Perth Academy National 5 Applications Homework 6

1. (a) £6000 is placed in a deposit account paying 4% compound interest per annum. How much is in the account after 4 years?

   (b) The population of a town is 54000 at present. It is estimated that the population is growing at 3% p.a.
   What is the expected population 5 years from now? Answer correct to two significant figures.

   (c) Another town has population 80000 at present. It is estimated that the population is declining at 2% p.a. What is the expected population 5 years from now? Answer correct to two significant figures.

   (d) The value of the machinery in a factory is £240000 at present, and is depreciating at the rate of 10% p.a.
   The machinery will be replaced at the end of the year when its value falls below £160000.
   How many years before this will happen?

2. (a) A car costs £16000 new. Its value depreciates by 35% in the first year and 20% in each subsequent year.
   Find the value after 3 years, correct to 2 significant figures.

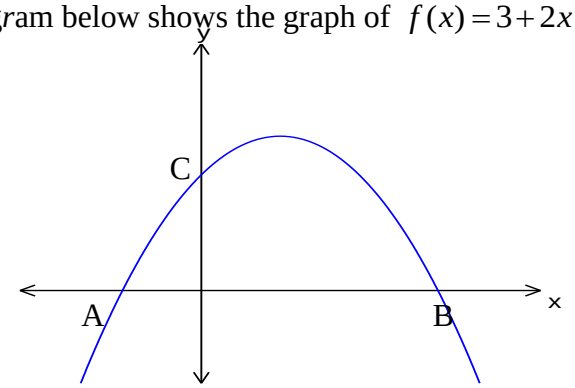
   (b) A piece of art is valued at £4300 at present.
   If its value appreciates at 6% p.a., find the value after 4 years, giving your answer correct to 2 significant figures.

   (c) The value of an investment has fallen by 12% over the last year.
   If it is now worth £7040, what was the value one year ago?

   (d) The value of a piece of electronic equipment depreciates by 10% p.a.
   If it is now valued at £8748, what was its value when new 3 years ago?

   (e) A savings account pays compound interest at a fixed rate of 3% p.a.
   If the account has value £13506·10 at present, how much was deposited 3 years ago?

3. The diagram below shows the graph of $f(x) = 3 + 2x - x^2$.



The graph crosses the *y*-axis at C and the *x*-axis at A and B.

   (a) Find the coordinates of A, B and C.
   (b) Find the equation of the axis of symmetry.
   (c) Find the coordinates of the maximum turning point.

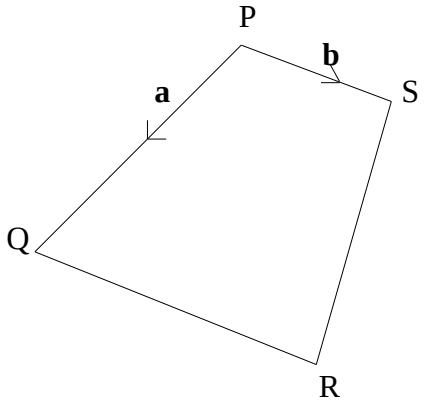
4. A quadratic function has equation $f(x) = (x+1)^2 - 9$.

(a) Write down the equation of the axis of symmetry.
(b) Write down the coordinates of the turning point, stating whether it is a maximum or minimum.
(c) Find the coordinates of the points where the graph crosses the coordinate axes.
(d) Use the above information to sketch the graph of $f(x)$.

5. At the carnival the height H metres, of a carriage on the big wheel above the ground is given by $H = 10 + 5\sin t^{\circ}$, t seconds after starting to turn.

(a) Find the height after 10 seconds.
(b) Find the two times during the first turn when the carriage is $12 \cdot 5$ metres above the ground.

6.



In the diagram $\overrightarrow{PQ}$ represents the vector **a** and $\overrightarrow{PS}$ represents the vector **b**.
$\overrightarrow{QR} = 2\overrightarrow{PS}$. T is the point on QS such that $\overrightarrow{QT} = \frac{2}{3}\overrightarrow{QS}$.

(a) Give expressions in terms of **a** and/or **b** for

(i) $\overrightarrow{QR}$ (ii) $\overrightarrow{PR}$ (iii) $\overrightarrow{QS}$ (iv) $\overrightarrow{QT}$
(v) $\overrightarrow{PT}$

(b) Using your answers to (ii) and (v) show that $\overrightarrow{PT} = k\overrightarrow{PR}$ and evaluate k.

(c) What conclusion can be made about T?

7. (a) On the same coordinate diagram, draw accurate graphs of each of these straight lines.

(i) $y = x + 2$ (ii) $2x + y = -4$

(b) Use your answer to part (a) to solve the simultaneous linear equations

$$y = x + 2$$
$$2x + y = -4$$