****Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Full Test (Sections 1 and 2)

Total Time: 44 minutes

Total Marks: 39 marks

Student Result \_\_\_\_\_\_\_\_/ 39

**MATHEMATICS METHODS Unit 1**

**TEST 1A -2018**

**Function Definition and Linear Relationships**

**Calculator Free Section**

Time: 17 minutes

Marks: 15 marks

Resources allowed: SCSA Formula Sheet

**Instructions to candidates**

Show all your working clearly. Your working should be in sufficient detail to allow your answers to be checked readily and for marks to be awarded for reasoning. Incorrect answers given without supporting reasoning cannot be allocated any marks**. For any question or part question worth more than two marks, valid working or justification is required to receive full marks.** If you repeat any question, ensure that you cancel the answer you do not wish to have marked.

**Question 1. [2 marks]**

Is the line parallel, perpendicular, or neither, to the line ?

**Question 2. [1, 2, 2 = 5 marks]**

Two points have coordinates and

1. Determine the coordinates of *C*, the mid-point of and .
2. If is the mid-point of and , determine the coordinates of .
3. Find the equation of the straight line passing through and **parallel** to the line segment.

**Question 3. [1 mark]**

Circle the correct answer from the following options.

If then is equal to:

**A** 1 **B** 7 **C** *f(x)* **D**

**Question 4. [1, 2, 4 = 7 marks]**

1. Over the restricted domain of , determine the corresponding range for
2. Complete the table below for the natural domain and range of each function.

|  |  |  |
| --- | --- | --- |
| **FUNCTION** | **DOMAIN** | **RANGE** |
|  |  |  |
|  |  |  |

**** Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**MATHEMATICS METHODS Unit 1**

**TEST 1A -2018**

**Function Definition and Linear Relationships**

**Calculator Assumed Section**

Time: 27 minutes

Marks: 24 marks

Resources allowed:

SCSA Formula Sheet

Up to three Calculators and

One A4 sheet, both sides of notes

**Instructions to candidates**

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**Question 5. [1, 3 = 4 marks]**

Given the lines and ,

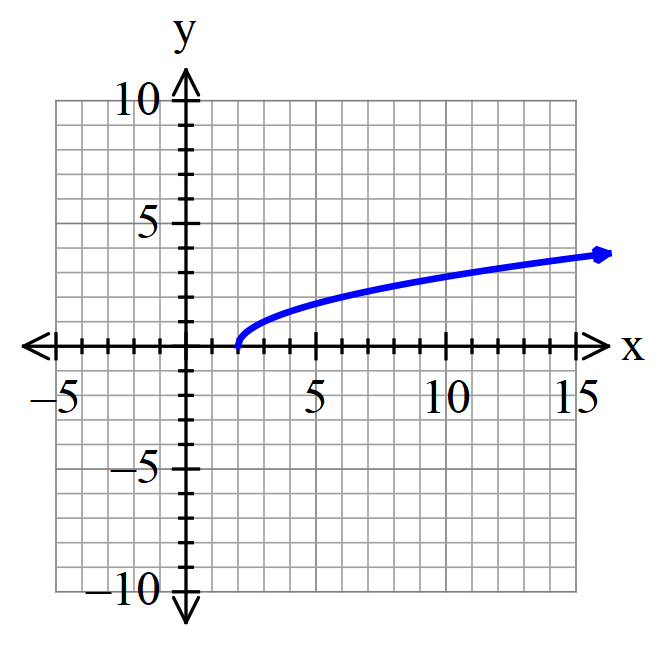
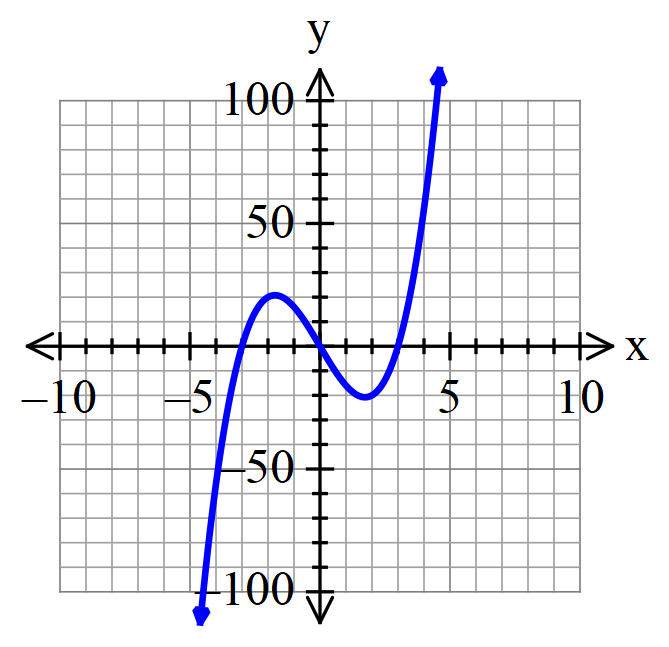
1. Determine point , the point of intersection between and .
2. Find the equation of the line that is perpendicular to passing through point .

**Question 6. [3 marks]**

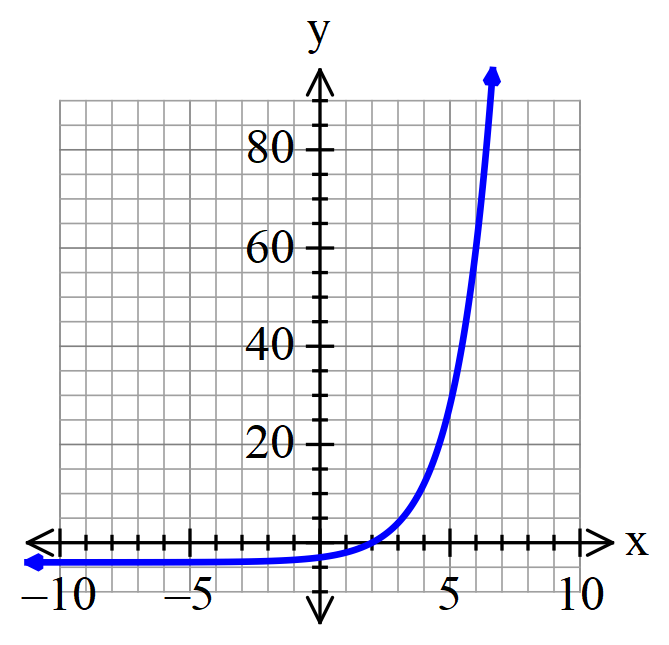
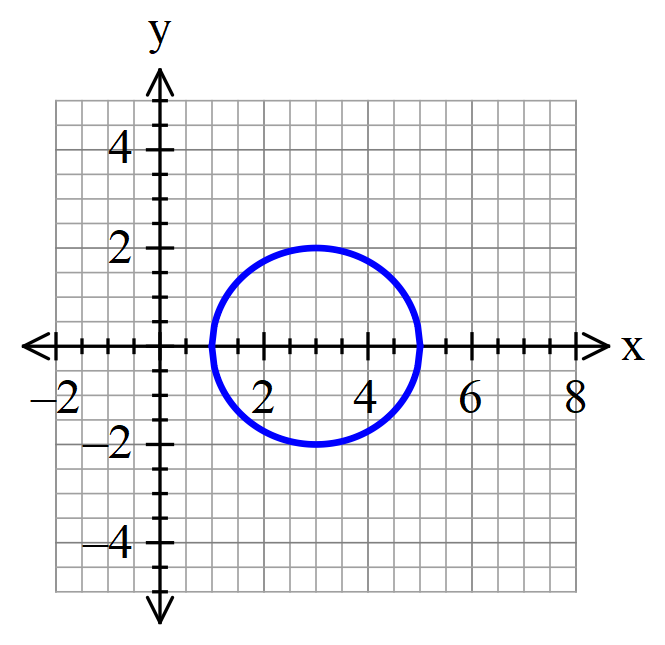
Below are four relationships and their matching graph. Which represent functions?

Of those that are functions, state if they are one-to-one or many-to-one.

a) b)



c) d)



**Question 7. [2, 1, 5 = 8 marks]**

The points and are the vertices of the quadrilateral .

The equation of the diagonal is,

1. Show that the equation of the diagonal is,
2. Find point , the point of intersection of the two diagonals.

1. Show that triangle ADE is a right angled isosceles triangle.

**Question 8. [2, 1, 1 = 4 marks]**

A linear relationship exists between the profit , when operating a tourist bus and , the number of **empty** seats.

A graph of the relationship shows the line passing through points, , of (8, 720) and (21, 486).

If the rule is of the form, ,

1. Calculate and .
2. What is the meaning of the constant term?

1. What is the number of empty seats if no profit is made?

**Question 9. [5 marks]**

Find the value(s) of *k* if is **perpendicular** to

****Name: \_\_\_\_\_\_\_\_**SOLUTIONS**\_\_\_\_\_\_

Full Test (Sections 1 and 2)

Total Time: 44 minutes

Total Marks: 39 marks

Student Result \_\_\_\_\_\_\_\_/ 39

**MATHEMATICS METHODS Unit 1**

**TEST 1A -2018**

**Function Definition and Linear Relationships**

**Calculator Free Section**

Time: 17 minutes

Marks: 15 marks

Resources allowed: SCSA Formula Sheet

**Instructions to candidates**

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**Question 1. [2 marks]**

Is the line parallel, perpendicular, or neither, to the line ?

✓ determines gradient of both line functions

✓ identifies lines are ⊥

**Question 2. [1, 2, 2 = 5 marks]**

Two points have coordinates and

1. Determine the coordinates of *C*, the mid-point of and .

*C* = ✓ determines coordinates correctly

1. If is the mid-point of and , determine the coordinates of .

✓✓ determines each coordinate correctly

1. Find the equation of the straight line passing through and **parallel** to the line segment.

✓ determines gradient of line segment AB

or

✓ determines the correct equation

**Question 3. [1 mark]**

Circle the correct answer from the following options.

If then is equal to:

**A** 1 **B** 7 **C** *f(x)* **D**

✓correct

**Question 4. [1, 2, 4 = 7 marks]**

1. Over the restricted domain of , determine the corresponding range for

✓correct lower and upper bounds

✓correct lower and ✓ upper bounds

1. Complete the table below for the natural domain and range of each function.

|  |  |  |
| --- | --- | --- |
| **FUNCTION** | **DOMAIN** | **RANGE** |
|  | ✓ | ✓ |
|  | ✓ | ✓ |

****Name: \_\_\_\_\_\_\_\_**SOLUTIONS**\_\_\_\_\_\_

**MATHEMATICS METHODS Unit 1**

**TEST 1A -2018**

**Function Definition and Linear Relationships**

**Calculator Assumed Section**

Time: 27 minutes

Marks: 24 marks

Resources allowed:

SCSA Formula Sheet

Up to three Calculators and

One A4 sheet, both sides of notes

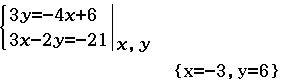
**Instructions to candidates**

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**Question 5. [1, 3 = 4 marks]**

Given the lines and ,

1. Determine point , the point of intersection between and .



✓correct

1. Find the equation of the line that is perpendicular to passing through point .

✓correct gradient of

✓correct gradient of the line ⊥ to

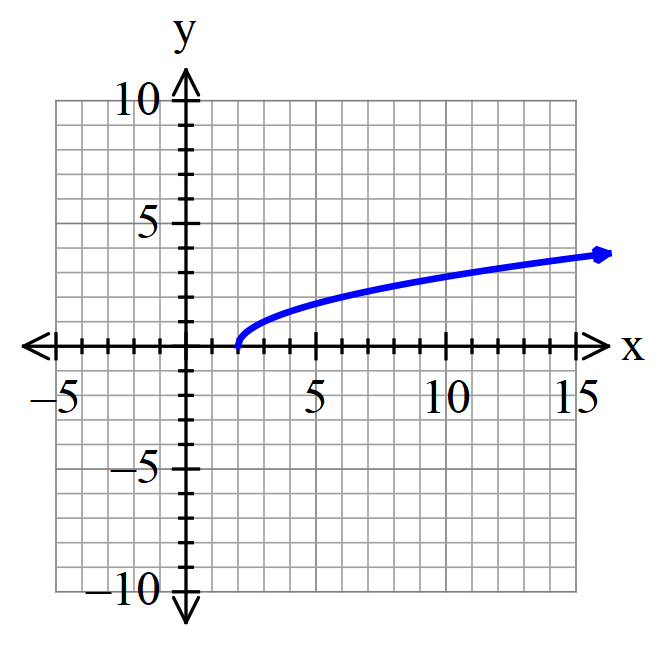
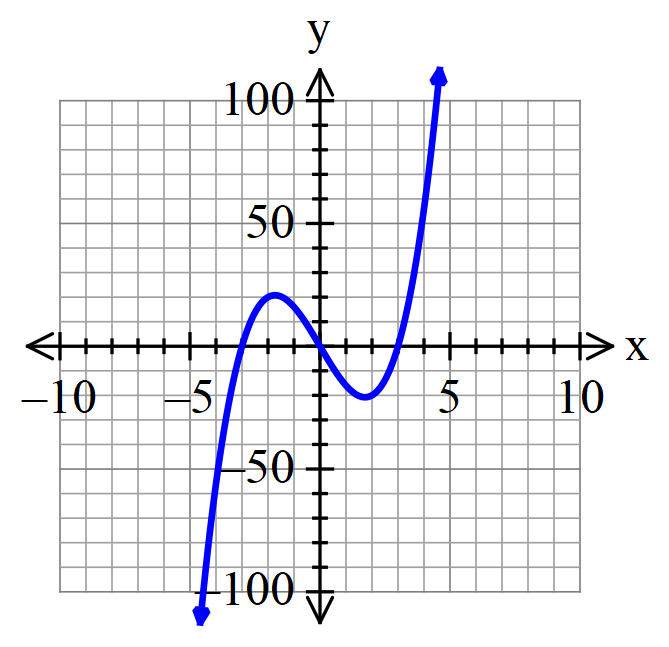
✓correct equation (follow through marks if part a) is different)

**Question 6. [3 marks]**

Below are four relationships and their matching graph. Which represent functions?

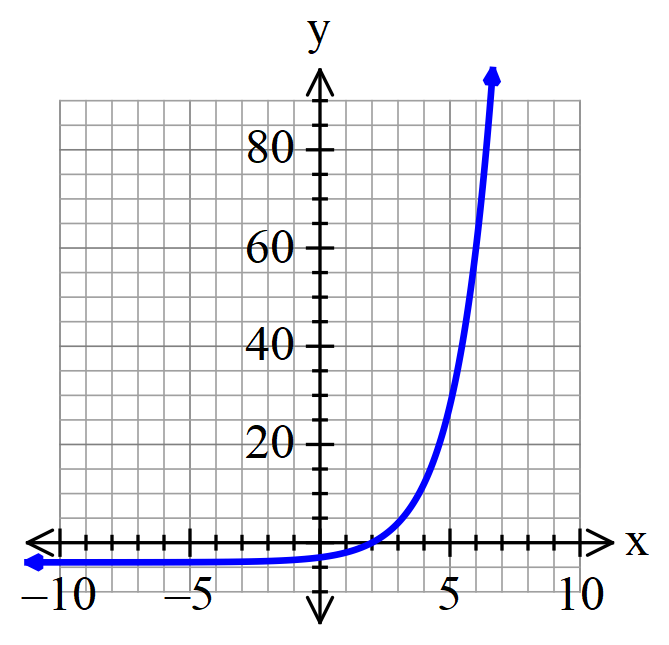
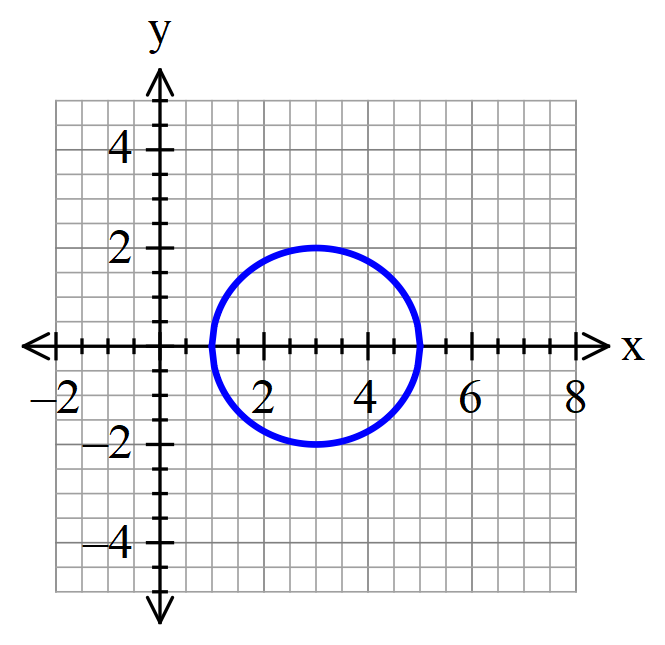
Of those that are functions, state if they are one-to-one or many-to-one.

a) b)



Function: one-to-one ✓correct Function: many-to-one ✓correct

c) d)



Not a function Function: one-to-one ✓correct

**Question 7. [2, 1, 5 = 8 marks]**

The points and are the vertices of the quadrilateral .

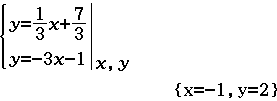
The equation of the diagonal is,

1. Show that the equation of the diagonal is,

✓correct use of gradient formula

✓correctly solves for the y-intercept (0, -1)

1. Find point , the point of intersection of the two diagonals.



✓correct

1. Show that triangle ADE is a right angled isosceles triangle.

Since points and are collinear and points and are collinear, then

✓states the gradients of the sides *AE* and *DE*

Since then ⊥ forming a right angle at vertex of the triangle.

✓shows the sides *AE* and *DE* form a right angle at vertex *E*

units

✓correct use of distance between two points formula

units

✓correct use of distance between two points formula

Since lengths and ⊥ , then triangle is a right isosceles triangle

✓coherent state of proof

**Question 8. [2, 1, 1 = 4 marks]**

A linear relationship exists between the profit , when operating a tourist bus and , the number of **empty** seats.

A graph of the relationship shows the line passing through points, , of (8, 720) and (21, 486).

If the rule is of the form, ,

1. Calculate and .

✓correct value for k

✓correct value for C

1. What is the meaning of the constant term?

The constant term represents the profit when no seats are empty. ✓coherent answer

1. What is the number of empty seats if no profit is made?

Solving

No profit is made when 48 seats are empty. ✓correct

**Question 9. [5 marks]**

Find the value(s) of *k* if is **perpendicular** to

and

✓✓correctly determines the gradient of each line in terms of k

✓equates the gradient of one line with the negative reciprocal of the other

✓✓correctly solves the resulting quadratic for the two solutions