BECA / Huson / 11.1 IB Math SL Name:
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Homework: Applications of quadratic functions
Write solutions on loose leaf paper. Spread your work out, working down the page. Write clearly.

Exercise 2K

1 The height of a ball t seconds after it is thrown is modeled by the function $h = 15t - 4.9t^2 + 3$, where h is the height of the ball in metres.
- **a** Find the maximum height reached by the ball.
- **b** For what length of time will the ball be higher than 12 metres?

2 The area, A cm^2, of a rectangular picture is given by the formula $A = 32x - x^2$, where x is the width of the picture in centimetres. Find the dimensions of the picture if the area is 252 cm^2.

3 A piece of wire 40 cm long is cut into two pieces. The two pieces are formed into two squares.
- **a** If the side length of one of the squares is x cm, what is the side length of the other square?
- **b** Show that the combined area of the two squares is given by $A = 2x^2 - 20x + 100$.
- **c** What is the minimum combined area of the two squares?

4 A rectangular portrait measures 50 cm by 70 cm. It is surrounded by a rectangular frame of uniform width. If the area of the frame is the same as the area of the portrait, what is the approximate width of the frame?

5 The length of a rectangle is five less than three times its width. Find the dimensions of the rectangle if its area is 782 m^2.

6 The sum of the squares of three consecutive positive odd integers is 251. Find the integers.

Review exercise

1 Solve each equation.

a $(x + 2)^2 = 16$

b $x^2 - 16x + 64 = 0$

c $3x^2 + 4x - 7 = 0$

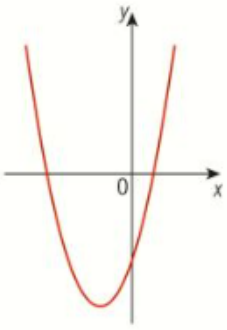
d $x^2 - 7x + 12 = 0$

e $x^2 + 2x - 12 = 0$

f $3x^2 - 7x + 3 = 0$

EXAM-STYLE QUESTION

2 Let $f(x) = x^2 + 3x - 4$. Part of the graph of f is shown.



a Write down the y-intercept of the graph of f.

b Find the x-intercepts of the graph.

c Write down the equation of the axis of symmetry.

d Write down the x-coordinate of the vertex of the graph.

4 Let $f(x) = a(x + 3)^2 - 6$

a Write down the coordinates of the vertex of the graph of f.

b Given that $f(1) = 2$, find the value of a.

c Hence find the value of $f(3)$.

5 The equation $x^2 + 2kx + 3 = 0$ has two equal real roots. Find the possible values of k.

6 Let $f(x) = 2x^2 + 12x + 5$.

a Write the function f, giving your answer in the form $f(x) = a(x - h)^2 + k$.

b The graph of g is formed by translating the graph of f by 4 units in the positive x-direction and 8 units in the positive y-direction. Find the coordinates of the vertex of the graph of g.

7 Write the equation of the quadratic function shown in the graph. Give your answer in the form $y = ax^2 + bx + c$.