **

**(e)  (f)  (g)  (h) **

**(i)  (j)  (k)  (l) **

**10 (a)  (b)  (c)  (d) **

**(e)  (f)  (g)  (h) **

**11 (a)  (b)  (c)  (d) **

**(e)  (f)  (g)  (h) **

**12 (a)  (b)  (c)  (d) **

**(e)  (f)  (g) **

**(h)  (i) **