**2020**

**VCE**

**Mathematical Methods**

**Trial Examination 1**

**Detailed Answers**



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| **Kilbaha Education Publishing**  **PO Box 2227**  **Kew Vic 3101**  **Australia** | **Tel: (03) 9018 5376**  **Fax: (03) 9817 4334**  [**kilbaha@gmail.com**](mailto:kilbaha@gmail.com)  [**https://kilbaha.com.au**](https://kilbaha.com.au) |

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**Question 1**

**a.**  using the chain rule



 M1



 A1

**b.i.** 

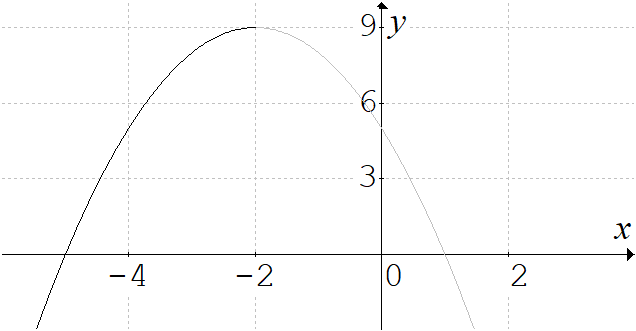
 A1

**ii.** 

 A1

**Question 2**

**a.**  completing the square

for the function *f* to be a one-one function

dom  A1

**b.** 

 ,  M1

take the negative sign, since ran  and dom

to state the function, we must state the domain

 A1

**Question 3**

rearranging to make *y* the subject

 M1

gradients are equal when 

 A1

the *y* intercepts are  and  , when , the *y*-intercepts are equal,

when  or , the *y*-intercepts are different.

**i.** a unique solution, when . A2

**ii.**  infinitely many solutions when .

**iii.**  no solution when  or .

**Question 4**

 , differentiating using the quotient rule



 for stationary points A1

 M1

the coordinate is  A1

**Question 5**

**a.** 

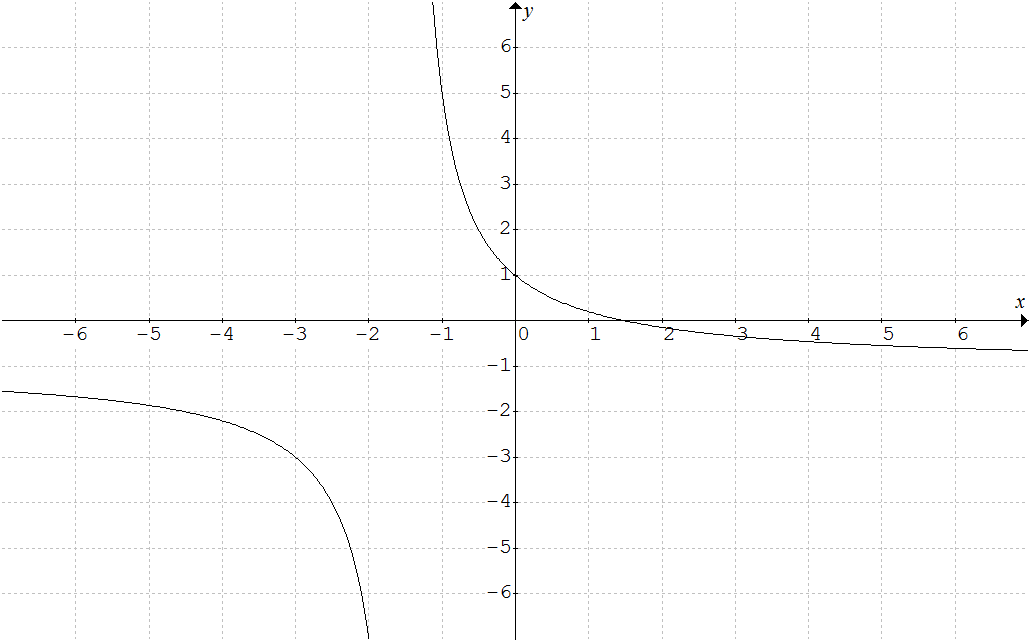
 , domain  A1

**b.** crosses the *x*-axis,  , 

crosses the *y*-axis,  ,

vertical asymptote , horizontal asymptote  G2











**c.** Since the area is below the *x*-axis, the area is



 A1  A1

**Question 6**

**a.** original curve , the image curve

 M1



 , so that  A1

**b.** reflect in the *x*-axis

dilate by a factor of 6 parallel to the *y*-axis ( or away from the *x*-axis )

dilate by a factor of parallel to the *x*-axis ( or away from the *y*-axis ) A2

translate 3 units up, parallel to the *y*-axis ( or away from the *x*-axis )

**c.** , the period , the range is 

endpoints, 

maximum value of 9, occurs when , 

 , . Note that  and ,

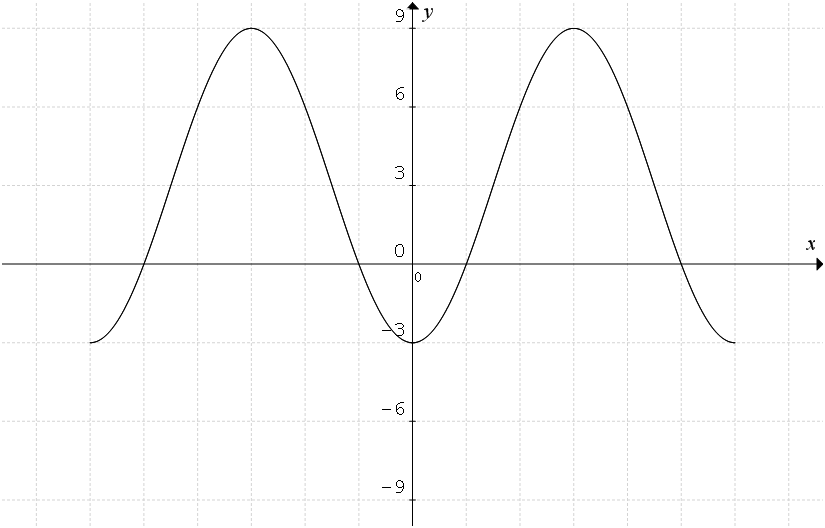
minimum value of  occurs when , 

crosses the *x*-axis when 

 ,  ,  ,  G2





























**Question 7**



|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

## 

A1

since all are probabilities, we require  , **, 

and ** now these are all satisfied for  and , since 

, now  so  M1

and , now  so  so that

 or  A2

**Question 8**

**a.**  using the product rule



 A1

**b.** 

 from part **a.** A1



 A1

**Question 9**



 M1



 A1

 M1



 A1

**Question 10**

**a.** Let , consider the tangent at the point 



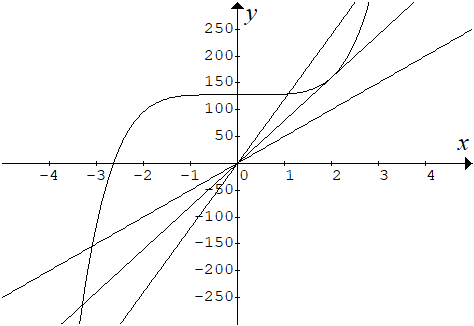
the tangent is 

since this tangent passes through the origin,  and  M1



The tangent which passes through the origin is  A1

**b.** Hence the equation , has exactly



**i.** one real solution when 

**ii.** exactly two real solutions 

**iii.** exactly three real solutions 

**iv.** there are no real values of *k*, A2

for exactly four real solutions.

##### End of detailed answers for the

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