Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_\_Block:\_\_\_\_\_\_

**IB Math Studies**

**Topic: Linear Relations and Functions**

**1.** The diagrams below show the graphs of two functions, *y* = *f*(*x*), and *y* = *g*(*x*).



State the domain and range of

(a) the function *f*;

(b) the function *g*.

(Total 8 marks)

**2.** The equation of the line *R*1 is 2*x* + *y* – 8 = 0. The line *R*2 is perpendicular to *R*1.

(a) Calculate the gradient of *R*2.

(2)

The point of intersection of *R*1 and *R*2 is (4, *k*).

(b) Find

(i) the value of *k*;

(ii) the equation of *R*2.

(4)

(Total 6 marks)

**3.** The coordinates of the vertices of a triangle ABC are A (4 , 3) , B (7, –3) and C (0.5, *p*).

(a) Calculate the gradient of the line AB.

(2)

(b) Given that the line AC is perpendicular to the line AB

(i) write down the gradient of the line AC;

(ii) find the value of *p*.

(4)

(Total 6 marks)

**4.** The straight line, *L*1, has equation *y* = *x* – 2.

(a) Write down the *y* intercept of *L*1.

(1)

(b) Write down the gradient of *L*1.

(1)

The line *L*2 is perpendicular to *L*1 and passes through the point (3, 7).

(c) Write down the gradient of the line *L*2*.*

(1)

(d) Find the equation of *L*2. Give your answer in the form *ax* + *by* + *d* = 0 where *a*, *b*, *d*.

(3)

(Total 6 marks)

**5.**



(a) On the grid above, draw a straight line with a gradient of –3 that passes through the point (–2, 0).

(b) Find the equation of this line.

(Total 8 marks)

**6.** A straight line, *L*1, has equation *x* + 4*y* + 34 = 0.

(a) Find the gradient of *L*1.

(2)

The equation of line *L*2is *y* = *mx*. *L*2is perpendicular to *L*1.

(b) Find the value of *m*.

(2)

(c) Find the coordinates of the point of intersection of the lines *L*1 and *L*2.

(2)

(Total 6 marks)

**7.** The gradients of several lines are as follows:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Line | *a* | *b* | *c* | *d* | *e* | *f* | *g* | *h* |
| Gradient | −3 |  |  | 0.5 |  |  |  | 0.4 |

(a) Find two pairs of lines that are parallel to each other.

(b) Find any two pairs of lines that are at right angles to each other.

(Total 4 marks)

**8.** (a) Consider the numbers 2,  and the sets , , ,and .

Complete the table below by placing a tick in the appropriate box if the number is an element of the set, and a cross if it is not.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
| (i) | 2 |  |  |  |  |
| (ii) |  |  |  |  |  |
| (iii) |  |  |  |  |  |

(3)

(b) A function *f* is given by *f* : *x* 2*x*2 – 3*x*, *x* {–2, 2, 3}.

(i) Draw a mapping diagram to illustrate this function.

(ii) Write down the range of function *f*.

(3)

(Total 6 marks)

**9.** A function is defined as *f* (*x*) = 1 + *x*3 for *x*, –3 *x* 3.

(a) List the elements of the domain of *f* (*x*).

(b) Write down the range of *f* (*x*).

(Total 4 marks)

**10.** *f* : *x* 3*x* − 5 is a mapping from the set *S* to the set *T* as shown below.



Find the values of *p* and *q*.

(Total 2 marks)

**11.** Write down the domain and range of the following functions.

(a)



(b)



(Total 8 marks)