**IB Math SL Year 1 Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Review – Unit 2**

**1.** The diagram shows the parabola *y* = (7 – *x*)(l + *x*). The points *A* and *C* are the *x*-intercepts and the point *B* is the maximum point.



Find the coordinates of *A*, *B* and *C*.

|  |  |
| --- | --- |
| *Working:* |  |
|  | *Answer:*  ...................................................................... |

(Total 4 marks)

**2.** (a) Express *f* (*x*) *= x*2 – 6*x* + 14 in the form *f* (*x*) = (*x* – *h*)2 + *k*, where *h* and *k* are to be determined.

(b) Hence, or otherwise, write down the coordinates of the vertex of the parabola with equation *y* – *x*2 – 6*x* + 14.

|  |  |
| --- | --- |
| *Working:* |  |
|  | *Answers*:  (a) ..................................................................  (b) .................................................................. |

(Total 4 marks)

**3.** Consider the function *f* (*x*) = 2*x*2 – 8*x* + 5.

(a) Express *f* (*x*) in the form *a* (*x* – *p*)2 + *q*, where *a*, *p*, *q*  .

(b) Find the minimum value of *f* (*x*).

|  |  |
| --- | --- |
| *Working:* |  |
|  | *Answers*:  (a) ..................................................................  (b) .................................................................. |

(Total 6 marks)

**4.** The equation *kx*2 + 3*x* + 1 = 0 has exactly one solution. Find the value of *k*.

|  |  |
| --- | --- |
| *Working:* |  |
|  | *Answer*:  .................................................................. |

(Total 6 marks)

**5.** The quadratic function *f* is defined by *f* (*x*) = 3*x*2 – 12*x* + 11.

(a) Write *f* in the form *f* (*x*) = 3(*x* *–* *h*)2 – *k*.

(b) The graph of *f* is translated 3 units in the positive *x*-direction and 5 units in the positive *y*-direction. Find the function *g* for the translated graph, giving your answer in the form *g*(*x*) = 3(*x* – *p*)2 + *q*.

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(Total 6 marks)

**6.** (a) Express y = 2*x*2 – 12*x* + 23 in the form *y* = 2(*x* – *c*)2 + *d*.

The graph of *y* = *x*2 is transformed into the graph of *y* = 2*x*2 – 12*x* + 23 by the transformations

a vertical stretch with scale factor *k* **followed by**

a horizontal translation of *p* units **followed by**

a vertical translation of *q* units.

(b) Write down the value of

(i) *k*;

(ii) *p*;

(iii) *q*.

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(Total 6 marks)

**7.** Consider two different quadratic functions of the form *f* (*x*) = 4*x*2 − *qx* + 25. The graph of each function has its vertex on the *x*-axis.

(a) Find both values of *q*.

(b) For the greater value of *q*, solve *f* (*x*) = 0.

(c) Find the coordinates of the point of intersection of the two graphs.

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(Total 6 marks)

**8.** The function *f* (*x*) is defined as *f* (*x*) = 3 + , *x*  .

(a) Sketch the curve of *f* for −5  *x*  5, showing the asymptotes.

(3)

(b) Using your sketch, write down

(i) the equation of each asymptote;

(ii) the value of the *x*-intercept;

(iii) the value of the y-intercept.

(4)

**9.** Consider the function *f* (*x*) =  + 8, *x*  10.

(a) Write down the **equation** of

(i) the vertical asymptote;

(ii) the horizontal asymptote.

(2)

(b) Find the

(i) *y*-intercept;

(ii) *x*-intercept.

(2)

(c) Sketch the graph of *f* , clearly showing the above information.

(4)

(d) Let *g* (*x*) = , *x*  0.

The graph of *g* is transformed into the graph of *f* using two transformations.

Give a full geometric description of the transformations.

(2)

(Total 10 marks)

10. In the equation , 2 is a root with multiplicity \_\_\_.

a) 0 b) 2 c) 3 d) 1 e) 4

11. Looking at the synthetic division shown, what is the complete factorization of

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 2 | 1 | -6 | 9 | 4 | -12 |
|  |  | 2 | -8 | 2 | 12 |
| -1 | 1 | -4 | 1 | 6 | 0 |
|  |  | -1 | 5 | -6 |  |
| 3 | 1 | -5 | 6 | 0 |  |
|  |  | 3 | -6 |  |  |
|  | 1 | -2 | 0 |  |  |

f(x) = ?

a) (x-2)(x-2)(x+1)(x-3)

b) (x-2)(x+1)(x-3)

c) (x+2)(x+2)(x-1)(x+3)

d) (x+2)(x-1)(x-3)

12. Find the roots of .

a) -1,4,9 b) -3,7,9 c) -1,2,4 d) -3,6,7 e) 1,-4,-9

Find ALL roots of the polynomial given. Leave ALL answers exact (NO DECIMALS!). Show work!

13. g(x) = 

14. Use synthetic division to find the value of k so that the remainder for  is 10.

15. Given f(x) = (x + 6)2(x – 4)5.

a. State the roots and their multiplicity.

b. What is the degree?

c. A polynomial with the same degree as f(x) could have \_\_\_\_ extrema,

d. Without graphing, state the end behavior of f(x).

16. Find the inverse of . Next state the domain and the range.

17. The following table depicts the spending at the National Institute of Health (NIH). Let 1990 be year 0.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Year | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 |
| $ (billions) | 10.3 | 11.0 | 11.3 | 11.9 | 12.7 | 13.6 | 15.6 | 17.9 | 20.5 | 23.6 |

1. Find the quadratic regression:
2. Use your model to estimate when the spending will exceed 30 billion.
3. What does the end behavior of the model suggest about the spending at the NIH?